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For Robin and Leslie Ann

Editor-in-Chief: Desiree Clinton
Executive Development Manager: Sylvia Maloney
Development Editor: Jane Telfer
Web Development: Melissa Hong
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Production Supervisor: Katherine Watson
Design Managers: Regina Kolenda
Text Design, Electronic Composition, and Project Management:
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Cover Designer: Regina Kolenda
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Manufacturing Coordinator: Hugh Crawford

International Economics: Theory and Policy
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Printed in the United States of America.

WORLD STUDENT SERIES
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The Place of This Book in the Economics Curriculum

Students studying international economics must quickly learn that it is presented in a method of analysis widely held to be in the world economy, rather than in a body of abstract theor- ems about capital models. Our goal has therefore been to stress concepts and their applica- tion rather than theoretical formulas. Accordingly, we have avoided a formal hierarchical approach to the subject, but have not rejected any of the main streams in international economics. Instead we have focused on the main issues and concepts, both theoretical and practical, that characterize the world economy and international economics.

The book begins by introducing the main concepts and issues in international economics. It then proceeds to discuss the major theories and models that are used to analyze the functioning of the world economy. We emphasize the importance of understanding the underlying economic principles that govern international trade and finance, and the role of institutions and policies in shaping the global economy.

We conclude with a discussion of the main challenges facing international economics today, including global imbalances, climate change, and the digital economy.

Some Distinctive Features of International Economics: Theory and Policy

This book differs from traditional textbooks in several ways.

1. It is more focused on policy issues, with fewer technical details.
2. It emphasizes the role of institutions and policies in shaping the global economy.
3. It provides a broader view of the international economic system, including the role of emerging economies.
4. It includes a case study on the crisis in Europe, which is a current and relevant example.
5. It provides a clear and concise overview of the main theories and models used in international economics.

Overall, this book aims to provide a comprehensive and accessible introduction to international economics, suitable for students at all levels.
Preface

microeconomics. The main ingredient of the macroeconomic model we develop in the
interest rate relation (augmented later by risk premiums). Among the topics we address
using the model are exchange rate " overshooting, " behavior of real exchange rates,
balance-of-payment crises under fixed exchange rates, and the causes and effects of capital
inflow in the foreign exchange market.

Increasing Returns and Market Structure

After discussing the role of comparative advantage in promoting trade and gains from
trade, we move to the frontier of research (in Chapter 6) by explaining how increasing
returns and product differentiation affect trade and welfare. The models employed in this
discussion capture significant aspects of reality, such as interindustrial trade and shifts in
trade patterns due to dynamic scale economies. The models show, too, that normally beneficial
trade need not be based on comparative advantage.

Politics and Theory of Trade Policy

Starting in Chapter 3, we stress the effect of power on income distribution as the key politi-
cal factor behind restrictions on free trade. This viewpoint makes it clear to students why the
perceptions of the standard welfare analysis of trade policy relations prevail in practice.
Chapter 11 expands the popular notion that governments should adopt activist trade policies
sacred at ever-varying stages of the economy seen as crucial. The chapter includes a hear-
tonal discussion of such trade policy based on simple ideas from game theory.

International Macroeconomic Policy Coordination

Our discussion of international monetary arrangements (Chapters 18, 19, 20, and 21) stresses
the theme that different exchange rate systems have led to different policy coordination
problems for their members. Just as the competitive goal assumed of the interwar years
drew how beggar-thy-neighbor policies can be self-defeating, the current flot chal-
enges national policymakers to recognize their interdependence and foresees policies
cooperatively. Chapter 19 presents a detailed discussion of the very topical problem of the
current system.

The World Capital Market and Developing Countries

A broad discussion of the world capital market is given in Chapter 21, which takes into
account implications of international portfolio diversification as well as problems of
provincial supervision of offshore financial institutions. Chapter 22 is devoted to the long-term
growth prospects and to the specific macroeconomic stabilization and liberalization prob-
lems of industrializing and newly industrialized countries. The chapter reviews emerging
market access and places in historical perspective the interactions among developing coun-
ytry borrowers, developed country lenders, and official financial institutions such as the
International Monetary Fund.

International Factor Movements

In Chapter 7 we emphasize the potential substitutability of international trade and interna-
tional movement of factors of production. A focus in the chapter is our analysis of interna-
tional borrowing and lending in an international trade, that is, the exchange of present con-
temptions for future consumption. We draw on the results of analysis in the book's second
half to throw light on the macroeconomic implications of the current account.

New to the Sixth Edition

For this sixth edition of International Economics: Theory and Policy, we have extensively
revised several chapters. These changes respond both to new research and to some
important developments on the theoretical and practical sides of international economics.
These new and revised chapters are the following:

Chapter 9, The Political Economy of Trade Policy. This chapter now includes a
section on the role of special-interest groups in shaping political decisions over trade policy.

Chapter 11, Controversies in Trade Policy. A new added chapter that signals to the
reader a coverage beyond in professor's focus on strategic trade policy. In addition, Chapter
11 now covers the recent globalization debate— including the effects of trade on
capital distribution and the environment, as well as the role of international labor standards.

Chapter 12, National Income Accounting and the Balance of Payments

The revised Chapter 12 reflects the new balance of payments accounting conventions
adopted by the United States and other countries.

Chapter 18, The International Monetary System, 1870-1973

This chapter now pays more attention to the political economy of exchange rate regimes, which is an
example the battle over the gold standard that dominated American politics in the late
nineteenth century.

Chapter 19, Macroeconomic Policy and Coordination under Floating
Exchange Rates

We have expanded the detailed two-country model of earlier editions with a brief intro-
duction to the major results on international policy coordination. This chapter allows the
instructor to focus more on important policy issues and less on dry technical details.

Chapter 20, Optimum Currency Areas and the European Experience

As recently as the mid-1960s, Europe's vision of a single currency looked like a distant and
possibly unattainable goal. As of 2002, however, twelve European countries had replaced
their national currencies with the euro, and others are poised to follow. Chapter 20 has been
expanded to cover the first years of experience with the euro.


To make room for more topical material elsewhere in the book, we have reorganized this
chapter by removing the detailed exposition of free-market evolution contained in earlier
editions.
Preface

In addition to these structural changes, we have updated the book in other ways to maintain current relevance. Thus, we extend our coverage of the welfare effects of newly insur- eing countries’ exports on more advanced economies (Chapter 5); we explore the dynam- ic of insurance policy toward the financial sector industry (Chapter 11); we discuss India’s liquidity trap (Chapter 17) and evidence on the effect of currency wars on trade volume (Chapter 20); and we re-examine the collapse of Argentina’s currency in 2001 (Chapter 22).

Learning Features

This book incorporates several special learning features that will maximize students’ interest in the material and help them master its lessons.

Case Studies

Theoretical discussions are often accompanied by case studies that perform the dual role of reinforcing material covered earlier, illustrating its applicability to the real world, and providing important historical information.

Special Boxes

Less central topics that nonetheless offer particularly vivid illustrations of points made in the text are treated in these boxes. Among these are the political bankruptcy of Ricardo’s and Heckscher’s theories (pp. 29 and 34); the surprising social importance of NAFTA’s effect on California’s demand for water (p. 227); the astonishing ability of disputes over human rights to generate economic among countries for too cold to grow any of their own bananas (p. 545); the story of the Bolivian hyperinflation (p. 388) and the 1998 speculative attack on the Mexican pint (p. 566).

Captions for Figures

More than 200 diagrams are accompanied by descriptive captions that reinforce the dis- cussion in the text and help the student in reviewing the material.

Summary and Key Terms

Each chapter closes with a summary recapitulating the major points. Key terms and phrases appear in boldface type where they are introduced in the chapter text and are listed at the end of each chapter. In order to aid the student in reviewing the material, key terms are italicized when they appear in the chapter summary.

Problems

Each chapter is followed by problems intended to test and justify students’ comprehension. The problems range from simple conceptual data to “big picture” questions suitable for classroom discussion. In many problems we ask students to apply what they have learned to real-world data or policy options.

Further Reading

For instructors who prefer to supplement the textbook with outside readings, and for stu- dents who wish to probe more deeply on their own, each chapter has an annotated bibliog- raphy that includes choice classics as well as up-to-date examination of current issues.

Study Guide, Instructor’s Manual, and Web Site

International Economics: Theory and Policy is accompanied by a Study Guide written by Linda S. Goldberg of the Political Science Department of New York, Michael W. Xiros of Tulane University, and Jay C. Sturhahn of Dartmouth College. The Study Guide aids students by providing a review of central concepts from the text, further illustrative examples, and additional practice problems. An Instructor’s Manual, also by Linda S. Goldberg, Michael W. Xiros, and Jay C. Sturhahn, includes chapter overviews, answers to the end-of-chap- ter problems, and suggestions for classroom presentation of the book’s content. The Study- Guide and Instructor’s Manual have been updated to reflect the changes in the third edition.

We are also pleased to recommend the companion Web site to accompany International Economics, Sixth Edition, at www.wiley.com/college/abraham. The site offers students self-check quizzes for each chapter, links to sites of external, and occasional updates on inter- breaking developments. All are in the site for this edition is an annotated PowerPoint pro- gram of the text’s figures and tables, prepared by Karen Low of the University of Florida under the direction of Professor Allen Drazen. The site is located on the Web site of a brand-new, comprehensive Test Prep for the economics, prepared by Yochanan Bruck- man of the City College of the City University of New York, and the University of Texas at Austin. The Test Prep offers a rich array of multiple-choice and essay questions, plus references and graphical problems, for each textbook chapter.

For those interested in course management, a Course Compass Web site is also available. Contact your Addison-Wesley sales representative for details.

Acknowledgments

Our primary debt is to Jane E. Tolls, the development editor, and to Sylvia Millroy and Darile Clark, the economics editor in charge of the project. Jane’s judgment and skill have been reflected in all six editions of this book; we cannot thank her enough for her con- tribution. Heather Johnson’s efforts as project editor are greatly appreciated. We thank the other editors who helped make the last five editions as good as they were.

We owe a debt of gratitude to Gálina Hof, who painstakingly updated data, checked proofs, and critiqued chapters. Anni Wai-Kee Shon provided sterling assistance. For co-author suggestions we thank Nady M. Abou, Daniel Bess, Peter Groppa, Alan M. Taylor, Hans von der, and Mickey Wu. We thank the following reviewers for their recommendations and insights:

Michael Akgun, Brandeis University, U.S.
Dekel Tirosh, Ben-Gurion University, Israel
Adrian Chabudoff, Georgetown University
Barbara Craig, Oberlin College
Robert Driskill, Vanderbilt University
Hugh McKelvey, University of Virginia
Michael Kaying, Towson University

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CHAPTER 1

Introduction

You could say that the study of international trade and finance is where the discipline of economics as we know it began. Historians of economic thought often describe the era "Of the balance of trade" by the Scottish philosopher Adam Smith as the first real exposition of an axiomatic model. Smith published his ideas in 1776, almost 28 years before his friend Adam Smith, published the Wealth of Nations. And the debate over British trade policy in the early nineteenth century still much to convert economies from a discount-rate-deducted to the model-oriented subject it has been ever since.

Yet the study of international economy has never been as important as it is now. As the beginning of the twenty-first century unfolds, we are more closely linked to each other in trade, goods, and services, through flows of money through investments in each other's economies than ever before. And the global economy created thus far is a fertile place for policymakers and business leaders in every country, including the United States, must now take account of what are sometimes rapidly changing economic fortunes halfway around the world.

A look at some basic trade relations gives us a sense of the unprecedented importance of international economic relations. Figure 1-1 shows the levels of U.S. exports and imports to shares of gross domestic product from 1993 to 2006. The more obvious feature of the figure is the sharp upward trend in both shares; international trade has greatly increased in importance compared with the economy as a whole.

Almost as obvious is the fact that both exports and imports have increased, in the last 15 years, far more than the economy, leading to a large surplus of imports over exports. How was the United States able to pay for all those imported goods? The answer is that the money was supplied by large inflows of capital, much invested by foreigners eager to buy a piece of the booming U.S. economy. Inflow of capital on that scale would have been unsustainable, now they are taking a huge hit. And the gap between imports and exports is an indicator of another aspect of growing international finance in that case the growing linkages between equal capital markets.

If international economic relations have become crucial in the United States, they are even more crucial to other nations, Figure 1-2 shows the shares of imports and exports in GDP for a sample of countries. The United States, by virtue of its size and the diversity of its resources, relies less on international trade than almost any other country
Consequently for the rest of the world, international economics is even more important than it is for the United States. This book introduces the main concepts and methods of international economics and illustrates them with applications drawn from the real world. Much of the book is devoted to old ideas that are still as valid as ever: the nineteenth-century trade theory of David Ricardo, and even the eighteenth-century monetary analysis of David Hume remains highly relevant to the twenty-first-century world economy. At the same time, we have made a special effort to bring the analysis up to date. The global economy of the 1990s threw up many new challenges, from the blacklist against globalisation to an unprecedented array of financial crises. Economists were slow to apply existing insights to some of these challenges, but they were also forced to rethink some important concepts. Furthermore, new approaches have emerged to old questions, such as the impact of changes in monetary and fiscal policy. We have attempted to convey the key ideas that have emerged in recent research while retaining the continuing usefulness of old ideas. 

What Is International Economics About?

International economics uses the same fundamental methods of analysis as other branches of economics, because the motives and behavior of individuals are the same in international trade as they are in domestic transactions. Consumers flock to Florida to sell coffee beans from Mexico and Hawaii; the sequence of events that brings these beans to the lips is not very different, and the international trade is not a distant decision. "Why international economics involves new and different concepts, because international trade and investment occur between independent entities. The United States and Mexico are sovereign states, Florida and Hawaii are not. Mexico's coffee prices in Florida could be disrupted if the U.S. government imposed a quota that limits imports. Mexican coffee could suddenly become cheaper to U.S. buyers if the peso were to fall in value against the dollar. Neither of these events can happen in commerce within the United States because the Constitution forbids states from interfering with all U.S. states use the same currency.

The subject matter of international economics, then, consists of issues raised by the special position of economic interaction between sovereign states. Seven chapters cover throughout the study of international economics: the gains from trade, the pattern of trade, protectionism, the balance of payments, exchange rate determination, international policy coordination, and the international capital market.

The Gains From Trade

Everybody knows that some international trade is beneficial—nobody thinks that Norway should grow its own oranges. Many people are skeptical, however, about the benefits of trading for goods that a country could produce for itself. Shouldn't American's buy American goods whenever possible, to help create jobs in the United States?

Probably the most important single insight in all of international economics is that there are gains from trade—that is, when countries sell goods and services to each other, this exchange is almost always to their mutual benefit. The gains of commerce unison are which international trade is beneficial in 2048—very dependent on taste differences. It is a common misconception that trade is harmful if there are large disparities between countries in productivity or wages. In one sense, businesses in less technologically advanced countries,
CHAPTER I Introduction

As such, experts warn that opening their economies to international trade will lead to disparate benefits whose injustices won’t be able to compete. On the other side, people in technologically advanced nations where workers earn high wages often fear that trading with lower-wage economies will drag down their standard of living. One presidential candidate coincidentally warned of a “great sucking sound” if the United States went to ensure a flood of trade agreements. Yet the flow of trade in this book (Chapter 2) demonstrates that two countries can trade to their mutual benefit even when one is more efficient than the other at producing something, and when producers in the less efficient country can compete only by paying lower wages. We’ll also see that trade provides benefits by allowing countries to exploit unique resources whose production makes use of resources that are locally scarce. (Chapter 4.) International trade also allows countries to specialize in generating exports of goods, giving them greater efficiency to large-scale production. Nor are the benefits of international trade limited to trade in tangible goods. International migration and international borrowing and lending are also forms of mutually advantageous trade—the first a smile of labor for goods and services, the second a smile of current goods for the promise of future goods (Chapter 7). Finally, international trade creates a number of risks such as threats and tends to reduce the volatility of its income (Chapter 5). These invisible forms of trade yield gains, not in the trade that puts fresh fruit from Latin America to Toronto markets in February. While usually gaining pain from international trade, however, it is quite possible that international trade may hurt particular groups under certain conditions—other words, that international trade will have strong effects on the distribution of income. The effects of trade on income distribution have long been a concern of international trade theorists, who have pointed out that:

International trade can adversely affect the owners of resources that are “specific” to industries that compete with imports, that is, cannot find alternative employment in other industries (Chapter 3).

Trade can also affect the distribution of income between broad groups, such as workers and the owners of capital (Chapter 4).

These concerns have moved from the classroom into the center of real-world policy debates, as it has become increasingly clear that the real wages of low-skilled workers in the United States have been declining over the years as a whole is continuing to grow richer. Many economists attribute this development to growing international trade, especially the rapidly growing exports and imports of manufactured goods from low-wage countries. Assessing the claim that international trade has been important for economic growth and is a major theme of both Chapters 4 and 5.

The Pattern of Trade

Economists worry about the effects of international trade or recommend changes in government policies toward trade with any confidence unless they know their theory is good enough to exploit the international trade that is actually observed. Thus attempts to explain

the pattern of international trade who seek to explain why goods and services that are made in one country can be sold in another. Some aspects of the pattern of trade are easy to understand. Climate and resource clearly explain why Brazil exports coffee and India exports tea. Much of the pattern of trade is more subtle, however. Why does Japan export automobiles, while the United States exports aircraft? In the early nineteenth century, English economists David Ricardo offered an explanation of trade in terms of international differences in labor productivity. According to this explanation, there is a maximum level of output. labor is one of the factors in the production of different goods on the other hand. Ricardo called this the implications of this theory, however, appear to show that it is less valid that many historians thought. More recently still, some international economists have been interested in areas that suggests a substantial role in explaining the pattern of international trade, themes that are developed in Chapter 6.

How Much Trade?

If the limits of trade from the mid-nineteenth century to the international economy, the theory under debate over how much trade to allow is one more important policy debate. Since the emergence of modern nations-states in the sixteenth century, government have worried about the effects of international competition on domestic industries and have used either to shield industries from foreign competition by placing limits on imports or to help them in world competition by subsidizing exports. The single most consistent message of international economics has been to analyze the effects of these so-called protectionist policies—and usually, though not always, in concrete protectionism and show the advantages of their international trade.

The debate over how much trade to allow such a new direction in the 1990s. Since World War II the advanced democracies, led by the United States, have pursued a broad policy of removing barriers to international trade, this policy reflected the view that free trade was not only for prospectivity but also for promoting world peace. In the first half of the 1990s several major free-trade agreements were negotiated. The most notable was the North American Free Trade Agreement (NAFTA) between the United States, Canada, and Mexico, approved in 1993, and the so-called Uruguay Round agreement establishing the World Trade Organisation in 1994.

Since then, however, an international political movement opposing globalization has gained many adherents. This movement achieved victory in 1999, when demonstrations representing a mix of traditional protectionists and new ideologies disrupted a major international trade meeting in Seattle. If nothing else, the anti-globalization movement has forced advocates of free trade to seek new ways to explain their views. As lexis both the theoretical importance and the current relevance of the protectionist issue, many a question of this book is devoted to this subject. Over the years, international economists have developed a simple yet powerful analytical framework for determining the effects of government policies that affect international trade. This framework not only predicts the effects of trade policies, it also allows cost-benefit analysis and delves into the criteria for determining when government intervention is good for the economy. We present this
in Chapters 8 and 9 and use it to discuss a number of policy issues in these chap-
ters and in the following two.

In the end, however, governments do not necessarily do what the case-benin
analysis of equilibrium tells them they should. This does not mean that analysis is unim-
portant. Economic analysis can help make sense of the politics of international trade policy,
by showing why benefits and who loses from government actions are quite impor-
tant reservation to exporters. The key insight of this analysis is that conflicts of interest within
nations are usually more important in determining trade policy than conflicts of interest
within nations. Chapter 3 and 4 show that trade protection has very strong effects on income
distributions within countries, while Chapter 10, 10, and 11 reveal that the relative power of
different interest groups within countries, rather than state norms of economic rational-
nists, is when the state determines factor in government policies toward international trade.

Balance of Payments

In 1999 both China and South Korea met large trade surpluses, of amount totaling $400 billion. In
China's case the trade surplus was not out of the ordinary—the country had been running
large surpluses for several years, precluding complaints from other countries, including
the United States, that China was playing by the rules. So it is good to read a trade surplus,
and it is not a trade deficit! Not according to the South Koreans. Their trade surplus was
found on them by an economic and financial crisis, and they bitterly resented the accu-
mony of running a surplus.

This complaint highlights the fact that a country’s balance of payments must be viewed
in the context of an economic analysis to understand what it means. Economic theories in a
variety of specific contexts is domestic interdependent on international capital movements (Chapter 7), in
inflation international transactions to national account statements (Chapter 12), and in deriving
value every aspect of international monetary policy (Chapter 16 through 22). Like the problem of globalization, the balance of payments has become a major issue for the
United States because the nation has huge trade deficits in every year since 1981.

Exchange Rate Determination

The case of foreign exchange markets for most of the nations of Western Europe was intro-
nuced on January 1, 1999. On that day the rate was worth about 1.17 United States.
However, as the Euro declined, and in early 2003 it was worth only about 0.85.
This slide was a major embarrassment to European politicians, through many economists
argued that the sliding Euro had been a benefit to the European economy—and that the strong dollar had become a problem for the United States.

A key difference between international economics and other areas of economics is that
countries usually have their own currencies. And in the example of the non-euro exchange
rate fluctuations, the relative value of currencies can change over time, sometimes drastically.

The study of exchange rate determination is a relatively new area of international econ-
omics, for historical reasons. For most of the twentieth century, exchange rates have been fixed
by government action rather than determined in the marketplace. Before World War II, the val-
ues of the world’s major currencies were fixed in terms of gold, while for a gener-
ations after World War II the values of most currencies were fixed in terms of the U.S.
dollar. The analysis of international monetary systems that fix exchange rates remains an
important subject. Chapter 17 and 18 are devoted to the workings of fixed-rate systems. Chapter 19 to
the debate over which system, fixed or floating rates, is better, and Chapter 20 to the eco-
nomics of currency areas such as the European monetary unit. For the time being, how-
over, none of the world’s most important exchange rates fluctuate freely by market and the
role of changing exchange rates remains at the center of the international economics story.

Chapters 13 through 16 focus on the modern theory of floating exchange rates.

International Policy Coordination

The international economic system provides important insights for two major economic and
economic policies. Unfortunately, in an integrated world economy one country’s economic
policies usually affect other countries as well. For example, when Germany’s Bundesbank
raised interest rates in 1999—was it too soon to combat the possible inflationary impact of the
reunification of West and East Germany? It helped precipitate a recession in the rest of
Western Europe. Differences in trade between two countries often lead to conflicts of interests.
Since when countries have similar goals, they may suffer losses if they fail to coordinate
their policies. A fundamental problem is international economics is to try to protect an
acceptable degree of harmony among the international trade and monetary policies of dif-
fferent countries without a world government that tells countries what to do.

For the last 30 years international trade policies have been governed by international
known as the General Agreement on Trade and Tariffs (GATT), multilateral interna-
tional agreements involving dozens of countries at a time have been held. We review
the implications of this system in Chapter 9 and look at whether the reactions of the game for
international trade in the world economy can or should survive.

While dependence on international trade policies in a globally integrated world econom-
ics is a serious problem for countries, this is a more serious topic for the one that has economics formulated at all precisely the case for nation-
wide economic policy coordination. Nonetheless, attempts at international macroeconomic coor-
nication are occurring with growing frequency in the real world. Both the theory of nation-
wide macroeconomic coordination and the developing experience are reviewed in
Chapters 18 and 19.

The International Capital Market

During the 1970s, banks in advanced countries lent large sums to firms and governments in
low-income countries, especially in Latin America. In 1982, however, this out of control credit came
to a sudden and when Mexico, then a member of other countries, found itself unable to
pay the money they owed. The resulting "debt crisis" lasted until 1990. In the 1990s
investor since again because waiting to pay hundreds of billions of dollars into "springing
markets," such as Latin America and in the rapidly growing economies of Asia. All two
bottom, but since countries are now in grade, Mexico experienced another financial
crisis at the end of 1994, and much of Asia was caught up in a massive crisis beginning in
the summer of 1997. The major current history concerns many lessons, the most unde-
termined of which is the growth in size and scope of the international capital market.

This is a weakened capital market in an empire capital markets: a set of arrange-
mements by which individuals and firms exchange their money for promises to pay in the
future. The growing importance of international flows since the 1950s has been accompa-
nied by a growth in the international capital markets, which links the capital markets of individual countries. Thus in the 1970s oil-rich Middle East nations placed their oil-
PART I

International Trade Theory

International Economics: Trade and Money

The economics of the international economy can be divided into two broad subfields: the study of international trade and the study of international money. International trade analy-

International Capital Markets differ in important ways from domestic capital markets. They must cope with special regulations that may restrict access to foreign investment; they also sometimes offer opportunities to earn higher returns on domestic investments. Since the 1960s, huge international capital markets have emerged, most notably the remarkable London Eurodollar market, in which billions of dollars are exchanged each day with-

Some special risks are associated with international capital markets. One risk is that of currency fluctuations. If the yen falls against the dollar, U.S. investors who bought yen bonds suffer a capital loss—as do the yen investors who had assumed that Europe’s new currency would be strong enough to support them. Another risk is that of national default. A nation may simply refuse to pay its debts (perhaps because it cannot), and there may be no effective way to force it to do so.

The growing importance of international capital markets and their new problems demand greater attention than ever before. This book devotes two chapters to issues arising from international capital markets: one on the internationalization of global capital markets (Chapter 21) and one on foreign borrowing by developing countries (Chapter 22).
CHAPTER 2 Labor Productivity and Comparative Advantage: The Ricardian Model

Countries engage in international trade for two basic reasons, each of which contributes to their gain from trade. First, countries trade because they are different from each other. Nations, like individuals, can benefit from their differences by reaching an agreement in which each does the thing it does relatively well. Second, countries trade to achieve economic goals in production. That is, each country produces only a limited range of goods, so each country can produce only so much of each good. The Ricardian model is useful in understanding the causes and effects of trade, and it is useful to look at the simplest models in which only one of these motives is present.

The next three chapters develop tools to help us to understand how differences between countries give rise to trade between them and why the trade is mutually beneficial. The essential concept in this analysis is that of comparative advantage.

Although comparative advantage is a simple concept, experience shows that it is a surprisingly hard concept for many people to understand (or accept). Indeed, Paul Samuelson—the Nobel laureate economist who did much to develop the models of international trade discussed in Chapters 3 and 4—has described comparative advantage as the best example he knows of an economic principle that is undoubtedly true yet not obvious to intelligent people.

In this chapter we begin with a general introduction to the concept of comparative advantage, then proceed to develop a specific model of how comparative advantage determines the pattern of international trade. In

The Concept of Comparative Advantage

On Valentine’s Day, 1995, which happened to be less than a week before the coastal Pea-

A step-by-step model is used to illustrate the concept of comparative advantage. In this model, the United States produces only roses, while South America produces only chocolates. The United States has a comparative advantage in roses, while South America has a comparative advantage in chocolates. The United States can produce more roses per hour than South America can, and South America can produce more chocolates per hour than the United States can. The United States chooses to produce roses and South America chooses to produce chocolates. The resulting exchange is beneficial to both countries.
A country has a comparative advantage in producing a good if the opportunity cost of producing that good in terms of other goods is lower in that country than in other countries.

In this example, South America has a comparative advantage in winter wheat and the United States has a comparative advantage in computers. The amount of labor—measured in both places if South America produces more for the U.S. market, while the United States produces computers for the South American market. We therefore have an essential insight about comparative advantage and international trade: Trade between two countries can benefit both countries if each country exports the goods in which it has a comparative advantage.

This is a statement about possibilities, not about what will actually happen. In the real world, there is no central authority dictating which country should produce more of which good and which should produce the other goods. Nor is there anyone forcing producers to choose their competitors in both places. Instead, comparative advantage is determined in the marketplace, where supply and demand rule. It can vary, so that it is not possible to say in advance that a particular good will be produced in one country and the other in the other. Will the trade that actually occurs make both countries better off?

To answer these questions, we must be much more explicit about our analysis. In this chapter, we will develop a model of international trade originally developed by the British economist David Ricardo, who introduced the concept of comparative advantage in the early nineteenth century. The approach, in which international trade is solely due to international differences in the productivity of labor, is known as the Ricardo model.

6. One-Country Economy

To introduce the idea of comparative advantage, in determining the terms of international trade, we begin by imagining that we are dealing with an economy — which we call Home — that has only one factor of production: labor. In later chapters we extend the analysis to include in which there are several factors. We imagine that only two goods, wine and cheese, are produced. The technology of Home’s economy is characterized by labor productivity, in which industry, expressed in terms of the unit labor requirement, the number of laborer’s hours required to produce a pound of cheese or a gallon of wine. For example, it might require 1 hour of labor to produce a pound of cheese, 4 hours to produce a gallon of wine. For this reason, we refer to $a_w$ and $a_g$ as the unit labor requirements in wine and cheese production, respectively. The economy’s total resources are defined as $L$, the total labor supply.

Possible Production Possibilities

Because any economy has limited resources, there are limits on what it can produce. Those trade-offs are illustrated graphically by a production possibility frontier (line PP in Figure 2.1), which shows the maximum amounts of wine and cheese that can be produced once the decision has been made to produce relatively fewer amounts of cheese and vice versa. When there is only one factor of production, the production possibility frontier of an economy is simply a straight line. We can observe this line as follows. If $Q_C$ is the economy’s production of cheese and $Q_W$ is production of wine, then the labor used in producing wine will be $a_wQ_w$, and the labor used in producing cheese $a_gQ_C$. The production possibility frontier is determined by the limits on the economy’s resources — in this case, labor. Because the economy’s total labor supply is $L$, the limits on production are defined by the inequality

$$a_wQ_w + a_gQ_C = L$$

(2.1)

When the production possibility frontier is a straight line, the opportunity cost of a pound of cheese in terms of wine is constant. As we saw in the previous section, this opportunity cost is defined as the number of gallons of wine the economy would have to give up in order to produce an extra pound of cheese. In this case, to produce another pound would require $a_w$ hours of labor. Each of these hours could have been used to produce $a_w$ gallons of wine. Thus the opportunity cost of cheese in terms of wine is $a_g/a_w$. For example, if it takes one person-hour to make a pound of cheese and two hours to produce a gallon of wine, the opportunity cost of cheese in terms of wine is one half. As Figure 2.1 shows, this opportunity cost is equal to the absolute value of the slope of the production possibility frontier.
PART I International Trade Theory

Relative Prices and Supply

The production possibility frontier illustrates the different mixes of goods the economy can produce. To determine what the economy will actually produce, however, we need to look at prices. Specifically, we need to know the relative price of the economy's two goods, that is, the price of one good in terms of the other.

In a competitive economy, supply decisions are determined by the incentives of individual producers maximising their earnings. In our simplified economy, more labor is the only factor of production, the supply of cheese and wine will be determined by the movement of labor to whichever sector pays the higher wage.

Let \( P_c \) and \( P_w \) be the prices of cheese and wine, respectively. It takes \( a_{c,l} \) labor hours to produce a pound of cheese; since there are no profits in our one-factor model, the hourly wage in the cheese sector will equal the value of what a worker can produce in an hour: \( P_c a_{c,l} \). Similarly, \( a_{w,l} \) labor hours are required to produce a gallon of wine; the hourly wage in the wine sector will thus be \( P_w a_{w,l} \). In the cheese sector, labor will be hired until \( P_c a_{c,l} = P_w a_{w,l} \) or wages in the cheese sector is higher, while in the wine sector, wages will be higher if \( P_w a_{w,l} > P_c a_{c,l} \), meaning everyone will want to work in the cheese industry iff the higher wage, the economy will specialise in the production of cheese iff \( P_c a_{c,l} > P_w a_{w,l} \), it will specialise in the production of wine if \( P_w a_{w,l} < P_c a_{c,l} \). Only when \( P_w a_{w,l} = P_c a_{c,l} \) will both goods be produced.

What is the significance of the number \( a_{c,l}/a_{w,l} \)? We see in the previous section that it is the opportunity cost of cheese in terms of wine. We have therefore just derived a crucial proposition about the relationship between prices and production: The economy will specialise in the production of cheese if the relative price of cheese exceeds its opportunity cost; it will specialise in the production of wine if the relative price of cheese is less than its opportunity cost.

In the absence of international trade, Home would have to produce both goods for itself. But it will produce both goods only if the relative price of cheese is just equal to its opportunity cost. Since opportunity cost equals the ratio of total labor requirements in cheese and wine, we can summarise the determination of prices in the absence of international trade with a simple labor theory of value: In the absence of international trade, the relative prices of goods are equal to their relative unit labor requirements.

Trade in a One-Factor World

To describe the patterns and effects of trade between two countries when each country has only one factor of production, we need to use the trade model introduced above. The implications of this analysis can be surprising. Indeed, to those who have not thought about international trade many of these implications seem to conflict with common sense. This simple model of trade can have some important guidance on real-world issues, such as what countries make in international trade or how they trade and how they manage their trade policies. Before we begin to look at the implications of this analysis, we need to make some assumptions. We assume there are two countries. Each country has the same factor of production (labor) and can produce two goods: cheese and wine. As before, the labor force in Home is its only labor supply in cheese and wine production by \( a_{c,l} \) and \( a_{w,l} \), respectively. For Foreign, we will use a different notation throughout this book. Wherever we refer to some aspect of Foreign, we will use the same symbol that we use for Home, but with an asterisk. Thus Foreign's labor force will be denoted by \( L^* \). Foreign's unit labor requirements in wine and cheese will be denoted by \( a_{c,l}^* \) and \( a_{w,l}^* \), respectively, and so on.

In general the unit labor requirements can take any pattern. For example, Home could be less productive than Foreign in wine but more productive in cheese, or vice versa. For the moment, we make only one arbitrary assumption that

\[ a_{c,l}^* < a_{c,l} \]

or, equivalently,

\[ a_{c,l} a_{w,l}^* < a_{c,l} a_{w,l} \]

In words, we are assuming that the ratio of the labor required to produce a pound of cheese to the labor required to produce a gallon of wine is lower in Home than it is in Foreign. More briefly still, we are saying that Home's relative productivity in cheese is higher than it is in wine.

But remember that the ratio of unit labor requirements is equal to the opportunity cost of cheese in terms of wine and remember also that we defined comparative advantage precisely in terms of such opportunity costs. So the assumption about relative productivity embodied in equation (2.1) and (2.2) amounts to saying that Home has a competitive advantage in cheese.

One point should be noted immediately: The condition under which Home has this comparative advantage involves all four unit labor requirements, not just two. You might think that to determine who will produce cheese, all you need to do is compare the two countries' unit labor requirements in cheese production, \( a_{c,l} \), and \( a_{c,l}^* \). But \( a_{c,l} < a_{c,l}^* \) Home labor is more efficient than Foreign in producing cheese. When and where country can produce a unit of good with less labor than another country, we say that the first country has an absolute advantage in producing that good. In our example, Home has an absolute advantage in producing cheese.

What we want to ask in our model, however, is how we can determine the patterns of trade from absolute advantage alone. One of the most important sources of error in choosing international trade is to confuse comparative advantage with absolute advantage.

Given the labor forces and the unit labor requirements in the two countries, we can draw the production possibility frontier for each country. We have already done this for Home, by drawing \( FF \) in Figure 2.1. The production possibility frontier for Foreign is shown as \( FF^* \) in Figure 2.2. Since the slope of the production possibility frontier equals the opportunity cost of cheese in terms of wine, Foreign's frontier is steeper than Home's.

In the absence of trade the relative prices of cheese and wine in each country would be determined by the relative unit labor requirements. Thus, in Home the relative price of cheese would be \( 1/a_{w,l} \) and in Foreign it would be \( 1/a_{w,l}^* \).

Once we allow for the possibility of international trade, however, prices will no longer be determined purely by domestic considerations. If the relative price of cheese is higher in Foreign than in Home, it will be profitable to move cheese from Home to Foreign and to ship
PART I  International Trade Theory

Chapter 2  Labor Productivity and Comparative Advantage

Comparative Advantage in Practice: The Case of Babe Ruth

Everyone knows that Babe Ruth was the greatest slugger in the history of baseball. Only two faces of the sport exist, however; Ruth also was one of the greatest pitchers of all time. Because Ruth stopped pitching after 1918 and played outfield during all the time he was not the loudest batter in the major leagues, most people don’t realize that he even could pitch. What explains Ruth’s legendary reputation as a hitter? The answer is provided by his principle of comparative advantage.

As a player with the Boston Red Sox early in his career, Ruth certainly had an absolute advantage in pitching. According to historian Geoffrey C. Ward and filmmaker Ken Burns:

In the Red Sox’s greatest years, he was their greatest player, the best left-handed pitcher in the American League, winning 89 games in his career. In 1911, he got his first chance to pitch in the World Series and made the most of it. After giving up a run in the first, he struck out the side two more times, and the Boston Red Sox went on to win the World Series in six games.

The Red Sox moved him to center field in 1912 so that he could be more frequently at the plate. The payoff for having Ruth specialize in hitting was huge. In 1918 he hit 39 home runs, more than any player ever to hit in a single season, according to Ward and Burns. The Washington Senators hit the outfields and at the plate after they acquired him in 1919. They knew a good thing when they saw it. This year, Ruth hit 34 home runs, set a new World Series record with 12 of them that ended unassisted in the first, and turned the Yankee into baseball’s most renowned free swinger.


Ruth’s career preceded the development later in the 20th century of National League pitchers today, such as Tom Seaver.

wine from France to America. This career can go on indefinitely, however. Eventually, House will export enough cheese and France enough wine to equalize the relative price. But what determines the level at which that price settles?

Determining the Relative Price after Trade

Prices of internationally traded goods, like other prices, are determined by supply and demand. In discussing comparative advantage, however, we must apply supply-and-demand analysis carefully. In some cases, such as some of the trade policy analysis in Chapters 8 through 11, it is acceptable to focus only on supply and demand in a single market. In assessing the effects of U.S. export quotas on sugar, for example, it is reasonable to use partial equilibrium analysis, that is, to study a single market, the sugar market. When we study comparative advantage, however, it is crucial to keep track of the relationships between markets (in our example the markets for wine and cheese). Since House exports cheese only in return for imports of wine, and Foreign exports wine in return for cheese, it can be misleading to look at the cheese and wine markets in isolation. What is needed is general equilibrium analysis, which tracks accounts of the linkages between the two markets. One useful way to keep track of two markets at once is to focus not just on the quantities of cheese and wine supplied and demanded but also on the relative supply and demand, that is, on the number of pounds of cheese supplied or demanded divided by the number of gallons of wine supplied or demanded.

Figure 2.1 shows world supply and demand for cheese relative to wine as functions of the price of cheese relative to that of wine. The relative demand curve is indicated by RD; the relative supply curve is indicated by RS. World general equilibrium requires that relative supply equal relative demand, and thus the world relative price is determined by the intersection of RD and RS.

The striking feature of Figure 2.1 is the funny shape of the relative supply curve. RS is a "step" with the sections linked by a vertical section. Once we understand the derivation of the RS curve, we will be almost home-free in understanding the whole model.

First, at the origin, the RS curve shows that there is no supply of cheese if the world price drops below $a_0/\alpha_0$. To see why, recall that we showed that House will specialize in the production of wine whenever $P_W < a_0/\alpha_0$. Similarly, Foreign will Specialize in wine production whenever $P_W > a_0/\alpha_0$. At the start of our discussion of equations (2.1) we made the assumption that $a_0/\alpha_0 > 0$. See at relative prices of cheese below $a_0/\alpha_0$, there will be no world cheese production.

Because Foreign’s relative unit labor requirements in cheese is higher than House’s it needs to give up many more units of wine to produce one more unit of cheese, its production possibility frontier is steeper.

Figure 2.1 World Supply and Demand for Cheese Relative to Wine, $Q_C$ in pounds.

Foreign wine, $P_W = MC$ in pounds.

Foreign cheese production, $Q_C$ in pounds.
The RD and AD curves show the demand for cheese relative to the price of cheese. The RD curve shows the relative supply of cheese and the AD curve shows the relative demand for cheese. The equilibrium point is where the two curves intersect. The price and quantity of cheese at this point are determined by the market forces of supply and demand.

The relative price of cheese, $P_{cheese}/P_{wine}$, is exactly $d_{cheese}/d_{wine}$, showing that the workers in Home can exactly make the same amount of cheese or wine. So Home will be willing to supply any relative amount of cheese and wine in the supply curve. The relative price of cheese is equal to the slope of the supply curve at any given point. The relative demand for cheese is equal to the slope of the demand curve at any given point. The relationship between the relative price of cheese and the relative demand for cheese is given by:

$$\frac{d_{cheese}}{d_{wine}} = \frac{P_{cheese}}{P_{wine}}$$

As $P_{cheese} = d_{wheat}$, we know that Foreign workers are indifferent between producing cheese and wine. Thus here we again have a flat section of the supply curve.

Finally, for $P_{cheese} > d_{wheat}$, both Home and Foreign will specialize in cheese production. There will be no wine production, so that the relative supply of cheese will become infinite.

The relative demand curve RD does not require such exhaustive analysis. The downward slope of RD reflects substitution effects. As the relative price of cheese rises, consumers will tend to purchase less cheese and more wine, so that the relative demand for cheese will become infinite.

The equal-income relative price of cheese is determined by the intersection of the relative supply and relative demand curves. Figure 2-8 shows a relative demand curve RD that intersects the RS curve at point 1, where the relative price of cheese is equal to the two countries' perfect prices. In this case each country specializes in the production of the good in which it has a comparative advantage: Home produces only cheese, Foreign only wine.

This is true, however, only up to a point. If the relative RD curve were RD', the relative supply and relative demand would intersect on one of the horizontal sections of RS at point 2. If the relative price of cheese were equal to $d_{wheat}$, then it would be inefficient to produce wine. In this case, the production of wine would be zero, and the relative price of cheese would be infinite. In this case, Home specializes in cheese production, and Foreign specializes in wine production. This is the condition for the existence of a two-country model of the world economy, where each country produces only one good.

The effect of this convergence on relative prices is that each country specializes in the production of the good in which it has the relatively lower unit labor requirement. The rise in the relative price of cheese in Home will lead Home to specialize in the production of cheese, producing at point $P$ in Figure 2-8. The fall in the relative price of cheese in Foreign will lead Foreign to specialize in the production of wine, producing at points $P'$ in Figure 2-8.

The Gains From Trade

We have now seen that countries whose relative labor productivity ratio across industries will specialize in the production of different goods. We now show that both countries can derive gains from trade from this specialization. This mutual gain can be demonstrated in two alternative ways.

The first way to show that specialization and trade are beneficial is to think of trade as an indirect method of production. Home could produce wine directly, but trade with Foreign allows it to "buy" wine by producing cheese and then trading the cheese for wine. This indirect method of "buying" a gallon of wine is a more efficient method than direct production. Consider two alternative ways of using 1 hour of labor: On one side, Home could use the hour directly to produce 1 bushel of wheat. On the other side, Home could use the hour to produce 1,000 pounds of cheese. This cheese could then be traded for wine, with each pound trading for $P_{cheese}/P_{wine}$, our original hour of labor yield (1,000) ($P_{cheese}/P_{wine}$) gallons of wine. This will be more wine than the hour could have produced directly, as long as:

$$\frac{d_{cheese}}{d_{wine}} = \frac{P_{cheese}}{P_{wine}} > 1$$

or

$$P_{cheese}/P_{wine} > d_{wheat}$$

But we just saw that in an international equilibrium, if neither country produces both goods, we must have $P_{cheese}/P_{wine} = d_{wheat}$. This shows that Home can "produce" wine more efficiently by making cheese and trading it more by producing wine directly for itself. Similarly,
A striking feature of the table is that Home has lower unit labor requirements, that is, for given labor productivity, both industries, let us leave this observation for a moment, however, and focus on the pattern of trade.

The first thing we need to do is determine the relative price of cheese, $P_C/P_W$. While the actual relative price depends on demand, we know that it must lie between the opportunity cost of cheese in the two countries. In Home, we have $n_{CH} = 1$, $n_{CH} = 2$, so the opportunity cost of cheese in terms of wine is $n_{W} = n_{W} = 1/2$. In Foreign, $n_{W} = 6$, $n_{W} = 3$, so the opportunity cost of cheese is 2. In world equilibrium, the relative price of cheese must be between these values. For example, we assume that in world equilibrium a pound of cheese fetches a gallon of wine on world markets so that $P_C/P_W = 1$.

If a pound of cheese sells for the same price as a gallon of wine, both countries will specialize. It takes only half as many person-hours to produce a pound of cheese as it takes to produce a gallon of wine (3 versus 6) so Foreign workers can earn more by producing cheese, and Home will specialize in cheese production. Conversely, it takes twice as many Foreign person-hours to produce a pound of cheese as it takes to produce a gallon of wine (6 versus 3), so Foreign workers can earn more by producing wine, and Foreign will specialize in wine production.

Let us consider that this pattern of specialization can arise from trade. First, we want to show that Home can "produce" wine more efficiently by making cheese and trading it for wine than by direct production. In the absence of trade, at one hour of Home labor produces only 3 gallons of wine. The same hour could be used to produce 1 pound of cheese, which can then be traded for 1 gallon of wine. Clearly, Home does better from trade. Similarly, Foreign could use 1 hour of labor to produce 3 pounds of cheese, if it wishes, it can do so to produce 3 gallons of wine, which could then be traded for 5 pounds of cheese. This is twice as much as the 5 pound of cheese it gets using the hour to produce the cheese directly. In this example, each country can use labor more efficiently to trade for what it needs instead of producing its imports for itself.

Relative Wages

Political decisions of international trade often focus on comparisons of wage rates in different countries. For example, opponents of trade between the United States and Mexico often emphasize the point that workers in Mexico are paid only about $2 per hour, compared with more than $15 per hour for the typical worker in the United States. Our discussion of international trade up to this point has not explicitly compared wages in the two countries, but it is possible to use the results of this numerical example to determine how the wage rates in the two countries compare.

In this example, since the countries have specialized, all Home workers are employed producing cheese. Since it takes 1 hour of labor to produce 1 pound of cheese, workers in...
THE LOSSES FROM NON-TRADE

Our discussion of the gains from trade was considered a "brilliant" experiment in which a computer was taught to predict how economic outcomes do not follow strictly in what they have been for some time. It is hypothetical because it allows us to understand the principles of the gains from trade, but it doesn't mean much to do with actual events. After all, computer systems can learn from past mistakes of moving from free trade to no trade. The historical context was as follows: as the time British and French were engaged in a massive military struggle, the Nippon-

istic Wars. Both countries experienced an economic depression in January. France tried to help the West, and Britain followed with a blockade of France. The young United States was caught in the conflict but suffered considerably. In particular, the British navy seized many U.S. merchant ships, and an occasional excursion resulted from these seizures. As an effect, production was reduced in Britain. The national government, President Theodore Roosevelt decided a complete ban on foreign shipping. This embargo


Home wine is the value of 1 pound of cheese per hour of the labor. Similarly, foreign workers produce only wine, since it takes 3 hours to produce each gallon, they earn the value of 10,000 gallons of wine per hour.

To convert these numbers into dollar terms, we need to know the price of cheese and wine. Suppose that a pound of cheese and a gallon of milk both sell for $12; then Home workers will earn $36 per hour, compared with the amount workers in another country. The relative wage of Home workers will therefore be.

Clearly, the relative-wage does not depend on whether the price of a pound of cheese is $12 or $20, or the price of a milk of wine. The relative-wage of Home workers will be the same as that of foreign workers.

CHAPTER 2
Labor Productivity and Comparative Advantage

Notice that this wage rate lies between the wages of the two countries' productive activities in the two industries. Notice in six times as productive in "cheese" as in "wine," but only one and a half times as productive in "wine," and it ends up with a wage rate time three times as high in France. It is precisely because the relative-wage lies between the relative productivity that each country ends up with a superior advantage as one good. Because of its lower wage rate, French wine is a competitive advantage in wine, even though it has lower productivity. France has a clear advantage in wine, despite its higher wage rate, because the higher wage is more offset by its higher productivity. We have developed the simple models of international trade. Even though the Ricardoian trade model is too simple to be a complete analysis of either cause or the effects of international trade, a focus on labor productivity can be a very useful tool for thinking about international trade. In particular, the simple one-factor model is a good way to deal with several common misconceptions about the meaning of a country's advantage and the nature of the gains from free trade. Thus, misconceptions appear so frequently in public debate about international economic policy, and even in statements by those who regard themselves as experts, that the next section will take time out to discuss some of the common misconceptions about comparative advantage in light of our model.

Misconceptions About Comparative Advantage

There is no shortage of misleading ideas in economics. Politicians, business leaders, and even economists frequently make statements that do not stand up to careful economic analysis. But some of these ideas seem to be especially prevalent in international economics. Open the business sections of the Wall Street Journal or any other economic magazine and you will probably find at least one article that makes foolish statements about international trade. These special factors may prove highly persistent, and our simple model of comparative advantage can be used to see why they are incorrect.

Productivity and Comparisons

CHAPTER 2  Labor Productivity and Comparative Advantage

DO WAGES REFLECT PRODUCTIVITY?

In the numerical example that we use to illustrate returns to scale and product differentiation, we assume that the relative wage of the two countries reflects their share of total productivity—specifically, that the ratio of wages (in Foreign wages) is in a range that gives each country a cost advantage in one of the two products. This is a necessary implication of our theoretical model. But many people are unconvinced by this model. In particular, rapid increase in productivity in developing countries, such as China has only recently been observed. We argue that these countries continue to pay lower wages even as their productivity increases—putting high-wage countries at a cost disadvantage—and that the country will continue to produce their output. China is an example of this logic of product differentiation, what is the evidence? As it happens, growth in its "trading partners' import" countries of Asia provides a clear test. The so-called "Asian tigers"—South Korea, Taiwan, Hong Kong, and Singapore— began a rapid process of development in the 1960s and achieved much higher rates of productivity growth than any of the Western nations through the last two decades of the twentieth century. For example, output per worker in South Korea was only 20 percent of the U.S. level in 1970, and so it was less than half the U.S. level by 1984.

The wages paid in these developing countries were not paid in the relatively overvalued currencies of the developed countries, but rather in the relatively undervalued currencies of the developing countries. The major difference between these two is that the wages paid in the developing countries were not paid in the relatively overvalued currencies of the developed countries, but rather in the relatively undervalued currencies of the developing countries. The major difference between these two is that the wages paid in the developing countries were not paid in the relatively overvalued currencies of the developed countries, but rather in the relatively undervalued currencies of the developing countries.

Table 2.2: Changes in Wages and Unit Labor Costs

<table>
<thead>
<tr>
<th>Country</th>
<th>Compensation Per Hour, 1975 (US$ = 100)</th>
<th>Compensation Per Hour, 2000 (US$ = 100)</th>
<th>Annual Rate of Increase in Unit Labor Costs, 1975–2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>100</td>
<td>100</td>
<td>1.1</td>
</tr>
<tr>
<td>South Korea</td>
<td>50</td>
<td>41</td>
<td>0.2</td>
</tr>
<tr>
<td>Taiwan</td>
<td>30</td>
<td>30</td>
<td>1.6</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>28</td>
<td>28</td>
<td>0.6</td>
</tr>
<tr>
<td>Singapore</td>
<td>17</td>
<td>37</td>
<td>NA</td>
</tr>
</tbody>
</table>

PART 1  International Trade Theory

American workers, who produce some of the world's trade,4 can often hard-hatted to try to justify the initially low wages paid in many of the world's workers. If one is asking about the desirability of free trade, however, the price is not to ask whether low-wage workers deserve to be paid more but to ask whether they and their country are worse off expecting goods based on low wages than they would be if they refused to enter into such decreasing exchange. And in asking this question one must also ask, what is the alternative?5

Although it is, our numerical example makes the point that one cannot declare that a low-wage regime represents exploitation unless one knows what the alternative is. In that example, Foreign workers are paid much less than Home workers, and one could easily imagine a columnist writing angrily that their exploitation. Yet if Foreign refused to let itself be "exploited" by refusing to trade with Home (or by insisting on much higher wages in its export sector, which would have the same effect), real wages would be even lower. The purchasing power of a worker's hourly wage would fall from 8 to 8 pounds of cheese.

The columnist who made the comment interpreted its significance as the executive at the Gap and the workers who make its clothes wereicago at the poverty of Central American workers. But to deny them the opportunity to trade and make wages will be to condemn them to even deeper poverty.

Comparative Advantage with Many Goods

In our discussion so far we have relied on a model in which only two goods are produced and traded. This simplified analysis allows us to capture many essential points about comparative advantage and trade, and as we saw in the last section, gives us a surprising amount of insight as well for discussing policy issues. To move closer to reality, however, it is necessary to understand how comparative advantage functions in a world with a large number of goods.

Setting Up the Model

Again, imagine a world of two countries, Home and Foreign. As before, each country has only one factor of production, labor. Each of these countries will now, however, be interested in consuming and be able to produce a large number of goods—say 15 different goods altogether. We assign each of the goods a number from 1 to 15.

The technology of each country can be determined by its unit labor requirements for each good, that is, the number of hours of labor it takes to produce one unit of each. We listed Home's unit labor requirement for a particular good in Table 2-1, where we have assigned to that good. If we know how much labor it's required to produce a particular good, we can determine the labor requirements for all the other goods. Following our usual rule, we list the corresponding Foreign unit labor requirements in Table 2-1.

To make trade, we must pull one good from. For each good we can calculate the rate of Home's unit labor requirements to Foreign's. The trick is to relate the goods so that

\[ w_H^* = w_F^* \]
Table 2-4

<table>
<thead>
<tr>
<th>Good</th>
<th>Home Unit Labor Requirement (a)</th>
<th>Foreign Unit Labor Requirement (a)</th>
<th>Home Unit Labor Requirement (b)</th>
<th>Relative Home Productivity Advantage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apples</td>
<td>1</td>
<td>10</td>
<td>1</td>
<td>0.10</td>
</tr>
<tr>
<td>Beans</td>
<td>5</td>
<td>40</td>
<td>5</td>
<td>0.01</td>
</tr>
<tr>
<td>Carrot</td>
<td>3</td>
<td>12</td>
<td>3</td>
<td>0.25</td>
</tr>
<tr>
<td>Dates</td>
<td>4</td>
<td>12</td>
<td>4</td>
<td>0.10</td>
</tr>
<tr>
<td>Enchilada</td>
<td>12</td>
<td>9</td>
<td>12</td>
<td>0.33</td>
</tr>
</tbody>
</table>

Which country produces which goods depends on the ratio of Home and Foreign wage rates. Home will have a cost advantage in any good for which its relative productivity is higher than its relative wage, and Foreign will have the advantage in the others. For example, the Home wages are five times that of Foreign, so the ratio of Home wage to Foreign wage is five to one. Apples and beans will be produced in Home and carrot, dates, and enchilada in Foreign. The Home wage rate is only three times that of Foreign, Home will produce apples, beans, and Foreign will produce only carrots and enchiladas. In each a pattern of specialization and an increase in productivity is possible in countries. We can see this is done by using the same method we used earlier: comparing the labor cost of producing a good directly in a country with that of manufacturing it by producing another good and trading for the first desired good. For example, let us consider the Foreign wage rate is three times the Foreign wage rate (five to one), Foreign’s wage rate is one-third that of Home, Home will import beans and export apples. A unit of dates requires 12 units of Foreign labor to produce, but its cost in terms of Home labor, given the three-to-one wage ratio, is only 4 units of labor (12 x 0.33). The cost of 4 hours of labor is less than 3 hours of domestic labor it would take to produce the unit of labor in Home. In practice, Foreign actually has higher productivity along with lower wages, it will cost Home only 3 hours to acquire a unit of enchilada through trade, compared with the 12 percent hours it would take to produce it domestically. A similar calculation will allow that Foreign also gains, for each of the goods Foreign imports it can turn its workers to cheaper terms of production to produce good domestically. For example, it would take 10 hours of Foreign labor to produce a unit of apples; even with a wage rate only three times that of Home workers, it will export only 3 hours of foreign labor. In making these calculations, however, we have simply assumed that the relative wage rate is 3. How does this relative wage rate vary with country determinants?

Determining the Relative Wage in the MultiGood Model

In the two-good model we determined relative wages by first calculating Home wages in terms of Home currency and Foreign wages in terms of Home currency, then using the price of each relative to the Home currency cost of Home to calculate the ratio of the two countries’ wage rates. We could do the same thing because we knew that Home would produce cheese and Foreign wine. In the many-good case, who produces what can be determined only after we know the relative wage rate, so this procedure is inapplicable. To determine relative wages in a multiproduct economy we must look behind the relative demand for goods to the underlying demand for labor. This is not a direct demand on the part of consumers; rather, it is a derived demand that results from the demand for goods produced with each country’s labor.

The relative derived demand for Home labor is full when the ratio of Home to Foreign wages for each good is the same. For example, if Home labor becomes more expensive relative to Foreign labor, goods produced in Home also become relatively more expensive, and world demand for these goods falls. Second, if Home wages rise, fewer goods will be produced in Home and more in Foreign, further reducing the demand for Home labor.

We can illustrate these two effects using our numerical example. Suppose we start with the following situation: The Home wage is initially 3.5 times the Foreign wage. At that level, Home would produce apples, beans, and carrot while Foreign would produce dates and enchiladas. If the relative Home wage were to increase from 3.5 to just under 4, say 3.9, the pattern of specialization would not change, but the goods produced in Home became relatively more expensive, the relative demand for exchange for these goods would decline and the relative demand for Foreign labor would decline with it.

Suppose now that the relative wage rose to increase slightly from 3.99 to 4.01. This small further increase in the relative Home wage would bring about a shift in the pattern of specialization. Because it is now cheaper to produce cheese in Foreign than in Home, the production of cheese shifts from Home to Foreign. What does this imply for the relative demand for Home labor? Clearly it implies that as the relative wage rises from a little less than 4 to 4 it little falls from 3.99 to 3.9; in an abrupt drop-off in the relative demand, as Home production of cheese falls in Home and Foreign acquires a new industry. As the relative-wage continues to rise, relative demand for Home labor will gradually decline, then drop off abruptly at a relative wage of 4, at which wage production of cheese shifts from Home to Foreign. We can illustrate the determination of relative labor demand graphically.

Unlike Figure 2-3, this diagram does not have relative quantities of goods or relative prices of goods on its axes, instead it shows the relative wage rate and the relative wage rate. The world demand for Home labor relative to its demand for Foreign labor is shown by the curve D. The world supply of foreign labor relative to its demand is shown by the free RS. The relative supply of labor is determined by the relative-wage curve, Foreign firms. Assuming that the number of persons-hours available does not vary with the wage, the relative wage has no effect on relative labor supply and RS is a vertical line.

Our discussion of the relative demand for labor explains the "stepped" shape of RS. Whenever we increase the wage rate and Home workers relative to Foreign workers, it is safe to say that the relative demand for goods in Home relative to their demand in Foreign will decline and the demand for Home labor will decline with it. In addition, the relative demand for Home labor will drop off abruptly whenever an increase in the relative Home wage makes it a good to produce in Foreign.

For the curve alternates between smoothly downward sloping sections where the pattern of specialization does not change and "steps" where the relative demand shifts abruptly because of shifts in the pattern of specialization. As shown in the figure, these "steps" correspond to relative wages that equal the ratio of Home to Foreign productivity for each of the six goods.
In a perfectly Ricardian model, relative wages are determined by the intersection of the derived relative demand curve for labor RD with the relative supply curve RS.

![Graph showing relative wages and demand for labor]

If the intersection of RD and RS happens to lie on one of the axes, both countries produce the good for which the flat applies.

Adding Transport Costs and Nontraded Goods

We now extend our model another step closer to reality by considering the effects of transport costs. Transportation costs do not change the fundamental principles of comparative advantage or the gains from trade. Because transport costs are obstacles to the movement of goods and services, however, they have important implications for the way a trading world economy is affected by a variety of factors such as foreign aid, international investment, and balance of payments problems. While we will not deal with the effects of these factors yet, the multilateral trade model is a good place to introduce the effects of transport costs.

First, notice that the world economy described by the model of the last section is marked by very extreme international specialization. At worst there is the good that both countries produce, at other goods are produced either in Home or in Foreign, not in both.

There are two main reasons why specialization in the real international economy is not this extreme:

1. The existence of more than one factor of production reduces the tendency toward specialization (as we see in the next two chapters).

2. Countries sometimes protect industries from foreign competition (discussed at length in Chapter 8 through II).

3. It is costly to transport goods and services, and in some cases the cost of transportation is so high that it makes sense to transport goods to distant markets.

In the traditional example of the last section we found that a relative wage of 3, Home could produce apples, bananas, and caviar more cheaply than Foreign, while Foreign could produce fish more cheaply than Home. In the absence of transport costs, then, Home will export fish and import the two non-traded goods.

Now suppose there is a cost to transporting goods, and that this transport cost is a million dollars per unit of production. The transportation costs will discourage trade. Consider, for example, the case of a country that has a 50% transport cost. In the absence of transport costs, it is cheaper for Home to produce fish, while in the presence of transport costs, it is cheaper for Foreign to produce fish.

A similar cost comparison shows that Foreign will find it cheaper to produce in its own market than import it. A country that is labor-rich will find it cheaper to produce even at a relative wage of 1, which makes it cheaper to produce 5 hours of foreign labor, while in the presence of transport costs, it is cheaper to produce 1 hour of foreign labor.

The result is an increase in the price of transportation costs, but the relative price of transportation remains the same. In the absence of transport costs, it is cheaper to produce fish, while in the presence of transport costs, it is cheaper to produce caviar.

The result of increasing transport costs in this example, then, is that while Home still exports apples and bananas and imports anchovies, caviar and and caviar becomes non-traded goods, which each country produces for itself.

In this example we have assumed that transport costs are the same fraction of production cost in all sectors. In practice there is a wide range of transportation costs. In some cases transportation is virtually impossible. Services such as finance and some repair cannot be traded internationally, even when there is a metropolitan area that supplies a border, like Detroit, Michigan- Windsor, Ontario. There is also little international trade in goods with high value-to-cost ratios, like cement. It is simply not worth the cost of importing cement, even if it can be produced much more cheaply abroad. Many goods end up being non-traded because of the absence of strong national cost advantages or because of high transportation costs.

The important point is that even smaller a share of their income as non-traded goods, which is of increasing importance in our later discussion of international transfers of income (Chapter 5) and in international monetary equilibrium.
The theory is a heavily qualified one. Clearly there are a number of ways in which the Ricardo model makes misleading predictions. First, as mentioned in our discussion of assiduous goods, the simple Ricardo model predicts an intense degree of specialization that we do not observe in the real world. Second, the Ricardo model ignores any effects of international trade on the distributions of income within countries, and this predicts that countries as a whole will always gain from trade. In practice, international trade has strong effects on income distribution, which we focus on in Chapter 4. Third, the Ricardo model does not factor in differences in the behavior of countries in a crisis of trade, thus missing an important aspect of the trading system (the focus of Chapter 5). Finally, the Ricardo model ignores the possible role of economies of scale in a crisis of trade, which may fail to explain the large trade flows between apparently similar nations as first discussed in Chapter 6.

In spite of these failings, however, the basic predictions of the Ricardian model—countries should seek to export goods in which their productivity is relatively high—has been strongly confirmed by a number of studies over the years.

Several classic tests of the Ricardo model were performed using data from the early years of World War II, comparing British and American productivity and trade. This was an unusually illuminating comparison, with British labor productivity being less than American in almost every sector. Yet America had an absolute advantage in everything. Nonetheless, the amount of British exports was about as large as American at the time. Clearly, then, there must have been some reason for which Britain had a comparative advantage in spite of lower absolute productivity. The Ricardian model would predict that this would be sector in which America’s productivity advantage was smallest.

Figure 2-6 illustrates the evidence in favor of the Ricardian model, using data processed by the Hungarian economist Bala Balassa in 1963. The figures compare the ratio of U.S. to British exports in 1951 with the ratio of U.S. to British productivity in 25 manufacturing industries. The productivity ratio is measured on the horizontal axis, and the export ratio on the vertical axis. Both scales are given a logarithmic scale, so any of the bars that touch up to produce a clearer picture.

The Ricardian theory would lead us to expect that the higher the relative productivity in the U.S. industry, the more likely U.S. than U.K. firms would expect in that industry. And that is what Figure 2-6 shows. In fact, the scatterplot lies quite close to an upward-sloping line, also shown in the figure. Bearing in mind that the data used for this comparison are, like all economic data, subject to substantial measurement errors, the fit is remarkably close.

As expected, the evidence in Figure 2-6 confirms the basic insight that trade depends on comparative advantage. The data plot which the data refer to U.S. industry had much higher labor productivity than British industry—on average about twice as high. The pattern holds in a different country that can be competitive only if it can also export other examples, which we discussed earlier in this chapter.

To predict U.S. export advantage across the board. The Ricardian model predicts, however, that having high productivity in an industry cannot guarantee high exports is not enough to ensure that a country will export any industry’s products, since productivity must be high compared with relative productivity in other sectors. As it happens, the U.S. productivity exceeded British in all 25 sectors by a ratio of 2 to 1. Most of the sectors, however, Britain actually had larger exports with the United States. A glance at the figure shows that in general, U.S. exports were larger than U.K. exports in industries where the productivity advantage was simultaneously more than two to one.

More recent evidence on the Ricardian model has been just as clear-cut. In part, this is because the growth of world trade and the resulting specialization of national economies means that we do not have to look to see what countries do today in the world economy of the 1990s. Countries do not produce goods for which they are at a comparative disadvantage, but to move their production, out relative advantage. For example, most countries do not produce airplanes, so there are no data on what their labor requirements would be if they did. Nonetheless, there are several cases of evidence suggesting that differences in labor productivity continue to play an important role in determining world trade patterns.

Perhaps the most important points is that there continue to be large differences in labor productivity between countries and correspondingly between in three productivity differences across industries. For example, one finds that the average productivity of labor is Japanese manufacturing in 1956 was 20 percent lower than labor productivity in the United States. But in the automobile and some parts industries Japanese productivity
PART I  International Trade Theory

was 16 to 24 percent higher than America's productivity. It is not hard to believe that this disparity explained much of Japan's ability to export millions of automobiles to the United States.

In the case of automobiles, one might argue that the pattern of trade simply reflected absolute advantage: Japan had the highest productivity and was also the world's largest exporter. The principle of comparative advantage may be illustrated by the case of world trade in clothing. By any measure, advanced countries like the United States have higher labor productivity in the manufacture of clothing than newly industrializing countries like Mexico or China. But because the technology of clothing manufacture is relatively simple, the productivity advantage of advanced nations in the clothing industry is less than its advantage in many other industries. For example, in 1992 the average U.S. manufacturing worker was probably about five times as productive as the average Mexican worker, but in the clothing industry the productivity advantage was probably only about 50 percent. The result is that clothing is a major export from low-wage to high-wage regions.

In sum, while few economists believe that the Ricardian model is a fully adequate description of the causes and consequences of world trade, its two principal implications—that productivity differences play an important role in international trade and that it is comparative rather than absolute advantage that matters—do seem to be supported by the evidence.

Summary

1. We examined the Ricardian model, the simplest model that shows how differences between countries give rise to trade and gains from trade. In this model labor is the only factor of production and countries differ only in the productivity of labor in different industries.

2. In the Ricardian model, countries will export goods that their labor produces relatively efficiently and import goods that their labor produces relatively inefficiently. In other words, a country's production pattern is determined by comparative advantage.

3. Trade benefits a country can be shown in either of two ways. First, we can think of trade as an indirect method of production. Instead of producing a good for itself, a country may use another good and trade it for the desired good. The simple model shows that whenever a good is imported in quantity, this indirect "production" requires less labor than direct production. Second, we can show that trade enlarges a country's consumption possibilities, implying gains from trade.

4. The distribution of the gains from trade depends on the relative prices of the goods countries produce. To determine these relative prices it is necessary to look at the relative world supply and demand for goods. The relative price implies a relative wage rate as well.

Key Terms

absolute advantage, p. 15
comparative advantage, p. 12
demand curve, p. 19
gains from trade, p. 19
general equilibrium analysis, p. 17
contradictory goods, p. 31
opportunity cost, p. 11
part equalization analysis, p. 16

Problems

1. (7.1) How many units of labor are available. It can produce two goods, apples and bananas. The unit labor requirements in apple production is 3, while in banana production is 2.

   a. Graph Ford's production possibility frontier.

   b. What is the opportunity cost of apples in terms of bananas?

   c. In the absence of trade, what would the price of apples in terms of bananas be?

   Why?

2. (4.3) Use the information provided. Foreign's unit labor requirements in apple production is 5, while in banana production is 7.

   a. Graph Foreign's production possibility frontier.

   b. Construct the world relative supply curve.

3. (5.2) Show how world relative demand takes the following form: Demand for apples divided by demand for bananas is the price of apple.

   a. Graph the relative demand curve along with the relative supply curve.
Further Reading


CHAPTER 3
Specific Factors and Income Distribution

As we saw in Chapter 2, international trade can be mutually beneficial to the nations engaged in it. Yet, throughout history, governments have protected sectors of the economy from imports competition. For example, despite its complementarity to free trade, the United States limits imports of textiles, sugar, and other commodities. If trade is such a good thing for the economy, why is there opposition to its effects? To understand the politics of trade, it is necessary to look at the effects of trade, not just on a country as a whole but on the distribution of income within that country.

The Ricardian model of international trade developed in Chapter 2 illustrates the potential benefits from trade. In that model, trade leads to international specialization, with each country shifting its labor force from industries in which labor is relatively insufficient to industries in which it is relatively more efficient. Because labor is the only factor of production in the model, and it is assumed to be able to move freely from one industry to another, there is no possibility that individuals will be harmed by trade. The Ricardian model thus suggests not only that all countries gain from trade, but that every individual is made better off as a result of international trade, because trade does not affect the distribution of income in the real world, however, trade has substantial effects on the income distribution within each trading nation, so that in practice the benefits of trade are often distributed very unevenly.

There are two main reasons why international trade has strong effects on the distribution of income. First, resources cannot move instantaneously or readily from one industry to another. Second, industries differ in the factors of production they demand. A shift in the role of goods that a country produces will ordinarily reduce the demand for some factors of production, while raising the demand for others. For both of these reasons, international trade is not as unanimously beneficial as it appears to be in Chapter 2. While trade can benefit a nation as a whole, it often hurts significant groups within the country at least in the short run.

Consider the effects of Japan's rice policy. Japan allows very little rice to be imported, even though the scarcity of land means that rice is much more expensive to produce in Japan than in other countries (including the United States). There is little question that Japan as a whole would have a higher standard of living if free imports of rice were allowed. Japanese rice farmers, however, would be hurt by free trade. While the farmers

The Specific Factors Model

The specific factors model was developed by Paul Samuelson and Ronald Coas. Like the simple Ricardian model, it assumes an economy that produces two goods and that labor is the only factor of production. Unlike the Ricardian model, however, the specific factors model allows for the existence of factors of production besides labor. Whereas labor is a mobile factor that can move between sectors, these other factors are assumed to be specific. That is, they can be used only in the production of particular goods.

Assumptions of the Model

Imagine an economy that can produce two goods, manufactured and food, instead of one factor of production, labor. In this economy, there is only labor (L), capital (K), and land (L). Manufacturers are produced using capital and labor, but no land, while food is produced using land and labor (but not capital). Labor is therefore a mobile factor that can be used in either sector, while land and capital are both specific factors that can be used only in the production of one good.

How much of each good does the economy produce? The economy's output of manufactured goods depends on how much capital and labor are used in that sector. This relationship is summarized by a production function that shifts to the quantity of manufacturers that can be produced given any level of capital and labor. The production function for manufacturers can be represented algebraically as:

Q_m = Q_m(K, L)

where Q_m is the economy's output of manufacturers, K is the economy's capital stock, and L is the labor force employed in manufacturing. Similarly, for food we can write the production function as:

Q_f = Q_f(K, L)

where Q_f is the economy's output of food, K is the economy's capital stock, and L is the labor force employed in manufacturing.

In the model developed in this chapter, we assume that there are two factors of production, labor and capital, which are permanently tied to particular sectors of the economy. In advanced economies, however, agricultural land represents only a small part of national income. When economists apply the specific factors model to economies like that of the United States or France, they typically treat of factor specificity as a permanent condition but as a matter of time. For example, the man used to build brick and the stamping press used to build auto bodies cannot be utilized for other tasks, and so these different kinds of equipments are called "specific." Given time, however, it is possible in theory to reduce man from auto production to beer or wine making, and so in a long-term sense both were and stamping press can be considered to be two manifestations of a single, mobile factor called "capital." In practice, then, the fascination between specific and mobile factors is not a sharp line. It is a question of the speed of adjustment, with factors more specific the slower it takes to replace them between industries. How specific are the factors of production in the real economy?

Workers who have highly general skills, as opposed to highly specific training, are not as essential to the model. One could still come from the time it takes to learn labor moves between geographic locations. One influential study finds that when a U.S. state has economic difficulties, workers who are "left in the lurch" leave for other areas, while the owners of the farmers remain. This contrasts with the lifetime of 10 to 20 years for a typical specialized machine, and perhaps 50 years for a shopping mall or office building. So labor is never a less specific factor than most kinds of capital. On the other hand, highly trained workers are pretty much stuck with their craft. A trained surgeon might have a pretty good reason, but she cannot switch careers in mid-life.


where \( Q_f \) is the economy's output of food, \( T \) is the economy's supply of land, and \( L_p \) in the labor force devoted to food production. For the economy as a whole, the labor employed must equal the total labor supply \( L \):

\[ L_p = L \]  

Production Possibilities

The specific factors model assumes that each of the specific factors employed in different sectors is used in different ways. Thus to specify the economy's production possibilities, we need to only set the technology the is in use. In our model, the only change in the technology is the shift of labor from one sector to the other. This can be done graphically. By tracing the production function (3.1-3.2) by case I and II and putting them together, we derive the production function frontier. Figure 3-1 illustrates the relationship between labor input and output of manufactures. The larger the input of labor, for a given capital supply, the larger the output will be. Figure 3-1 shows the output of labor and capital product of labor, and so the output of products generated by adding one more person. Therefore, if labor input is increased without increasing capital as well, there will normally be diminishing returns. Because adding a worker means that each worker has less capital to work with, each successive movement of labor will add less to production than the last. Diminishing returns are reflected in the slope of the production function. The \( Q_f (L) \) gets flatter as we move to the right, indicating that the marginal product of labor declines as more labor is used. Figure 3-2 shows the same information a different way. In this figure we directly plot the marginal product of labor as a function of the labor employed. (In the appendix to this chapter we show that the area under the marginal product curve represents the total output of manufactures.)

A similar pair of diagrams can be used to represent the production function for food. These diagrams can be combined to derive the production possibility frontier for the economy, as illustrated in Figure 3-3. As we saw in Chapter 2, the production possibility frontier shows the total output of manufactures and food, and the area under the marginal product curve represents the total output of manufactures. In the lower left quadrant we show the production function for manufactures illustrated in Figure 3-1. This time, however, we turn the figure on its side. A movement downward along the vertical axis represents an increase in the labor input to the manufacturing sector, while a movement to the right along the horizontal axis represents an increase in the output of manufactures. In the upper left quadrant we show the corresponding \( Q_f (L) \) for food; this part of the figure is also flipped around. We move to the left along the horizontal axis and to the right along the vertical axis, increasing labor input to the food sector, while an upward movement along the vertical axis indicates an increase in food output.

The lower left quadrant represents the economy's allocation of labor. Both quantities are measured on the vertical axis. A downward movement along the vertical axis indicates an increase in the labor employed in manufactures; a horizontal movement indicates an increase in the labor employed in food.
The marginal product of labor in the manufacturing sector equals the slope of the production function shown in Figure 3.1, that is, the more labor the sector employs, the greater the marginal product of labor. Along the horizontal axis indicates the increase in labor employed in food. Since an increase in employment in one sector must mean that less labor is available for the other, the possible allocations are indicated by a downward sloping line. This line, labeled AA, slopes downward at a 45-degree angle, that is, if it has a slope of -1. To see why this line represents the possible labor allocations, notice that if all labor were employed in food production, 40 would equal 0 while 0 would equal 40. If one were then to move labor gradually into the manufacturing sector, each person-hour moved would increase 40 by one unit while reducing 0 by one unit, tracing a line with a slope of -1, until all the labor supply 40 was employed in manufactures. Any particular allocation of labor between the two sectors can thus be represented by a point on AA, such as point 2.

We can now see how to determine production given any particular allocation of labor between the two sectors. Suppose that the allocation of labor was represented by point 2 in the lower left quadrant, that is, with 10 hours in manufacturing and 40 hours in food. Then we can use the production function for each sector to determine output. 0 units are produced in manufacturing, 100 units are produced in manufacturing. Given the coordinates (2, 0) in the upper right quadrant of Figure 3.3, the marginal product of labor for manufacturing production equals 0.

To trace the whole production possibility frontier, we simply integrate separating this equation for every alternative allocation of labor. We might start with some of the labor allocated to food production. As at point 1 in the lower left quadrant, then gradually increase the amount of labor used in manufacturing until very few workers are employed in food. As at point 3, the corresponding points in the upper right quadrant will trace out the curve running from 0 to 3. This MPP in the upper right quadrant shows the economy's production possibilities for given supplies of land, labor, and capital.

In the Ricardian model, where labor is the only factor of production, the production possibility frontier is a straight line because the opportunity cost of manufactures in terms of food is constant. In the specific factors model, however, the addition of other factors of production changes the shape of the production possibility frontier PP to a curve. The curvature of PP reflects diminishing returns to labor in each sector; these diminishing returns are the crucial differences between the specific factors and the Ricardian models.
Notice that when tracing PP, we shift labor from the food to the manufacturing sector. If we shift one person-hour of labor from food to manufactures, however, this extra input will increase output in the sector by the marginal product of labor in manufactures, $MPF_M$. This increase in manufactures output in one unit, then, we must increase labor input by $MPF_M$ hours. Meanwhile, each unit of labor input shifted out of food production will lower output in the sector by the marginal product of labor in food, $MPF_F$. To increase output of manufactures by one unit, then, the necessary net increase output of food by $MPF_M - MPF_F$ units. The step of PP, which measures the opportunity cost of manufactures in terms of food—that is, the number of units of food output that must be sacrificed to increase manufactures output by one unit—is therefore

Steps of production possibilities curve = $-MPF_M + MPF_F$

We can now see why PP has the bowed shape it does. As we move from the $16^\text{th}$ to the $17^\text{th}$ century, the marginal product of labor in manufactures fell, correspondingingly in $L_F$, the marginal product of labor in food rose. So PP gets steeper as we move down it is the right.

We have now shown how output is determined, given the allocation of labor. The next step is to ask how a market economy determines the allocation of labor.

Prices, Wages, and Labor Allocation

How much labor will be employed in each sector? To answer this, we need to look at supply and demand in the labor market. The demand for labor in each sector depends on the price of output and the wage rate. In turn, the wage rate depends on the combined demand for labor by food and manufactures. Given the prices of manufactures and food together with the wage rate, we can determine each sector's employment and output.

First, let us see the demand for labor. In each sector, profits-maximizing employers will demand labor up to the point where the value added by an additional person-hour equals employers' expectations of employment in that sector's manufacturing sector. For example, the value of an additional person-hour is the marginal product of labor in manufactures multiplied by the price of one unit of manufactures, $MPF_M \times P_M$. So, in the wage rate of labor, employers will therefore hire workers up to the point where

$$MPF_M \times P_M = w$$  \hspace{1cm} (3-4)

But the marginal product of labor in manufacturing, already illustrated in Figure 3, is a downward-sloping function of diminishing returns. So, for any given price of manufactures, $P_M$, the value of that marginal product, $MPF_M$, will also decrease. We can therefore think of equation (3-4) as defining the demand curve for labor in manufactures. If the wage rate falls, other things equal, employers in the manufacturing sector will want to hire more workers.

Similarly, the value of an additional person-hour in food is $MPF_F \times P_F$. The demand curve for labor in the food sector may therefore be written

$$MPF_F \times P_F = w$$  \hspace{1cm} (3-5)

The wage rate $w$ must be the same in both sectors, because of the assumption that labor is freely mobile between sectors. That is, because labor is a mobile factor, it will move from the low-wage sector to the high-wage sector until wages are equal. The wage rate, in turn, is determined by the requirement that total labor demand (total employment) equal total labor supply.

$$w = L_T = L_F + L_M$$  \hspace{1cm} (3-6)

By representing these three equations in a diagram (Figure 3-4), we can see how the wage rate and employment in each sector are determined given the prices of food and manufactures. Along the horizontal axis of Figure 3-4 we show the total labor supply $L_T$. Measuring from the left of the diagram, we show the value of the marginal product of labor in manufactures, which is simply the $MPF_M$ curve from Figure 3-2 multiplied by $P_M$. This is the downward-sloping demand curve for labor in the manufacturing sector. Measuring from the right, we show the value of the marginal product of labor in food, which is the demand for labor in food. The equilibrium wage rate and allocation of labor between the two sectors is represented by point $L$. Above wage rate $w^*$, the sum of labor demanded by manufactures ($L_M$) and food ($L_F$) just equals the total labor supply $L_T$.

There is a useful relationship between prices and output that emerges clearly from this analysis of labor allocation; this relationship applies to many general situations that are described by the specific factors model. Equations (3-4) and (3-5) imply that
The economy produces in the point on the production possibility frontier (PP) where the slope of two frontier equals minus the relative price of manufactures:

\[ MP_{Q_1} \times P_1 = MP_{Q_2} \times P_2 \]

or, rearranging:

\[ \frac{MP_{Q_1}}{MP_{Q_2}} = \frac{P_2}{P_1} \]  

The left side of equation (7-7) is the slope of the production possibility frontier at the actual production point; the right side is minus the relative price of manufactures. This result tells us that at the production point, the production possibility frontier must be vertical in a line whose slope is minus the price of manufactures divided by the price of food. The result is illustrated in Figure 5-3: if the relative price of manufactures \( P_{M/F} \) is the same as at point 1, then manufactures and food each change in proportion to each other.

What happens to the allocation of labor and the distribution of income when the prices of food and manufactures change? Notice that any price change can be broken into two parts: an equal proportional change in both \( P_1 \) and \( P_2 \), and a change in only one price. For example, suppose that the price of manufactures rises 17 percent and the price of food rises 10 percent. We can analyze the effects of this by first asking what happens if manufactures prices rise by 17 percent, then by finding out what happens if food prices rise by 10 percent. These allow us to separate the effect of changes in the overall price level from the effects of changes in relative prices.

An Equal Proportional Change in Prices. Figure 5-4 shows the effect of an equal proportional increase in \( P_1 \) and \( P_2 \), which holds \( P_{M/F} \) constant. The labor demand curve shifts up by 17 percent as well, and the price of manufactures rises by 10 percent increase in labor.

The labor demand curve shifts up in proportion to the rise in \( P_1 \) from \( P_2 \) to \( P_2 \) and the rise in \( P_2 \) from \( P_1 \) to \( P_2 \). The wage rate rises in the same proportion from \( w^1 \) to \( w^2 \). But the allocation of labor between the two sectors does not change.

The wage rate is \( w^1 \) (point 1) to \( w^2 \) (point 2). The allocation of labor between the sectors and the outputs of the two goods does not change.

In fact, when \( P_1 \) and \( P_2 \) change in the same proportion, no real changes occur. The wage rate rises in the same proportion as the prices, so real wages remain the same. This is illustrated by the series of labor demand curves in Figure 5-5. The labor demand curve shifts up by 17 percent as well, and the price of manufactures rises by 10 percent increase in labor.

A Change in Relative Prices. Consider the effect of a price change that does alter relative prices. Figure 5-7 shows the effect of a change in the price of only one good, in this case a 17 percent rise in \( P_1 \) from \( P_1 \) to \( P_1 \). The increase in \( P_1 \) shifts the manufacturing labor demand curve in the same proportion as the price increase and moves the equilibrium demand for labor.
from point 1 to point 2. Notice two important facts about the results of this shift. First, although the wage rate rises, it rises by less than the increase in the price of manufactures. This can be seen by comparing Figures 3-6 and 3-7. In Figure 3-6, which represents the results of a 10 percent increase in both $P_m$ and $P_c$, we see that $w$ increased by 10 percent as well. If only $P_m$ increased, or only $P_c$ increased by 10 percent, $w$ would increase by less than 10 percent.

Second, when only $P_m$ rises, it is similar to the case of a simultaneous rise in $P_m$ and $P_c$. A rise in the wage rate is the marginal product of labor in that sector. Thus, the effect of a rise in the relative price of manufactures on labor costs can be seen directly by looking at the production possibility curve. In Figure 3-8, we show the effects of a rise in the price of manufactures, which raises the relative price of manufactures from $P_m/P_c$ to $P_m/P_c$. The production point, which is always located where the slope of $PP$ equals minus the relative price, shifts from 1 to 2. Food output rises and manufactures output falls as a result of the rise in the relative price of manufactures.

Since higher relative prices of manufactures lead to higher output of manufactures relative to that of food, we can draw a relative demand curve showing $Q_m/Q_c$ as a function of $P_m/P_c$. This relative supply curve is shown in Figure 3-8. As we showed in Chapter 2, we can also draw a relative demand curve, which is illustrated by the downward-sloping
INTERNATIONAL TRADE IN THE SPECIFIC FACTORS MODEL

Now that we have a general model for a single economy, we turn to an analysis of international trade. Imagine that two countries, Japan and America, trade with each other; let's examine the effects of this trade on their welfare.

For trade to take place, the two countries must differ in the relative price of manufactures that would prevail in the absence of trade. In Figure 3-9 we saw how $P_{M}$ is determined in a single economy in the absence of trade. Japan and America could have different relative prices of manufactures either because they differ in their relative demand or because they differ in their relative supply. We will assume away demand differences that is, we assume that at any given $P_{M}$, relative demand is the same in the two countries. If both countries face the same relative price of manufactures, $M_{Y}$ will consume food and manufactures in the same proportions. Thus both countries will have the same relative demand curve. We will therefore focus on differences in relative supply at the source of international trade.

Why might relative supply differ? The countries could have different technologies, as is the Ricardo model. Now that our model has more than one factor of production,

However, the countries could also differ in their resources. It is worth examining how differences in resources can affect relative supply.

RESOURCES AND RELATIVE SUPPLY

The basic relationship between resources and relative supply is straightforward. A country with a lot of capital and not much land will tend to produce a high ratio of manufactures to food at any given prices, while a country with a lot of land and not much capital will do the reverse. Consider what would happen if one of the countries experienced an increase in the supply of some resource. Suppose, for example, that Japan were to increase its capital stock. The effects of such an increase are shown in Figure 3-10.

Other things equal, an increase in the quantity of capital would raise the marginal product of labor in the manufacturing sector. Thus the demand curve for labor in manufacturing would shift to the right, from $P_{M} \times M_{Y}P_{L}$ to $P_{M} \times M_{Y}P_{L}$. As any given prices of manufactures and food, this increase in demand for manufacturing labor would shift the equilibrium from point 1 to point 2. More workers would be drawn into the manufacturing sector out of the food sector. Manufacturing output would rise, for two reasons: There would be more workers in the sector and they would have more capital to work with. Food output would fall because of reduced labor input. So at any given relative price of manufactures, the relative output of manufacturers would rise. We therefore conclude that an increase in the supply of capital would shift the relative supply curve to the right.
Correspondingly, an increase in the supply of land would increase food output and reduce manufacturing output, so the relative supply curve would shift left. What about the influence of an increase in the labor force? This is a less clear-cut case. To induce employers to hire the additional workers, the wage rate must fall. This will lead to increased employment and output of both manufactures and food; the effect on relative output is ambiguous.

Suppose, however, that America and Japan have the same labor force, but that Japan has a larger supply of labor. America can afford a higher supply of land than Japan. Then the situation will look like that in Figure 5-11. Japan's relative supply curve AS1 lies to the right of America's curve AS2, because Japan's abundance of capital and scarcity of land leads it to produce a large quantity of manufactures and relatively little food at any given relative price of manufactures, whereas the reverse is true for America.

Trade and Relative Prices

In this model, as always, international trade leads to a convergence of relative prices, illustrated in Figure 5-11. Since relative demand is the same in Japan and America, R2OPT is the relative price of manufactures in Japan as well as America, as is RR2OPT. Both country's relative demand curves and the versus relative demand curves when the two countries trade. RS1 and RS2 represent the relative supply curves of Japan and America, respectively. Japan is assumed to be relatively well-endowed with capital and poorly endowed with land, while America is conversely, so RR2 lies to the right of RS2. The presence of trade in manufactures and food results in lower relative prices in Japan than in America, G2PR. When the two countries open trade, they create an integrated world economy whose production of manufactures and food is the sum of the national output of the two goods. The world relative supply of manufactures (RSWORLD) lies between the relative supplies in the two countries. The world relative price of manufactures (PRWORLD) therefore lies between the national relative prices. Trade has increased the relative price of manufactures in Japan and has decreased it in America.

The Patterns of Trade

If trade occurs initially because of differences in relative prices of manufactures, how does the convergence of PW2 translate into a pattern of international trade? To answer this question, we need to elaborate basic relationships among prices, production, and consumption. It is a country that cannot trade, the output of a good must equal its consumption. If D1P1 is the consumption of manufactures and D2P2 consumption of food, then in an closed economy D01 = Q01 and D02 = Q02. International trade makes it possible for the mix of manufactures and food consumed to differ from the mix produced. While the amounts of each good that a country consumes and produces may differ, however, a country cannot spend more than it earns. The value of consumer net exports must equal the value of production. That is,

\[ P_R = D_1 + P_2 = R_2 = P_1 + Q_2 = D_2. \]  

Equations (3-5) can be rearranged to yield the following:

\[ D_1 = (P_R - P_2) = (Q_2 - D_2). \]  

\[ D_1 = D_2, \]  

is the economy's food imports, the amount by which its consumption of food exceeds its production. The right-hand side of the equation is the product of the relative price of manufacturers and the amount by which production of manufactures exceeds consumption, that is, the economy's export of manufactures. The equation, then, shows that imports of food equal exports of manufactures times the relative price of manufactures.

While we do not discuss how much the economy will import or export, the equation does show that the amount the economy can afford to import is limited, by the amount it exports. Equation (3-6) is therefore known as a budget constraint.5

Figure 5-12 (page 5-12) illustrates two important features of the budget constraint for a trading economy. First, the slope of the budget constraint is minus P2/R2, the relative price of manufactures. The rise in net consumer income of manufactures raises the economy 1/2P2. It is shown that per capita consumption increases when the relative price of manufactures increases, in response to increased consumer income. The graph is not available to the budget constraint. Equations (5-3) illustrate this feature. International borrowing and lending are explained in Chapter 7, which shows that on economy's consumption over time is constrained by the necessity of paying its debt to foreign lenders.

5The equation shows the role of consumption equal to production (e.g., expenditure), the equation equals in values which are not held when economic relations between countries are considered. For an alternative approach to net imports and limits to budget constraints, see equation (3-6). International borrowing and lending are explained in Chapter 7, which shows that on economy's consumption over time is not constrained by the necessity of paying its debt to foreign lenders.
choice of production given the relative price of manufactures, shown in the figure in price 1. That is, the economy can always afford to consume what it produces.

We can now use the budget constraints of Japan and America to construct a picture of the trading equilibrium. In Figure 3-13, we show the outputs, budget constraints, and consumption choices of Japan and America at equilibrium prices. In Japan, the rise in the relative price of manufactures leads to a rise in the consumption of manufactures and a fall in the relative output of food. Japan produces QF* of food but consumes QF. Therefore it becomes a manufactures exporter and a food importer. In America, the opposite shift is in the relative price of manufactures leads to a rise in the consumption of manufactures relative to food and a fall in the relative output of manufactures. America therefore becomes a manufactures importer and a food exporter. In equilibrium Japan's exports of manufactures must exactly equal America's imports and Japan's imports of food exactly equal America's exports. The questions are shown by the equality of the two colored triangles in Figure 3-13.

Income Distribution and the Gains From Trade

We have seen how production possibilities are determined by resources and technology; how the choice of what to produce is determined by the relative price of manufactures; how changes in the relative price of manufactures affect the real incomes of different factors of production; and how trade affects both relative prices and the economy's budget constraint. Now we can ask the crucial question: Who gains and who loses from international trade?
Before trade, an economy's production possibilities frontier (PP) is. After trade, the economy can consume more than it could prior to trade. The consumption of both goods at point 2 is higher than the production possibility frontier.

**Budget constraint**

\[ M = \frac{C}{P_C} \]

\[ Q = \frac{C}{P_Q} \]

Consumption of food, \( C \):\nOutput of food, \( Q \):\nBudget constraint (slope = \( \frac{P_Q}{P_C} \)):

- **Consumption of manufactured goods, \( C_m \):**\n- **Output of manufactured goods, \( Q_m \):**

out of increased consumption, while landowners are harmed vicariously who get immense pleasure out of it. Thus one might well imagine that trade reduces the total amount of pleasure in Japan. But the welfare, I would say, cannot be true. More to the point, it is outside the province of what we normally think of as an economic analysis to try to figure out how much enjoyment individuals get out of their lives.

A better way to assess the overall gains from trade is to ask a different question: Could those who gain from trade compensate those who lose, and will it be better off themselves? If so, then trade is genuinely a source of gains to everyone.

To illustrate that trade is a source of potential gains for everyone, we proceed in three steps:

1. We show that in the absence of trade the economy would have to produce what it consumed, and vice versa. Thus the consumption of the economy in the absence of trade would have to be at a point on the production possibility frontier. In Figure 3-14, a typical pretrade consumption point is shown at point 2.

2. Next, we notice that it is possible for a trading economy to consume more of both goods than it would in the absence of trade. The budget constraint in Figure 3-14 represents all the possible combinations of food and manufactures that the economy could consume given the world relative price of manufactures. Part of that budget constraint—\( P \) represents the part in the colored region—represents situations in which the economy consumes more of both manufactures and food than it could in the absence of trade. Notice that this result does not depend on the assumption that import production and consumption was at point 2; unless import production was at point 1, so that trade has no effect on production at all, there is always a gain in the budget constraint that allows consumption of more of both goods.

3. Finally, observe that if the economy as a whole consumes more of both goods, then it is possible in principle to give each individual more of both goods. This would make everyone better off. This shows, then, that it is possible to ensure that everyone is better off as a result of trade. Of course, everyone might be still better off if they had less of one good and more of the other, but this only confines the analysis to how everyone could potentially gain from trade.

The fundamental reason why trade potentially benefits a country is that it expands the economy's choices. The expansion of choice means that it is always possible to redistribute income in such a way that everyone gains from trade. That everyone could gain from trade unambiguously does not mean that everyone actually does. In the real world, the presence of liberty as well as winners from trade is one of the most important reasons why trade is not free.

**The Political Economy of Trade: A Preliminary View**

Trade often produces losers as well as winners. This insight is crucial in understanding the considerations that actually determine trade policy in the modern world economy. Trade policy is examined in detail in Chapters 6 through 11; it is possible, however, to take a preliminary view at this point.

There are two ways to hold a trade policy (or any government policy): (1) Given its objectives, what should the government do? What is an optimal trade policy? (2) What are governments likely to do in practice? The income distribution effects of trade are important to the first way of looking at the issue and are crucial to the second.

**Optimal Trade Policy**

Suppose a government wants to maximize the welfare of its population. If everyone were exactly the same in utility and in income there would be a straightforward solution: The government would choose policies that make the representative individual as well off as possible. In this homogeneous society, free international trade would clearly serve the government's objectives.

When people are not exactly alike, however, the government's problem is less well-defined. The government must somehow weigh one person's gain against another person's loss. If, for example, the Japanese government is relatively more concerned about hurting landowners than about helping exporters, then international trade, which as we analyze, benefits capital owners and hurts landowners in Japan, might be a bad thing from the Japanese government's point of view.  

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*The expected result is that trade is beneficial because it enlarges "incomes in countries" to much more general than this notion. For a thorough discussion of Paul Samuelson, "The Limits from International Trade Open Agreements," Economic Journal 71 (1961), pp. 592-600.*
PART 1 International Trade Theory

There are many reasons why one group might want more than another, but one of the most compelling reasons is that some groups need special policies because they are already relatively poor. There is widespread sympathy in the United States for such policies. The United States for some reasons (pre-emption of pests and plants, even though the ARs are not concrete persons, because workers in those industries are already poorly paid) that the gains that arise from con-

1. Income distribution effects are not specific to international trade. Every change in a nation's economy, including technological progress, shifting consumer preferences, extraction of old resources and discovery of new ones, and so on, affects income distribution. If every change in the economy were allowed only after it had been examined for its distributive effects, economic progress could easily end up reversed and end up reversed. If it is always better to allow trade and compensate those who are hurt by it than to prohibit the trade. (This applies to other forms of economic change as well.) All modern industrial countries provide some sort of "safety net" of income support programs (such as unemployment benefits and subsidized training and relocation programs) that can cushion the losses of groups hurt by trade. Economists would argue that if this cushion is filled to be inadequate, more support rather than less trade is the right answer.

2. Those who stand to lose from increased trade are typically better organized than those who stand to gain. This imbalance creates a bias in the political process that requires a countermovement. It is the traditional role of economic groups to strongly support free trade, pointing to the overall gains, those who have usually have little trouble making their complaints heard. The economic policy of some industries may be more sensitive to the actual restrictions of policy.

Income Distribution and Trade Politics

It is easy to see why groups that lose from trade lobby their governments to restrict trade and protect their incomes. You might expect that those who gain from trade would lobby as strongly as those who lose from it, but this is rarely the case. In the United States and in many countries, those who want trade limited are more effective politically than those who want it extended. Typically, those who gain from trade in any particular product are a much less constant, informed, and organized group than those who lose. A good example of this contrast between the two sides is the U.S. sugar industry. The United States has limited imports of sugar for many years, at the time of writing the price of sugar in the U.S. market was about twice as high as in the world market. Most estimates put the cost of U.S. consumers of this import restrictions at about $2 billion a year—that is, about $4 a year for every man, woman, and child. The gain is producers are much small-

CHAPTER 3 Specific Factors and Income Distribution

SPECIFIC FACTORS AND THE BEGINNINGS OF TRADE THEORY

The modern theory of international trade begins with the demonstration by David Ricardo in 1817, that trade is mutually beneficial to nations. We studied Ricardian theory in Chapter 2. Ricardo used his model to argue for free trade, in particular for an end to the mercantilist policies that restricted England's imports of food. Yet another side of the British economy of 1817 was better described by a specific factors model than by the one-factor model Ricardo presented.

To understand the situation, recall that from the beginning of the French Revolution in 1789 until the decline of Napoleon at Waterloo in 1815, Britain was engaged continuously at war with France. This was not unusual with Britain's trade. Great Britain was the world's largest shipper and the French attempted to isolate a blockade of British goods. Since Britain was an exporter of manufactures and an importer of agricul-

The production of manufactures required few laborers and sugar was produced near the coast, the politically influ-

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PART 1 International Trade Theory

trade. This trade made in general became mostly from 1945 to 1980-dependent, as we will see in Chapter 4, on a special set of circumstances that controlled what is probably an inherent political bias against international trade.

Summary

1. International trade often has strong effects on the distribution of income within countries, so that it often produces losers as well as winners. Income distribution effects arise for two reasons. Factors of production cannot move instantaneously and continuously from one industry to another, and changes in an economy's output mix have differential effects on the demand for different factors of production.

2. A useful model of income distribution effects is the production function model, which allows for a distinction between general-purpose factors that move between sectors and factors that are specific to particular uses. In this model, differences in resource requirements can cause countries to have different relative supply curves, and thus generate international trade.

3. In the specific factors model, factors specific in export sectors in each country gain from trade, while factors specific to import-competing sectors lose. Mobile factors that can work in either sector may either gain or lose.

4. Trade restrictions produce overall gains as the limited sum that those who gain couldnt empoy would compensate those who lose while still maintaining ratios off than before.

5. Most economists do not regard the effects of international trade on income distribution as a good reason to limit this trade. In an undistorted foreign trade, trade is no different from any other forms of economic change, which are not normally regulated. Furthermore, agreements would prefer to address the problem of income distribution directly, rather than by interfering with trade flows.

6. Nonetheless, in the actual politics of trade policy income distribution is of quite importance. This is true in particular because those who lose from trade are usually a much more informed, collective, and organized group than those who gain.

Key Terms

- budget constraint, p. 53
- diminishing returns, p. 41
- marginal product of labor, p. 45
- production function, p. 39
- production possibility frontier, p. 41
- specific factors, p. 39
- specific factors model, p. 39

Problems

1. In 1986, the price of oil on world markets dropped sharply. Since the United States is an oil-importing country, this was widely regarded as good for the U.S. economy. Yet in Texas and Louisiana 1986 was a year of economic decline. Why?

CHAPTER 3 Specific Factors and Income Distribution

2. An economy can produce good 1 using labor and capital and good 2 using labor and land. The total supply of labor is 100. Given the supply of capital, the output of the two goods depends on labor input as follows:

<table>
<thead>
<tr>
<th>Labor Input in Good 1</th>
<th>Output of Good 1</th>
<th>Labor Input in Good 2</th>
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<td>20</td>
<td>1.14</td>
<td>20</td>
<td>0.9</td>
</tr>
<tr>
<td>30</td>
<td>0.97</td>
<td>30</td>
<td>0.82</td>
</tr>
<tr>
<td>40</td>
<td>0.87</td>
<td>40</td>
<td>0.89</td>
</tr>
<tr>
<td>50</td>
<td>0.71</td>
<td>50</td>
<td>0.61</td>
</tr>
<tr>
<td>60</td>
<td>0.74</td>
<td>60</td>
<td>0.54</td>
</tr>
<tr>
<td>70</td>
<td>0.69</td>
<td>70</td>
<td>0.50</td>
</tr>
<tr>
<td>80</td>
<td>0.66</td>
<td>80</td>
<td>0.46</td>
</tr>
<tr>
<td>90</td>
<td>0.63</td>
<td>90</td>
<td>0.49</td>
</tr>
<tr>
<td>100</td>
<td>0.60</td>
<td>100</td>
<td>0.40</td>
</tr>
</tbody>
</table>

a. Graph the production functions for good 1 and good 2.

b. Graph the production possibility frontier. What is it called?

c. The marginal product of laborcurve corresponding to the production functions is problem 2 are as follows:

<table>
<thead>
<tr>
<th>Workers Employed</th>
<th>MPL in Sector</th>
<th>MPL in Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0.51</td>
<td>0.89</td>
</tr>
<tr>
<td>20</td>
<td>1.14</td>
<td>1.05</td>
</tr>
<tr>
<td>30</td>
<td>0.97</td>
<td>0.82</td>
</tr>
<tr>
<td>40</td>
<td>0.87</td>
<td>0.89</td>
</tr>
<tr>
<td>50</td>
<td>0.71</td>
<td>0.61</td>
</tr>
<tr>
<td>60</td>
<td>0.74</td>
<td>0.54</td>
</tr>
<tr>
<td>70</td>
<td>0.69</td>
<td>0.50</td>
</tr>
<tr>
<td>80</td>
<td>0.66</td>
<td>0.46</td>
</tr>
<tr>
<td>90</td>
<td>0.63</td>
<td>0.49</td>
</tr>
<tr>
<td>100</td>
<td>0.60</td>
<td>0.40</td>
</tr>
</tbody>
</table>

d. Suppose that the price of good 2 relative to that of good 1 is 1. Determine graphically the wage rate and the allocation of labor between the two sectors.

e. Using the graph drawn for problem 2, determine the output of each sector. Then confirm graphically that the slope of the production possibility frontier at this point equals the relative price.

f. Suppose that the relative price of good 2 falls to 0. Repeat (a) and (b).

g. Calculate the effects of the price change on the income of the specific factors in sections 1 and 2.

h. In the text we examined the impacts of increases in the supply of capital and land. But what if the mobile factor, labor, increases in supply?
Further Reading
Annandale and Victor Nierenberg. *Theory of International Trade*. Cambridge: Cambridge University Press, 1988. The problem of establishing gains from trade when more people may be worse off has been the subject of a long debate. Clark and Nierenberg show it is always possible in principle for a country's government to increase real welfare and to improve the terms of trade in such a way that everyone is better off with free trade than with trade restrictions.


While Ricardo's principle emphasizes the national gains from trade at one point, elsewhere in his book the conflict of interests between landlords and capitalists is a central issue.

APPENDIX TO CHAPTER 3

Further Details on Specific Factors

The specific factors model developed in this chapter is such a convenient one of analysis that we take the time here to spell out some of its details more fully. We give a fuller treatment of two related issues: (1) the relationship between marginal and total product within each sector; (2) the income distribution effects of relative price changes.

Marginal and Total Product

In the text we illustrated the production function in manufacturing as two different maps. In Figure 3.1 we showed total output as a function of labor input, holding capital constant. We then observed that the slope of this curve is the marginal product of labor as it is customary to use the margin product in Figure 3.2. We now want to demonstrate that the total output is measured by the area under the marginal product curve. (Students who are familiar with calculus will find that obvious.) Marginal product is the derivative of total output. As total output is the integral of marginal. (See for these studies, however, as an intuitive approach can be helpful.)

In Figure 3.2, we show once again the marginal product curve in manufacturing. Suppose that we employ L₀ labor per-hour. How can we show the total output of manufacturers? Let's approximate this using the marginal product curve. First, let's ask what would happen if we used slightly fewer persons-hours, say L₀ - δ. Then output would be less. The fall in output would be approximately

\[dL_0 \times MPP_0\]

This is the reduction in the work force times the marginal product of labor at the initial level of employment. This reduction in output is represented by the area of the rectangle in Figure 3.4. Now subtrahen another five person-hours, the output loss will be another rectangle. This time the rectangle will be taller, because the marginal product of labor rises as the quantity of labor falls. If we continue this process until all of L₀ is gone, our approximation of the total output less the sum of all the rectangles shown in the figure. When no labor is employed, however, output will fall to zero. So we can approximate the total output of the manufacturing sector by the sum of the areas of all the rectangles under the marginal product curve.

This is, however, zero approximation, because we are using the marginal product of only the first person-hour in each batch of labor removed. We can get a better approximation if we use smaller triangles—the smaller the better. As the groups of labor removed get infinitely small, however, the rectangles get thinner and thinner, and we approximate ever more closely the true area under the marginal product curve. In the end, then, we find that the total output of manufacturers produced with labor L₀ is equal to the area under the marginal product of labor curve MPL₀ up to L₀.
Relative Prices and the Distribution of Income

Figure 3A-2: We can now see how to show the distribution of income within the manufacturing sector in terms of a given real wage. We know that employers will hire labor up to the point where the real wage in terms of manufactures, $w_P$, equals the marginal product. We can immediately read off the graph the total output in manufactures to the area under the marginal product curve. We can also read off the height of manufactures output that is paid out as wages, which is equal to the real wage times employment, and thus to the area of the rectangle shown. The rest of the output that is kept by owners of capital, then, is the remainder. We can determine the distribution of food production between labor and landlords in the same way.

Suppose the relative price of manufactures now rises. We saw in Figure 3-7 that a rise in $P_P/P_F$ lowers the real wage in terms of manufactures while raising it in terms of food. The effects of this on the incomes of capitalists and landlords can be seen in Figures 3A-3 and 3A-4. In the manufactures sector, the real wage is shown as falling from $w_P^1$ to $w_P^2$; as a result capitalists receive increased income. In the food sector, the real wage must fall from $w_F^1$ to $w_F^2$, and landlords receive less income.

This effect on income is reinforced by the change in $P_P/P_F$ itself. Owners of capital receive more income in terms of manufactures; their purchasing power is further increased by the rise in the price of manufactures relative to food. Landlords receive less income in terms of food; they are made off worse off because of the rise in the relative price of manufactures.
CHAPTER 4
Resources and Trade: The Heckscher-Ohlin Model

Labor was the only factor of production, as the Ricardoian model assumes, comparative advantage could arise only because of international differences in labor productivity in the real world, however, while trade is partly explained by differences in labor productivity; it also reflects differences in country's resources. Canada exports forest products to the United States not because its lumberjacks are more productive relative to their U.S. counterparts than other Canadians but because sparsely populated Canada has more forested land per capita than the United States. A realistic view of trade must allow for the importance not just of labor but of other factors of production such as land, capital, and mineral resources.

To explain the role of resource differences in trade, this chapter examines a model in which resource differences are the only source of trade. This model shows that comparative advantage is influenced by the interaction between nations' resources (the relative abundance of factors of production) and the technology of production (which influences the relative variability with which different factors of production are used in the production of different goods). The same idea was present in the specific factors model of Chapter 3, but the model we study in this chapter puts the interaction between abundance and intensity in sharper relief.

Traditionally trade is largely driven by differences in countries' resources is one of the most influential theories in international economics. Developed by two Swedish economists, Eli Heckscher and Bertil Ohlin (Ohlin received the Nobel Prize in economics in 1977), the theory is often referred to as the Heckscher-Ohlin theory. Because the theory emphasizes the interplay between the proportions in which different factors of production are available in different countries and the proportions in which they are used in producing different goods, it is also referred to as the factor-proportions theory.

To develop the factor-proportions theory we begin by describing an economy that does not trade, then ask what happens when two such economies trade with each other. Since the factor-proportions theory is both an important theory and a controversial one, the chapter concludes with a discussion of the empirical evidence for and against the theory.
CHAPTER 4 Resources and Trade: The Heckscher-Ohlin Model

A farmer can produce a calorie of beef with less land if he uses more labor, and vice versa. The unit labor input \( L_{u} \) is given by the cost function 

\[
\text{cost} = L_{u} \times 2
\]

that the definition of income depends on the ratio of land to labor used in production, not the ratio of land or labor to output. Thus a good cannot be both land- and labor-intensive.

Factor Prices and Goods Prices

Suppose for a moment that the economy produces both cloth and food. (This need not be the case if the economy engages in international trade, because it might specialize completely in producing one good or the other, but it is at least theoretically open this possibility.) Then converting millions of producers in each sector will ensure that the price of each good equals its cost of production. The cost of producing a good depends on factor prices. If the real rate of land is higher, then other things being equal, the price of goods whose production involves land input will also be higher.

The importance of a particular factor price to the cost of producing a good depends, however, on how much of that factor the good's production involves. If cloth production uses one very little land, then a rise in the price of land will not have much effect on the price of cloth, whereas if food production uses a great deal of land, a rise in land prices will have a large effect on its price. We can therefore conclude that there is a one-one relationship between the ratio of the wage rate to the rental rate, and the ratio of the price of cloth to the price of food, 

\[ \frac{w}{r} \]

The relationship is illustrated by the upward-sloping curve SS in Figure 4.3.

It is possible to put Figures 4.2 and 4.3 together. In Figure 4.4, the left panel is Figure 4.2 (of the SS curve) turned on its side, while the right panel reproduces Figure 4.2.

---

1 The relationship between goods prices and factor prices was clarified in a classic paper by Wolfgang Schepe and Paul Samuelson, "Protection and Real Wages," Review of Economic Studies 9 (1942), pp. 56-79, and is traditionally known as the Heckscher-Ohlin effect.
In each sector, the ratio of land to labor used in production depends on the cost of labor relative to the cost of land. This curve FF shows the land-labor ratio choices in food production. The curve CC shows the corresponding choices in cloth production. Any given wage-land ratio for food production uses a higher land-labor ratio; when this is the case, we say that food production is land-intensive and that cloth production is labor-intensive.

Because cloth production is labor-intensive while food production is land-intensive, there is a share-to-share relationship between the latter price ratio w/l and the relative price of cloth \( P_c/P_f \). The higher the relative cost of labor, the higher is the relative price of the labor-intensive good. The relationship is illustrated by the curve SS.

By putting these two diagrams together, we see what may seem at first to be a surprising linkage of the prices of goods to the ratio of land to labor used in the production of each good. Suppose that the relative price of cloth is \( P_1/P_2 \) (shift point of Figure 4.6). If the economy produces both goods, the ratio of the wage rate to the rental rate on land must equal \( w/l \). This ratio then implies that the ratio of land to labor employed in the production of cloth and food must be \( (w/l)P_2/\lambda_1 \) and \( (w/l)P_1/\lambda_2 \), respectively (right panel). If the relative price of cloth were to rise, the wage rate

Given the relative price of cloth \( P_c/P_f \), the ratio of the wage rate to the rental rate on land must equal \( w/l \). This wage-land ratio then implies that the ratio of land to labor employed in the production of cloth and food must be \( (w/l)P_c/\lambda_1 \) and \( (w/l)P_f/\lambda_2 \). If the relative price of cloth rises to \( P'_c/P'_f \), the wage-land ratio rises to \( w/l' \). This will cause the land-labor ratio used in the production of both goods to rise.

By this means, we see that the wage rate and the rental rate on land are related to the relative price of cloth and that the relative price of cloth is a function of the wage rate and the rental rate on land. This is a surprising result, given that the wage rate and the rental rate on land are determined by the productivity of labor and land, respectively. However, the relative price of cloth is a function of the wage rate and the rental rate on land, which are determined by the productivity of labor and land, respectively. This is a surprising result, given that the wage rate and the rental rate on land are determined by the productivity of labor and land, respectively. However, the relative price of cloth is a function of the wage rate and the rental rate on land, which are determined by the productivity of labor and land, respectively.
CHAPTER 4 Resources and Trade: The Herschkorn-Orin Model

The table on the back measures the economy's total supply of labor (horizontal axis) and land (vertical axis). layoffs into cloth production are measured from the lower left corner. Input into land production from the upper right corner. Given the land-labor ratio in cloth production, the cloth industry's employment of resources must be on the line OC, which is the line drawn from the origin with the slope EC/LC. Similarly, the food industry's employment of resources must be on the line OD, the line drawn from the origin with the slope EC/LP. Consequently, the intersection of the resource availability in the economy must be on both lines, and the point of intersection must be on the line OC. The elevation of resources can therefore be read off from point C, where these lines intersect.

The best way to think about this result is to recognize how resource availability affects the economy's production possibilities. In Figure 4.7 the curve O'TT represents the economy's production possibilities. Therefore, the curve O'TT represents the economy's production possibilities. Therefore, the curve O'TT represents the economy's production possibilities. Therefore, the curve O'TT represents the economy's production possibilities.
An increase in the supply of land shifts the economy's production possibility frontier from $T_1T_2$ to $T_1T_2'$ but does so disproportionately in the direction of food production. The result is that an unchanged relative price of cloth (indicated by the slope $-P_C/P_F$) cloth production actually declines from $Q_2$ to $Q_1$.

In the production of goods, we move from point 1 to point 2, which involves an actual fall in cloth output from $Q'_1$ to $Q'_2$, and a large increase in food output from $Q'_3$ to $Q'_4$.

The trend effect of increases in resources on production possibilities is the key to understanding how differences in resources give rise to international trade. An increase in the supply of land expands production possibilities disproportionately in the direction of food production, while an increase in the supply of labor expands them disproportionately in the direction of cloth production. This means that an economy with a high rate of labor to land will be relatively better at producing food than an economy with a low ratio of land to labor. Generally, an economy will tend to be relatively effective at producing goods that are intensive in the factors with which the country is relatively well-endowed.

Effects of International Trade Between Two-Factor Economies

Having outlined the production structure of a two-factor economy, we now look at what happens when two such economies, Home and Foreign, trade. As always, Home and Foreign are similar along many dimensions. They have the same tastes and therefore have
Relative Prices and the Pattern of Trade

Since Home has a higher ratio of labor to land than Foreign, Home is labor-abundant and Foreign is land-abundant. Note that abundance is defined in terms of a ratio and not in absolute quantities. If America has 80 million workers and 200 million acres (a labor-to-land ratio of one-to-two-and-a-half), while Britain has 20 million workers and 20 million acres (a labor-to-land ratio of one-to-one), we consider Britain to be labor-abundant even though it has less total labor than America. "Abundance" is always defined in relative terms, by comparing the ratio of labor to land in the two countries, not that no country is absolutely in abundance everywhere.

Since cloth is the labor-intensive good, Home’s production possibility frontier relative to Foreign is shifted out more in the direction of cloth than in the direction of food. Thus, other things equal, Home tends to produce a higher ratio of cloth to food. Because trade leads to a convergence of relative prices, one of the interthings that will be equal is the price of cloth relative to food. Because the countries differ in their factor abundances, however, for any given ratio of the price of cloth to that of food Home will produce a higher ratio of cloth to food than Foreign will. Home will have a larger relative supply of cloth. Home’s relative supply curve, then, lies to the right of Foreign’s.

The relative supply schedules of Home (HS) and Foreign (FS) are illustrated in Figure 4-4. The relative demand curve, which we have assumed to be the same for both countries, is shown as DD. If there were no international trade, the equilibrium for Foreign is at point 3. That is, the absence of trade the relative price of cloth would be lower in Home than in Foreign.

When Home and Foreign trade with each other, their relative price converges. The relative price of cloth does in Home and declines in Foreign, and a new world relative price of cloth is established at a point somewhere between the previous relative prices, say at point 2. In Home, the rise in the relative price of cloth leads to a rise in the production of cloth and a decline in relative consumption, so Home becomes an exporter of cloth and an importer of food. Conversely, the decline in the relative price of cloth in Foreign leads it to become an importer of cloth and an exporter of food.

To sum up, what we have learned about the pattern of trade: Home has a higher ratio of labor to land than Foreign; that is, Home is abundant in labor and Foreign is abundant in land. Cloth production uses a higher ratio of labor to land in its production than food; that is, cloth is labor-intensive and food is land-intensive. Home, the labor-abundant country, exports cloth, the labor-intensive good; Foreign, the land-abundant country, exports food, the land-intensive good. The general statement of the case is: Goods whose production is intensive in factors with which they are absolutely endowed.

Trade and the Distribution of Income

Trade produces a convergence of relative prices. Changes in relative prices, in turn, have strong effects on the relative earnings of labor and land. A rise in the price of cloth raises the purchasing power of labor in terms of both goods while lowering the purchasing power of land in terms of both goods. A rise in the price of food has the reverse effect. Thus international trade has a powerful effect on income distribution. In Home, where the relative price of cloth is high, people who get their income from labor gains from trade but those who derive their income from land are made worse off. In Foreign, where the relative price of cloth falls, the opposite happens. Laborers are made worse off and landowners are made better off.

The result of which a country has a relatively large supply (labor) in Foreign and a relatively small supply (labor) in Home is that one country’s export-goods producers gain from trade, but another country’s export-goods producers lose.

This conclusion is similar in one respect to one made in the case of specific factors. There we found that factors of production that are "fixed" in an import-competing industry lose from the opening of trade. Here we find that factors of production that are used intensively by the import-competing industry are hurt by the opening of trade. As a practical matter, however, there is an important difference between these two views. The specificity of factors to particular industries is often only a temporary problem. Garment makers cannot become computer manufacturers overnight, but given time the U.S. economy can shift its manufacturing employment from declining sectors to expanding ones. Thus income distribution effects arise because labor and other factors of production are immobile important a temporary, transitional problem which is not to say that such effects are not present to those who lose. In contrast, effects of trade on the distribution of income among land, labor, and capital are more or less permanent.
PART 1  International Trade Theory

We will see shortly that the trade pattern of the United States suggests that compared with the rest of the world the United States is absolutely endowed with highly skilled labor and that low-skill labor is comparatively scarce. This means that international trade tends to make low-skilled workers in the United States worse off—temporarily, but on a sustained basis. The negative effect of trade on low-skilled workers poses a persistent political problem. Industries that use low-skill labor intensively, such as apparel and shoes, commonly demand protection from foreign competition, and their demands attract considerable sympathy because low-skilled workers are relatively thinly spread off to begin with.

The difference between income distribution effects due to immobility and those due to differences in factor intensity also reveals that there is frequently a conflict between short-term and long-term interests in trade. Consider a highly skilled U.S. worker who is employed in an industry that is intensive in low-skill labor. His short-term interest is to restrict international trade, because he cares intensely about jobs. Over the long term, however, he would be better off with free trade, which will increase the income of skilled workers generally.

Factor Price Equalization

In the absence of trade, labor would earn less in France than in Foreign, and land would earn more. Without trade, labor-abundant France would have a lower relative price of cloth than land-abundant Foreign, and the difference in relative prices of goods implies an even larger difference in the relative prices of factors. When Home and Foreign trade, the relative prices of goods converge. This convergence, in turn, causes convergence of the relative prices of land and labor. Thus there is a tendency toward equalization of factor prices. How far does this tendency go?

The surprising answer is that in the model this tendency goes far the way. International trade leads to complete equalization of factor prices. Although Home has a higher ratio of labor to land than Foreign, once they trade, each worker that gets paid the same in the new equilibrium, and the cost of land are the same in both countries. To see this, refer back to Figure 4.1, which shows that the given the prices of cloth and food we can determine the wage ratio and the rental rate without reference to the supplies of land and labor. (If Home and Foreign face the same relative prices of cloth and food, they still hire the same factor prices.

To understand how this equalization occurs, we have to make the trade that Home earns and Foreign earns. Each worker gets more than a simple exchange of goods. In an indirect way the two countries are in effect trading factors of production. Home labor earns Foreign have the use of stems of labor-abundant labor, but by selling the labor directly by selling goods produced with a high ratio of labor to land for goods produced with a low labor-to-land ratio. The goods that Home would require more labor to produce than the goods it receives in return; that is, more labor is embodied in France's exports than in its imports. Thus France expects labor, embodied in its labor-intensive exports. Conversely, Foreign's exports embody more land than its imports, then Foreign is labor-intensive exporting its land. When viewed this way, it is not surprising that trade leads to equalization of the two countries' factor prices.

Although this view of trade is simple and appealing, there is a major problem: in the real world factor prices are not equalized. For example, there is an extremely wide range of wage rates across countries (Table 4.1). While some of these differences may reflect differences in the quality of labor, they are too wide to be explained away on this basis. To understand why the model doesn't give us an accurate prediction, we need to look at its assumptions. Three assumptions central to the prediction of factor price equalization are in reality rather narrow. These are the assumptions that (1) both countries produce both goods; (2) technologies are the same; and (3) trade actually equalizes the prices of goods in the two countries.

1. To derive the wage and rental rate from the prices of cloth and food in Figure 4.3, we assumed that the country produced both goods. This need not, however, be the case. A country with a very high ratio of labor to land might produce only cloth, while a country with a very high ratio of land to labor might produce only food. This implies that factor price equalization occurs only if the countries involved are sufficiently similar in their relative factor endowments. A more thorough discussion of this point is given in the appendix to this chapter. Thus, factor price equalization cannot be expected because normally different amounts of capital to labor or of skilled to unskilled labor.

2. The proposition that trade equalizes factor prices will not hold if countries have different technologies of production. For example, a country with superior technology might have a higher wage rate and a higher rental rate than a country with inferior technology. An extended form of this chapter, recent work suggests that if it is not essential to allow for such differences in technology to reconcile the proposition model with actual data on world trade.

3. Finally, the proposition of complete factor price equalization depends on complete convergence of the prices of goods. In the real world, prices of goods are not fully equalized by international trade. This lack of convergence is due to such natural barriers (such as transportation costs) and barriers to trade such as tariffs, import quotas, and other restrictions.
CHAPTER 4  Resources and Trade: The Heckscher-Ohlin Model

This is an argument with much more than purely academic significance. If one regards the growing inequality of income as an aggregate problem, as many people do, and if one also believes that growing world trade is the main cause of this problem, then it becomes difficult to maintain the traditional support of economists for free trade. (As we pointed out in Chapter 3, in principle, taxes and government payments can offset the effect of trade on income distribution, but one may argue that this is unlikely to happen in practice.) Some influential commentators have argued that advanced nations will have to restrict their trade with low-wage countries if they want to remain basically middle-class societies.

While some economists believe that growing trade with low-wage countries has been the main cause of growing inequality of income in the United States, however, most empirical workers believe that the cause of rising inequality is not international trade but rather the growing gap between the incomes of skilled and unskilled workers.

First, although advanced countries are capital-abundant, goods and services produced in labor-intensive countries, as of the 1990s there had been virtually no change in the distribution of income between capital and labor; the share of compensation (wages plus benefits) in U.S. national income was the same (51 percent) in 1990 as it had been in 1973. So in most of the trade story could apply as a shift in the distribution of income between skilled and unskilled workers, rather than between nations and capital.

Second, the factor proportions model says that international trade affects the income distribution via a change in relative goods prices. So if international trade was the main driving force behind growing inequality, there ought to be clear evidence of a rise in the price of skill-intensive products compared with those of unskilled-labor-intensive goods. Studies of international price data, however, failed to find clear evidence of such a change in relative prices.

Third, the model predicts that relative price factors should converge. If wage of skilled workers are rising and those of unskilled workers stagnating, the relative skill-abundant country should be importing. While data on wages and income distribution in the NIES are poor, casual observation suggested that in many countries, especially in China, the reverse was true. Income inequality was increasing at least as rapidly in the NIES as in the advanced countries, and skilled workers were doing very well.

Fourth, although trade between advanced nations and NIES has grown rapidly, it still constitutes only a small percentage of total spending in the advanced nations. As a result, estimates of the "factor content" of this trade—the skilled labor exported, in effect, by advanced countries embodied in skill-intensive exports, and the unskilled labor, in effect, imported in labor-intensive exports—can still only a small fraction of the total supply of skilled and unskilled labor. This suggests that these trade flows cannot have had a large impact on income distribution.

What, then, is responsible for the growing gap between skilled and unskilled workers in the United States? The view of the majority is that the villain is not trade but technology, which has developed less-skilled work. The view that trade is in fact the main explanation still has a number of adherents, however.

Table 4-2  Comparison of Domestic and Foreign Products

<table>
<thead>
<tr>
<th>Agricultural Products</th>
<th>Mining Products</th>
<th>Manufactured Goods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>23</td>
<td>65.5</td>
</tr>
<tr>
<td>1995</td>
<td>25.5</td>
<td>67.5</td>
</tr>
</tbody>
</table>

Source: World Trade Organization.

**CHAPTER 4  Resources and Trade: The Heckscher-Ohlin Model**

### Table 4-2  Factor Costs of U.S. Exports and Imports for 1972

<table>
<thead>
<tr>
<th>Country</th>
<th>Labor (per hour) per million dollars</th>
<th>Capital (per hour) per million dollars</th>
<th>Average years of education per worker</th>
<th>Proportion of engineers and scientists in work force</th>
</tr>
</thead>
<tbody>
<tr>
<td>Export</td>
<td>119</td>
<td>134</td>
<td>9.9</td>
<td>0.0189</td>
</tr>
<tr>
<td>Import</td>
<td>136</td>
<td>178</td>
<td>15.1</td>
<td>0.0235</td>
</tr>
</tbody>
</table>


**Tests on Global Data**

Most recently, economists have attempted to test the Heckscher-Ohlin model using data for a large number of countries. An important study by Harry R. Bowes, Edward S. Lazear, and Len Swidkowski was based on the idea described earlier that, if certain factors are significantly related to the relative prices of goods, then the relative prices of goods should vary with the relative abundance of these factors. Bowes et al. used an empirical procedure to test the hypothesis that the relative abundance of various factors was a good predictor of the relative prices of goods.

Table 4-4 shows one of the key tests of Bowes et al. For example, in the second column of the table, the column labeled "Labor" shows the relative abundance of labor in the country. In this case, the relative abundance of labor is higher in the country with a lower price of goods. This supports the Heckscher-Ohlin model, which predicts that the relative abundance of a factor will affect the relative price of goods. However, the results can vary depending on the specific factors considered and the empirical model used.

**Tests on North-South Trade**

Although the overall pattern of international trade does not seem to be very well understood, this is not true for a specific Heckscher-Ohlin model. North-South trade is characterized by the fact that developed countries tend to export goods that are labor-intensive and import goods that are capital-intensive. This is because developed countries have a relative abundance of capital, while developing countries have a relative abundance of labor. This pattern is often referred to as the Heckscher-Ohlin model, which predicts that the relative abundance of a factor will affect the relative price of goods.

The results of these tests can vary depending on the specific factors considered and the empirical model used. However, the overall pattern of North-South trade is consistent with the predictions of the Heckscher-Ohlin model.
CHAPTER 4 Resources and Trade: The Heckscher-Ohlin Model

production, this predicts not only the direction but also the volume of trade. Factor trade in general turns out to be much smaller than the Heckscher-Ohlin model predicts.

A large part of the reason for this disparity comes from a false prediction of large-scale trade in labor between rich and poor countries. Consider the United States, on one side, and China on the other. The United States has about 250 million workers, but only about 5 percent of the world’s workers; so a simple factor proportions story would suggest that U.S. imports of labor embodied in trade goods are huge, something like four times as large as the nation’s own labor force. In fact, calculations of the factor content of U.S. trade show only small net exports of labor. Conversely, China has less than 3 percent of world income but approximately 15 percent of the world’s workforce; it therefore "should" expect most of its total trade—but it does not.

Many trade economists now believe that this puzzle can be resolved only by dropping the Heckscher-Ohlin assumption that technologies are the same across countries. The way that results works is roughly as follows: if workers in the United States are much more efficient than those in China, then the "efficiency" labor surplus in the United States is much larger compared with that of China than the raw data suggests—and hence the expected volume of trade between labor-abundant China and labor-scarce America is correspondingly less. As we pointed out earlier, technological differences across countries are also one likely explanation for the dramatic failure of factor-price equalization to hold, as documented in Table 4-1.

If one makes the working assumption that technological differences between countries take a simple multiplicative form—that is, that a given set of inputs produces only 0 times as much in China as it does in the United States, which is a much smaller number than —it is possible to use data on labor trade to estimate the relative efficiency of production in different countries. Table 4-6 shows Tarfett’s estimates for a sample of countries; why suggest that technological differences are at least very large.

But in any case, once we conclude that technology varies across countries, why should we assume that it is the same across all countries? Why not suppose instead that different countries have specific areas of expertise? The British are good at software, the French at furniture, the Americans at action movies, and so on? In that case the pattern of international trade might be determined as much by these differing technological capacities as by factor endowments.

Implications of the Theory

The main results of our factor proportions theory point international economists in a difficult direction. We saw in Chapter 2 that empirical evidence broadly supports the Ricardian model’s prediction that countries will export goods in which their labor is especially productive. Most international economists, however, regard the Ricardian model as too limited to serve as their basic model of international trade. By contrast, the Heckscher-Ohlin model has long occupied a central place in trade theory, because it allows a simultaneous treatment of issues of income distribution and the pattern of trade. So the model that predicts trade best is too limiting for other purposes, while this new strong evidence against the pure Heckscher-Ohlin model.

While the Heckscher-Ohlin model has been less successful in explaining the actual patterns of international trade than one might hope, it remains vital for understanding the effects of trade, especially its effects on the distribution of income. Indeed, the growth of
Table 4.4  (Concluded on page 1)
(United States $1)  

<table>
<thead>
<tr>
<th>Country</th>
<th>0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>0.17</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>0.41</td>
</tr>
<tr>
<td>Japan</td>
<td>0.70</td>
</tr>
<tr>
<td>West Germany</td>
<td>0.79</td>
</tr>
</tbody>
</table>


North-South trade in manufactures—a trade in which the factor intensity of the North’s imports is very different from that of its exports—has bought the factor proportions approach into the center of practical debates over international trade policy.

Summary

1. To understand the role of resources in trade we develop a model in which the two goods are produced using two factors of production. The two goods differ in their factor intensity, that is, the amount of one-factor input. Production of one of the goods will use a higher share of labor than compared to production of the other.

2. As long as a country produces both goods, there is a one-to-one relationship between the relative prices of goods and the relative prices of factors used to produce the goods. A rise in the relative price of the labor-intensive good will shift the distribution of income in favor of labor, and will do so very strongly. The real wage of labor will rise in terms of both goods, while the real income of farmers will fall in terms of both goods.

3. An increase in the supply of one factor of production expands production possibilities, but in a strongly biased way: As unchanged relative goods prices, the output of the goods intensifies in that factor ratio. The output of the other actually falls. A country can use production relatively more of goods that use the abundant resource intensively. The result is the basic Heckscher-Ohlin theory of trade: Countries tend to export goods that are intensive in the factors with which they are abundantly supplied.

4. Because changes in relative prices of goods have very strong effects on the relative earnings of resources, countries become endowings relative prices, international trade has strong income distribution effects. The owners of a country’s abundant factors gain from trade, but the owners of scarce factors lose.

5. In an idealized model international trade would actually lead to equalization of the prices of factors such as labor and capital between countries. In reality, complete factor-price equalization is not observed because of wide differences in resources, barriers to trade, and institutional differences in technology.
Factor Prices, Goods Prices, and Input Choices

In the main body of this chapter we made two assertions that were true but not carefully derived. First was the assertion, embodied in Figure 4-2, that the ratio of land to labor employed in each industry depended on the wage-ratio within. Second was the assertion, embodied in Figure 4-3, that there is a one-to-one relationship between relative good prices $P_Y/P_X$ and the wage-ratio. This appendix briefly demonstrates both propositions.

Choice of Techniques

Figure 4A-1 illustrates again the trade-off between labor and land input in producing one unit of food—the net imputation for food production shown in curve II. It also illustrates another important point: as labor input increases, the total cost of producing that unit, K, is

$$K = w_0 + \gamma a_y.$$  

A line showing all combinations of $a_y$ and $w_0$ with the same cost has the equation

$$a_y = K - \gamma w_0.$$  

That is, it is a straight line with a slope of $- \gamma$. The figure shows a family of such lines, each corresponding to a different level of costs: lines further from the origin indicate higher total costs. A producer will choose the lowest possible cost given the technological trade-off outlined by curve II. Here, this occurs at point 1, where $w_0$ is equal to the lowest line and the slope of $K$ equals $- \gamma$. If these results seem reminiscent of the proposition in Figure 3-5, that the country produces at a point on the production possibility frontier whose slope equals minus the wage-ratio, you are right.

The same principle is involved.

Now compare the choice of land-labor ratio for two different factor price ratios. In Figure 4A-2 we show input choice gives a low relative price of labor, $a_y$ (with a high relative price of labor, $\gamma w_0$, in the former case the input choice is at $a_1$ in the lower case at $a_2$). That is, the higher relative price of labor leads to the choice of a higher land-labor ratio, as assumed in Figure 4-2.
CHAPTER 4 Resources and Trade: The Heckscher-Ohlin Model

Determining the Wage-Rental Ratio

The two isoquants CC and FF show the inputs necessary or productive output of cloth and food, respectively. Since price must equate the cost of production, the inputs into each good must also cost one dollar (this means that the wage-rental ratio must equal minus the slope of a 45-degree line through both isoquants.

Goods Prices and Factor Prices

We now turn to the relationship between goods prices and factor prices. There are several equivalent ways of approaching this problem, here we follow the analysis introduced by Abraham Lerner in the 1930s.

Figure 4A.3 shows land and labor inputs into both cloth and food production. In previous figures we have shown the inputs required to produce one unit of a good. In this figure, however, we show the inputs required to produce one dollar's worth of each good (actually, any dollar amount will do, as long as it is the same for both goods). Then the isoquant for cloth, CC, shows the possible input combinations for producing US. units of cloth. In contrast, for food, FF shows the possible combinations for producing US. units of food. Notice that as driven, food production is land-intensive. For any given US. of cloth production will always use a higher land-labor ratio than cloth production.

If the economy produces both goods, then it must be the case that the cost of producing one dollar's worth of both goods is the same. This existence is only possible, however, if the minimum-cost point of production for both goods lie on the same isocost line. Thus the wage-rental ratio W/L must be the slope of the isocost line, which is just tangent to both isoquants.

Finally, now, consider the effect of a rise in the price of cloth on the wage-rental ratio.

If the price of cloth rises, it becomes necessary to produce fewer yards of cloth in order to have one dollar's worth. Thus the isoquant corresponding to a dollar's worth of cloth shifts inward. In Figure 4A.4, the original isoquant is shown as CC', the new isoquant as CC''. Once again we may draw a line that is just tangent to both isoquants, the slope of this line is the wage-rental ratio. It is immediately apparent from the inverse slopes of the isoquant line (slope = NEP) that the area W/L is higher than the previous one: A higher relative price of cloth implies a higher wage-rental ratio.
CHAPTER 5
The Standard Trade Model

Previous chapters developed three different models of international trade, each of which makes different assumptions about the determinants of production possibilities. To bring out important points, each of these models leaves out aspects of reality than the others stress. These models are:

- The Ricardian model. Production possibilities are determined by the allocation of a single resource, labor, between sectors. This model conveys the essential idea of comparative advantage but does not allow us to talk about the distribution of income.
- The specific factor model. While labor can move freely between sectors, there are other factors specific to particular industries. This model is ideal for understanding income distribution but awkward for discussing the pattern of trade.
- The Heckscher-Ohlin model. Multiple factors of production can move between sectors. This is a harder model to work with than the first two but conveys a deeper understanding of how resources may drive trade patterns.

When we analyze real problems, we want to base our insights on a measure of the models. For example, in the 1990s one of the central changes in world trade was the rapid growth in exports from newly industrializing economies. These countries experienced rapid productivity growths, and during the 1990s these countries grew rapidly. To apply the Ricardian model of Chapter 2, the changing pattern of trade has differential effects on different groups in the United States. To understand the effects of increased Pacific trade in U.S. income distribution, we may want to apply the specific factor model of Chapter 3. Finally, over time the resources of the newly industrializing nations have changed. If these countries have more educated, skilled labor, their labor becomes scarcer. To understand the implications of this shift, we may want to turn to the Heckscher-Ohlin model of Chapter 4.

In spite of the differences in their details, our models share a number of features:

1. The productive capacity of an economy can be summarized by its production possibility frontier and differences in these frontiers give rise to trade.
2. Production possibilities determine a country’s relative supply schedule.
3. World equilibrium is determined by world relative demand and a world relative supply schedule that lies between the material and non-material supply schedules.

Because of their common features, the models we have studied may be viewed as special cases of a more general model of a trading world economy. There are many important issues in international economics whose analysis can be conducted in terms of this general model, with only the details depending on which special model you choose. These issues include the effects of shifts in world supply resulting from economic growth shifts in world demand resulting from foreign aid, over-repayments, and other international transfers of income, and simultaneous shifts in supply and demand resulting from tariffs and export subsidies.

This chapter attempts to show insights from international trade theory that are not strongly dependent on the details of the economy's supply side. We develop a standard model of a trading world economy in which the models of Chapters 2 and 3 can be regarded in special cases and use this model to ask how a variety of changes in underlying parameters affect the world economy.

A Standard Model of a Trading Economy

The standard trade model is built on four key relationships: (1) the relationship between the production possibility frontier and the relative price curve; (2) the relationship between relative price and relative demand; (3) the determination of world equilibrium by world relative supply and world relative demand; and (4) the effect of terms of trade—the price of a country's exports divided by the price of its imports—on a nation's welfare.

Production Possibilities and Relative Supply
For the purposes of our standard model we assume that each country produces two goods, food (F) and cloth (C), and that each country's production possibility frontier is a smooth curve that is illustrated by TT in Figure 5.1.

The point on its production possibility frontier at which an economy actually produces depends on the price of cloth relative to food, P_c/P_f. It is a linear projection of microeconomics that a market economy that is not distorted by monopoly or other market failures is efficient in production, that is, maximizes the value of output at given market prices, P_cQ_c + P_fQ_f.

We can indicate the market value of output by drawing a number of isoquant lines—lines along which the value of output is constant. Each of these lines is defined by an equation of the form P_cQ_c + P_fQ_f = Y or by rearranging Q_c = Y/P_c - (P_f/P_c)Q_f, where Y is the value of output. The higher Y is, the further out an isoquant line is; thus isoquant lines further from the origin correspond to higher values of output. The slope of an isoquant line is minus the relative price of cloth. The economy will produce the highest value of output it can, which can be achieved by producing at point Q, where TT is just tangent to an isoquant line.

Now suppose that P_f/P_c is too high. Then the isoquant lines would be steeper than before. In Figure 5.2 the highest isoquant line the economy could reach before the change in P_f/P_c is shown as Y'. The highest line after the price change is Y'', the point at which the economy produces shifts from Q' to Q''. Thus, as we might expect, a rise in the relative price of cloth leads the economy to produce more cloth and less food. The relative supply of cloth will therefore rise when the relative price of cloth rises.

Relative Prices and Demand

Figure 5.3 shows the relationship among production, consumption, and trade in the standard model. As we shall see in Chapter 3, the value of an economy's consumption equals the value of its production

\[ P_cQ_c + P_fQ_f = P_cQ_c + P_fQ_f = Y \]

where Q_c and Q_f are the consumption of cloth and food, respectively. The equality above says that production and consumption must lie on the same isoquant line.

footnote: We know that these are only very rough estimates, but in Chapter 3, the production possibility frontier is not a straight line. The same model, however, will still be a useful exercise and the balance can be moved in an enormous way.
The economy's choice of a point on the indifference curve depends on the tastes of its consumers. For our standard model, we make the useful simplifying assumption that the economy's consumption decision may be represented as if they were based on the tastes of a single representative individual.

The tastes of an individual can be expressed graphically by a series of indifference curves. An indifference curve traces out a set of combinations of cloth (C) and food (F) consumption that leave the individual equally well off. Indifference curves have three properties:

1. They are downward sloping. If an individual is offered less F, then he or she is made equally well off.
2. The farther up and to the right an indifference curve lies, the higher the level of satisfaction to which it corresponds. An individual will prefer any point that is to the right and above any point that is to the left and below.
3. Each indifference curve shifts as we move to the right. The more C and the less F an individual consumes, the more valuable is a unit of F in the marginals compared with a unit of C. Thus, C and F have to be provided to compensate for any further reduction in F.

In Figure 5-3 we show a set of indifference curves for the economy that have these three properties. The economy will choose to consume at the point on the indifference curve that yields the highest possible welfare. This point is where the indifference curve is tangent to the highest possible indifference curve, showing here as point D. Notice that at this point the economy exports cloth (the quantity of cloth produced exceeds the quantity of cloth consumed) and imports food. (If this is not obvious, refer back to our discussion of the pattern of trade in Chapter 3.)

Now consider what happens when A/F is increased. In Figure 5-4 we show the effects. First, the economy produces more C and less F, shifting production from D to D'. This shifts the indifference curve on which consumption lies, from V to V'. The economy's consumption choice therefore also shifts from E to E'.

The move from D to D' affects two effects. The first is E/F. First, the economy has moved to a higher indifference curve. It is better off. The reason is that this economy is an exporter of cloth. When the relative price of cloth decreases, the economy is able to import more food for any given volume of exports. Thus the higher relative price of export goods generates an advantage. Second, the change in relative prices leads to a shift along the indifference curve, toward food and away from cloth.

These two effects are familiar from basic economic theory. The rise in welfare is an income effect; the shift in consumption is an expenditure effect. The income effect tends to increase consumption of both goods, while the substitution effect acts to make the economy consume less C and more F.
The Higher $P_F$ is, the larger the world supply of cloth relative to food ($RS$) and the lower the world demand for cloth relative to food ($RD$). Equilibrium relative prices ($P_C/P_F)$ is determined by the intersection of the world relative supply and demand curves.

measured by $P_C/P_F$, while Foreign's are measured by $P_C/P_F$ and $Q_F$ are the quantities of cloth and food produced by Home ($Q_H$) and $Q_F$ are the quantities produced by Foreign.

To determine $P_C/P_F$, we find the intersection of world relative supply of cloth and world relative demand. The world relative supply curve ($OS$ in Figure 5-3) is upward sloping because an increase in $P_C/P_F$ leads both countries to produce more cloth and less food. The world relative demand curve ($OR$ is downward sloping because an increase in $P_C/P_F$ leads both countries to shift their consumption mix away from cloth toward food. The intersection of the curves (point 1) determines the equilibrium relative price ($P_C/P_F$).

Note that we know how relative supply, relative demand, the terms of trade, and welfare are determined in the standard model, we can see that this is understood a number of important issues in international economics.

Economic Growth: A Shift of the RS Curve

The effects of economic growth in a trading world economy are a potential source of controversy. The debate revolves around two questions. First, is economic growth in other countries good or bad for one country? Second, is growth in a country some less valuable when the nation is part of a closely integrated world economy?

In assessing the effects of growth in other countries, comparative advantages can be made on either side. One side, the growth in the rest of the world may be good for our economy because it means larger markets for our exports. On the other side, growth in other countries may mean increased competition for our exports. Similar ambiguities mean present when we look at the effects of growth at home. On one hand, growth in an economy's production capacity should be more valuable when that country can sell some of its increased production to the world market. On the other hand, the benefits of growth may be offset in the form of lower prices for its country's exports rather than retained at home.
CHAPTER 5 The Standard Trade Model

5. The specific features of our model of Chapter 3 and the famous Heckscher-Ohlin model of Chapter 4 both derive from an increase in a country's supply of a factor of production, say, an increase in the capital stock resulting from saving and investment, and produce biased expansion of production possibilities. The bias will be in the direction of either the good to which the factor is specific or the good whose production is intensive in the factor whose supply has increased. Thus the same consequences are true for international trade as well as biased growth in a trading economy.

The biases of growth in Figure 5.6 and 5.6a are strong. In each case the economy is able to produce more of both goods, but at an exchange rate where the output of cloth actually falls in Figure 5.6a, while the output of cloth actually rises in Figure 5.6b. Although growth is not always as strongly biased as it is in these examples, every growth path is more strongly biased toward cloth rather than food, even if it occurs to a rising output relative price of cloth, a rising output relative price of cloth.

Relative Supply and the Terms of Trade

Suppose now that the Home experiences growth strongly biased toward cloth, so that its output of cloth rises at a given relative price of cloth, while its output of food declines. Then for the world as a whole the output of cloth relative to food will rise at any given price and the world relative supply curve will shift to the right from RS to RS' (Figure 5.7a). This shift results in a decrease in the relative price of cloth from \( P_{CL}/P_{FO} \) to \( P'_{CL}/P'_{FO} \), a worsening of Home's terms of trade and an improvement in Foreign's terms of trade.

Notice that this important consideration here is not which country grows but the bias of the growth. If Foreign had experienced growth biased toward food, the effect on the relative supply curve and thus on the terms of trade would have been the same. On the other hand, either Home or Foreign growth biased toward food (Figure 5.7b) leads to a downward slope of the RS curve (RS" to RS") and thus to a rise in the relative price of cloth from \( P''_{CL}/P''_{FO} \) to \( P''_{CL}/P''_{FO} \). This increase in an improvement in Home's terms of trade, a worsening of Foreign's.

Growth that disproportionally expands a country's production possibilities in the direction of the good it exports (cloth in Home, food in Foreign) is export-biased growth. Similarly, growth biased toward the good a country imports is import-biased growth. Our analysis leads to the following general principle: Export-biased growth tends to worsen a growing country's terms of trade, so the benefit of the rest of the world; import-biased growth tends to improve a growing country's terms of trade at the cost of the rest of the world.

International Effects of Growth

Using this principle, we are now in a position to answer our questions about the international effects of growth. Is growth in the rest of the world good or bad for our country? Does the fact that our country is part of a trading world economy increase or decrease the benefits of growth? In each case the answer depends on the terms of the good. Export-biased growth in the rest of the world is good for us, improving our terms of trade, while import-biased growth abroad worsens our terms of trade. Export-biased growth in our own
The Steelcut trade Model

CHAPTER 3

Has the Growth of Newly Industrializing Countries Hurt Advanced Nations?*

In the early 1973, many observers began warning that the growth of newly industrializing economies poses a threat to the property of advanced nations. In the case study in Chapter 4 on N. To-South trade we addressed one way in which (r) growth might prove a problem: It might aggravate the growing gap in income between high-skill and low-skill workers in advanced nations. Some observers, however, believed that the threat was still broader: that (2) the wages of skilled workers in advanced nations had been or would be reduced by the appearance of new competitors. For example, a (3) report released by the European Commission (the administrative arm of the European Union) in its listing reasons for Europe’s economic difficulties, emphasized the fact that “other countries are becoming more and more competitive and competing with us—even on our own markets—at costs levels which we cannot match.” Another report by the industrial group showed that the pricing produc-tive of their competitors would reduce prices on our markets, to such an extent that “the earning power of many countries in trade” is at stake.

Are these concerns justified? At first sight it may seem obvious that growth of food in less-developed economies threatens a country’s standard of living. As we have seen above, however, the effect of growth stands in a bias of bias is by no means maximized, or even performed, on a high level. The effect of the increased wages of other countries’ will flow into the hands of the country’s workers, and if it is spread toward the advanced country’s wages will reduce its real income via a decrease in terms of trade.

It is difficult to determine the direction of bias in the growth of newly industrializing countries. It is easy, however, to check directly whether the terms of trade of advanced countries have in fact deteriorated sufficiently to sustain a major drag on their real incomes. Table 5.1, from the International Monetary Fund’s report on real exchange rate changes, shows the terms of trade for three groups of countries over two decades (the numbers for 1991-2002 are partly a

**International Trade Theory**

**Table 5-1**

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Advanced countries</td>
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</tr>
<tr>
<td>Oil-importing developing countries</td>
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<td>+2.0</td>
<td>+0.2</td>
</tr>
<tr>
<td>Non-oil-importing developing countries</td>
<td>-0.6</td>
<td>-0.2</td>
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</tbody>
</table>

**International Transfers of Income: Shifting the ND Curve**

We now turn from terms of trade changes originating on the supply side of the world economy to changes that originate on the demand side.

While world demand for goods may shift for many reasons, taxes may change. With rising concern over inflation, demand for this has risen relative to the demand for real man. Technology may also change demand. What all fueled pumps at one time was supplanted by kerosene, later by gas, and finally by electricity. In international economics, however, perhaps the most important and controversial issue is the shift in world relative demand that can result from international transfers of income.

In the past, transfers of income between nations often occurred in the aftermath of war. Germany demanded a payment from France after the latter's defeat in the Franco-Prussian War of 1871; after World War I the victorious Allies demanded large reparations payments from Germany (country never paid). After World War II, the United States provided aid to defeated Japan and Germany as well as to various allies to help them adjust. Since the 1950s, advanced countries have provided aid to poorer nations, although the same have made a major contribution to the income of only a few of the very poor countries. Financial transfers are not a widely accepted solution to income, since the normal remover of spending power has been the commoner with an obligation to repay later. In the short run, however, the economic effects of a sum of money given outright to a nation and the same sum lent to that nation are similar. Thus an analysis of international income transfers is also useful in understanding the effects of international loans.

**The Transfer Problem**

The issue of how international transfers affect the terms of trade was raised in a famous debate between two great economists, J.B. Clark (one of the creators of the concept of the degree of trade) and John Maynard Keynes. The subject of the debate was the reparations payments demanded of Germany after World War I, and the question was how much of the burden of these payments represented to the German economy.

Keynes, who made a forceful case that the large, forced terms of the Allies (the "Contingent royal") were too heavy, argued that the controversy was being demanded more in an abstract discussion of the "what burdened Germany" idea. He pointed out that to pay money to other countries, Germany would have to export more goods and import less. To do this, he argued, Germany would have to make its exports cheaper relative to its imports. The resulting worsening of Germany's terms of trade would add in excess of the direct burden of the payment.

On the other hand, Keynes was right in assuming that Germany's terms of trade would worsen. He overestimated that when Germany raised are of terms relative to its exports, it earned for goods would automatically decrease. At the same time, the reparations payment would be distributed in other countries in the form of reduced taxes or increased government spending, and some of the resulting increased foreign demand would be for German exports. Thus Germany might be able to reduce imports and increase exports without having its terms of trade worsen.

In particular, the exchange of the so-called "traders turn out to be the point. In the end, Germany paid very little of its reparations. The terms of the trade effects of a transfer, however, is a surprisingly weak variety of terms in international economics.

**Effects of a Transfer on the Terms of Trade**

If Home makes a transfer of some of its income to Foreign, Home's income is reduced, and it must reduce its reproduction. Correspondingly, Foreign increases its expenditure. This shift in the national division of world spending may lead to a shift in world relative demand and, thus, the terms of trade.

The shift in the ND curve (if it occurs) is the only effect of a transfer of income. The BS curve does not shift. As long as only income is being transferred, and not physical resources like capital equipment, the production and trade for any given relative price will not change in either country. Thus the transfer problem is a purely demand-side issue.

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For notes, see "The German Transit Policy" and "Optimum and the German Transit Problem: A Discussion," both in *German Journal of International Economics: 136, 152-158, respectively."
The RD curve does not necessarily shift when world income is redistributed, however (this was Ohlin's point). If Foreign allocates its extra income between cloth and food in the same proportions that Home does, then world spending on cloth and food will not change. The RD curve will not shift, and there will be no terms of trade effect.

If the two countries do not allocate their extra income in the same proportions, however, there will be a terms of trade effect; the direction of the effect will depend on the difference in Home and Foreign spending patterns. Suppose that Home allocates a higher proportion of its marginal income to expenditure on cloth than Foreign does. That is, Home has a higher marginal propensity to spend on cloth than Foreign. (Correspondingly, Home in this case must have a lower marginal propensity to spend on food.) Then at any given relative price, Home's transfer payment to Foreign tends to increase for cloth and decrease for food. In the case the RD curve shifts to the left, from RD to RD₂ (Figure 5-5) and equilibrium shifts from point 1 to point 2. This shift lowers the relative price of cloth from (P̂₂/P̂₁) to (P̂₂/P̂₁), increasing Home's terms of trade because it imports cloth while importing Foreign's. This is the case that Keynes described. The essential effect of an international transfer on terms of trade reinforces its initial effect on the incomes of the two countries.

If Home has a higher marginal propensity to spend on cloth, a transfer to Home from Foreign shifts the RD curve right, and improves Home's terms of trade at Foreign's expense. This effect offsets both the desire effect on Home's income and the positive effect on Foreign's income.

In general, then, a transfer transfers power to Home. If the donor has a higher marginal propensity to spend its surplus, the recipient gains. If the donor has a lower marginal propensity to spend its surplus, the terms of trade will actually improve.

If Home has a higher marginal propensity to spend on cloth than Foreign's marginal propensity, Home's terms of trade are transferred to Home from Foreign. The RD curve shifts to the left, from RD to RD₂, increasing the equilibrium relative price of cloth.

Relative price of cloth,

Foreign's

Home's

Nucleus quantity of cloth, Q̂₂

Q̂₁

Comparison of the following factors suggests that if the United States were to transfer some of its surplus to Greece, the relative demand for U.S. goods would fall and the U.S. terms would decline, just as Keynes argued.

The United States spends so much of its income on its home because of barriers to trade, both natural and artificial. Transportation costs, tariffs, and so on, impose an import quota (government regulations that limit the amount of imports) that cause residents of each country to buy more goods and services at home rather than import them from abroad. As we noted in Chapter 2, the effect of such barriers to trade is to create a set of restricted goods. Even if every country divides its income among different goods in the same proportions, local preference for restricted goods will ensure that spending has a national bias.

In considering the following example, suppose that there are two butchers: one whose goods are cloth, food, and barley; the other, only cloth. The former produces cloth, the latter only cloth. Home, however, a not a creditor good that each country produces for itself. Each country exports cloth to the other, and in doing so gains. Even though the countries have the same tastes, each of them produces two-thirds of its income domestically and one-third of imports.

As a practical possibility is implied by this analysis. A transfer payment—say foreign aid—could considerably improve the donor's terms of trade to such an extent that the donor's terms of trade off and the recipient worse off. In this case it is definitely better to give than to receive. State theoretical work has shown for this reason, like the case of rearranging growth, is possible in a rigorously specified model. The conditions are, however, even more stringent than those for rearranging growth, and this possibility is almost surely probably theoretical.¹

No tariffs or quotas can give rise to what looks like a natural preference for all goods produced domestically. But to analyze the effects of a tariff or quota on the terms of trade we need to know what happens to the supply and demand for exports. Here the crucial point is that a country's competitive goods compete with imports from abroad. A transfer of income from the United States to the rest of the world lowers the demand for manufactured goods in the United States, releasing resources that can be used to produce U.S. exports. As a result, the supply of U.S. exports falls. At the same time, the transfer of income from the United States to the rest of the world increases the rest of the world's demand for nontradable goods because some of that income is spent on housing and other nontradable services. The increases in the demand for nontradable goods in the rest of the world draws foreign resources away from imports and increases the supply of foreign exports (which are U.S. imports). The result is that a transfer by the United States to other countries may lower the price of U.S. exports relative to foreign, non-U.S. terms of trade.

Tariffs also cause resources to move between the nontradable and import-competing sectors. As a practical matter, however, more international theory believes that the effect of changes in trade is to validate the presumption that an international transfer of income increases the donor's terms of trade. Thus, Keynes was right in practice.

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The Standard Trade Model
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What seems to have saved Asia from a severe transfer problem was that other things were happening at the same time. Oil prices fell sharply, benefiting all the crisis countries except Indonesia. Japan, the leading importer to the region, also saw its export prices fall as the yen plunged against the U.S. dollar. So those probably was a transfer problem for Asia, but its effects were masked by other forces.

Tariffs and Export Subsidies: Simultaneous Shifts in RS and RD

Import producers (those located on imports) and export subsidizers (payments given to domestic producers who sell in abroad) are not usually part in place to affect a country's terms of trade. These governments intervene in trade usually take place for income distribution, for the promotion of industries thought to be crucial to the country's welfare, or for balance of payments reasons (as discussed in Chapter 9, 10, and 11). Whatever the motive for tariffs and subsidies, however, they do have terms of trade effects that can be understood by using the standard trade model.

The distinctive feature of tariffs and export subsidies is that they create a difference between prices at which goods are traded on the world market and their prices within a country. The direct effect of a tariff is to make imported goods more expensive inside a country than they are outside. An exporter normally gives producers an incentive to export. It will therefore be more profitable to sell abroad than at home unless the price at home is higher, so a subsidy raises the price of exported goods inside a country.

The price changes caused by tariffs and subsidies change both relative supply and relative demand. The result is a shift in the terms of trade of the country implying the policy change and in the terms of trade of the rest of the world.

Relative Demand and Supply Effects of a Tariff

Tariffs and subsidies drive a wedge between the prices at which goods are traded internationally (external prices) and the prices at which they are traded within a country (internal prices). This means that we have to be careful in defining the terms of trade. The terms of trade are intended to measure the ratio at which countries exchange goods; for example, how many units of food can Canada import for each unit of cloth that it exports? The terms of trade therefore correspond to external, not internal, prices. When analyzing the effects of a tariff or export subsidy, we want to know how it affects relative supply and demand as a function of external prices.

If Canada imposes a 20 percent tariff on the value of food imports, the internal price of food relative to cloth falls by 20 percent. Producers and consumers will both 20 percent higher than the external relative price of food on the world market. Equivalently, the internal relative price of cloth on which Canadian residents face their decisions will be lower than the relative price on the external market.

At any given world relative price of cloth, then, Home producers will face a lower relative cloth price and therefore will produce less cloth and more food. At the same time,
Home consumers will shift their consumption toward cloth and away from food. From the point of view of the world as a whole, the relative supply of cloth will fall (from $R^D$ to $R^1$) As a result, the relative price of cloth rises.

An import tariff imposed by Home both reduces the relative supply of cloth (from $R^D$ to $R^2$) and increases the relative demand (from $R^P$ to $R^1$). Clearly, the world relative price of cloth rises from $\left(\frac{P^e}{P^f}\right)^1$ to $\left(\frac{P^e}{P^f}\right)^2$, and thus Home's terms of trade improve as foreign's depreciate.

The essence of this terms of trade effect depends on how large the country imposing the tariff is relative to the rest of the world—if the country is only a small part of the world, it cannot have much effect on world relative supply and demand and therefore cannot have much effect on relative prices. If the United States, a very large country, were to impose a 20 percent tariff, some analysts suggest that the U.S. terms of trade might rise by 15 percent. That is, the price of U.S. imports relative to exports might fall by 15 percent on the world market, while the relative price of exports would rise only 5 percent inside the United States. On the other hand, if Luxembourg or Paraguay were to impose a 20 percent tariff, the terms of trade effect would probably be too small to measure.

Effects of an Export Subsidy

Taxes and export subsidies are often treated as similar policies, since they both seem to support domestic producers, but they have opposite effects on the terms of trade. Suppose that Home offers a 20 percent subsidy on the value of any cloth exported. For any given world price this subsidy will raise Home's domestic price of cloth relative to food by 20 percent. The rise in the relative price of cloth will lead Home producers to produce more cloth and less food, while leading foreign consumers to substitute food for cloth. As illustrated in Figure 5-9, the subsidy will increase the world relative supply of cloth (from $R^P$ to $R^3$) and decrease the world relative demand for cloth (from $R^P$ to $R^3$), shifting equili-
PART I International Trade Theory

Are foreign tariffs always bad for a country and foreign export subsidies always beneficial? Not necessarily. Our model is of a two-country world, where the other country exports the good we import and vice versa. In the real world of many countries, a foreign government may subsidize the export of a good that competes with U.S. exports; this foreign subsidy will obviously hurt the U.S. terms of trade. A good example of this is European export subsidies to agrarian exports. But this is just one example. A country may impose a tariff on something the United States also imports, lowering its price and benefiting the United States. We thus need to qualify our conclusions from a two-country analysis. Subsidies to exports of things the United States import help us, while tariffs against U.S. exports hurt us.

The view that subsidized foreign sales to the United States are good for us is a popular one. When foreign governments charge with subsidizing sales to the United States, the popular and political pressures in this is such a competitive. Thus where a Commerce Department study determined that European governments were subsidizing exports of steel to the United States, our government demanded that they raise these prices. The model standard tells us that when foreign governments subsidize exports to the United States, the appropriate response from a national point of view should be to send them a nice of thanks.

Of course this view happens, largely because of the effects of foreign subsidies on incomes distribution within the United States. If European subsidies export of steel to the United States, most U.S. workers gain less, but steelworkers, the owners of steel company stock, and industrial workers in general may not be so cheerful.

The Distribution of Income Within Countries. Foreign tariffs or subsidies change the relative prices of goods, which change incomes distribution within the United States. If European subsidies export of steel to the United States, most U.S. workers gain less, but steelworkers, the owners of steel company stock, and industrial workers in general may not be so cheerful.

As for income, the direction of the effect of tariffs and export subsidies on relative prices, and therefore on income distribution, may seem obvious. A tariff has the direct effect of raising the relative price of the imported goods, while an export subsidy has the direct effect of raising the relative price of the exported goods. We have just seen, however, that tariffs and export subsidies have indirect effects on a country's terms of trade. The terms of trade affect the income distribution of goods. If foreign subsidies export of steel to the United States, most U.S. workers gain less, but steelworkers, the owners of steel company stock, and industrial workers in general may not be so cheerful.

The Distribution of Income Between Countries. Foreign tariffs or subsidies change the relative prices of goods, which change incomes distribution between the United States and the country of origin. Foreign subsidies export of steel to the United States, most U.S. workers gain less, but steelworkers, the owners of steel company stock, and industrial workers in general may not be so cheerful.

The same issue arises in the case of the distribution of income within a country. If foreign subsidies export of steel to the United States, most U.S. workers gain less, but steelworkers, the owners of steel company stock, and industrial workers in general may not be so cheerful.

Summary

1. The terms of trade affect the distribution of income between countries. This is because the terms of trade affect the relative prices of goods, which change the distribution of income between countries.

2. The terms of trade affect the distribution of income within a country. This is because the terms of trade affect the relative prices of goods, which change the distribution of income within a country.

3. The terms of trade affect the distribution of income between countries. This is because the terms of trade affect the relative prices of goods, which change the distribution of income between countries.

4. The terms of trade affect the distribution of income within a country. This is because the terms of trade affect the relative prices of goods, which change the distribution of income within a country.

5. The terms of trade affect the distribution of income between countries. This is because the terms of trade affect the relative prices of goods, which change the distribution of income between countries.

6. The terms of trade affect the distribution of income within a country. This is because the terms of trade affect the relative prices of goods, which change the distribution of income within a country.

7. The terms of trade affect the distribution of income between countries. This is because the terms of trade affect the relative prices of goods, which change the distribution of income between countries.

8. The terms of trade affect the distribution of income within a country. This is because the terms of trade affect the relative prices of goods, which change the distribution of income within a country.

9. The terms of trade affect the distribution of income between countries. This is because the terms of trade affect the relative prices of goods, which change the distribution of income between countries.

10. The terms of trade affect the distribution of income within a country. This is because the terms of trade affect the relative prices of goods, which change the distribution of income within a country.
uses that make barriers to trade, natural and artificial, which cause many goods to be imported. If nominalized goods compute with experts for resources, transfers will usually yield an increase of terms of trade. The evidence suggests that this is, in fact, the case.

6. Import tariffs and export subsidies affect both relative supply and demand. A tariff raises relative supply of a country's import good while lowering relative demand. An export subsidy generally depresses the country's terms of trade at the cost of the world's experience. An export subsidy has the reverse effect, increasing the supply and reducing the relative demand for the country's export good, and thus worsening the terms of trade.

7. The terms of trade affect of an export subsidy hurt the subsidizing country and benefit the rest of the world, while those of a tariff do the reverse. This suggests that export subsidies do not make sense from a national point of view and that foreign export subsidies should be welcomed rather than countered. Both tariffs and subsidies, however, have strong effects on the distribution of income within countries, and these effects often weigh more heavily on policy than the terms of trade consider.

Key Terms
- Normalized growth, p. 108
- Export-based growth, p. 101
- Import subsidies, p. 103
- Subsidy balance, p. 102
- Transmogrifying growth, p. 102
- Import-based growth, p. 101
- Import tariff, p. 109
- Indifference curves, p. 96

Problems
1. In some economies relative supply may be incompatible to changes in prices. For example, if factors of production were completely immobile between sectors, the production possibility frontier would be right-angled, and output of two goods would not depend on relative prices. Is it still true in 1988 that a rise in the terms of trade increases welfare? Analyze graphically.

2. The counterpart to immobile factors on the supply side would be lack of substitution on the demand side. Imagine an economy where consumers always buy goods in rigid proportions—say, for example, one yard of cloth for every pound of food—regardless of the prices of the two goods. Show that an improvement in the terms of trade benefits this economy, as well.

3. Japan primarily exports manufactured goods, while importing raw materials such as food and oil. Analyze the impact on Japan's terms of trade of the following events:
   a. A war in the Middle East disrupts oil supply.
   b. Korea develops the ability to produce automobiles that it can sell in Canada and the United States.

4. Countries A and B have two factors of production, capital and labor, with which they produce two goods, X and Y. Technology is the same in the two countries. X is capital intensive, Y is capital abundant. Analyze the effects on the terms of trade and the welfare of the two countries if the following occur:
   a. An increase in A's capital stock.
   b. An increase in A's labor supply.
   c. An increase in B's capital stock.
   d. An increase in B's labor supply.

5. It is not clear how economic growth will benefit a country's terms of trade as it will improve them. Why? Then, do more economists regard increasing growth, which growth actually boosts the growing country, as unambiguously in practice?

6. In practice such foreign aid is "dead," that is, it comes with conditions that require that the recipient spend the aid on goods from the donor country. For example, Peace might provide money for an irrigation project in Africa, on the condition that the pumps, pipelines, and construction equipment be purchased from France rather than from Japan. How does such tying of aid affect the transfer problem analysis? Does tying of aid make sense from the donor's point of view? Can you think of a scenario in which tied aid actually produces the recipient worse off?

7. During 1989 a wave of political change swept over Eastern Europe, raising prospects not only of democracy but also of a shift from centrally planned market economies. One consequence might be a shift in how Western European sees its money: Nations, especially Germany, that during the 1980s were leading heavily in the United States might start to lend to newly Eastern European nations instead.

Using the analysis of the transfer problem, how do you think this should affect the prices of Western European goods relative to those from the United States and Japan? (Hint: how would the Holy see a dollar of financial resources diffuse, say from Germany, from its see in the United States?)

8. Suppose that one country subsidizes its exports and the other country imposes a "concomitant" tariff that offsets its effect, so that in the end relative prices in the second country are unchanged. What happens to the terms of trade? What about welfare in the two countries?

Suppose, on the other hand, that the second country continues with an export subsidy. Is this welfare? Comment on the result.

Further Reading
- J. B. Hicks, "The Long-Run Phillips Curves" in Oxford Economic Papers 2 (1953), pp. 17-33. The modern analysis of growth and trade has its origins in the first of these papers in the...
Representing International Equilibrium with Offer Curves

For most purposes, analyzing international equilibrium in terms of relative supply and demand is the simplest and most useful technique. In some circumstances, however, it is useful to analyze trade in a diagram that shows clearly where each country ships to the other. A diagram that does this is the offer curve diagram.

**Deriving a Country's Offer Curve**

In Figure 5-3 we showed how to determine a country's production and consumption given the relative price $P_{M}P_{T}$. Trade is the difference between production and consumption. In an offer curve diagram we show directly the trade flows that correspond to any given relative price. On one axis of Figure 5A-1 we show the country's exports ($Q_{E}$ - $Q_{D}$) on the other its imports ($Q_{I}$ - $Q_{D}$). Point $T$ in Figure 5A-1 corresponds to the situation shown in Figure 5-3 (production at $Q$, consumption at $Q$). Since

$$\Delta P = \frac{(Q_{E} - Q_{I})}{(Q_{I} - Q_{D})} \times \frac{(Q_{E} - Q_{D})}{(Q_{D} - Q_{I})},$$

(SA.1)

the slope of the line from the origin to the point $T$ in Figure 5A-1 is equal to $P_{M}P_{T}$. This line's offer at the attained relative price. At that price, Home residents are willing to trade ($Q_{E} - Q_{D}$) units of cloth for ($Q_{I} - Q_{D}$) units of food.
The offer curve is generated by tracing
the home's offer curve as the
relative price of cloth is changed.

By calculating Home's offer at different relative prices, we trace out Home's offer curve.
(Exercise 5A-2). We saw in Figure 5-4 that at Pc/Pl = Ql, Home exports Ql of cloth
and Qc of cloth; when Pc/Pl is equal to 2, Home exports Q2 of cloth and Q2 of cloth,
and so on. The curve is generated by tracing off the offer curve at prices
different from the one shown in Figure 5-4. P in the offer corresponding to Q2, Q3 in
Figure 5-4, P' in the offer corresponding to Q2', Q3' in Figure 5-4, P' in the offer corresponding to Q2'.

Foreign's offer curve (DF) may be traced out in the same way (Figure 5A-3). On the vertical axis we plot (Q2 - Q2), Foreign's desired exports of cloth, while on the horizontal axis we plot (Q2 - Q2). Export offer of cloth. The lower DF, the more cloth Foreign will want to export and the more cloth it will want to import.

International Equilibrium

International equilibrium is the point where Home's and Foreign's offer curves intersect (Figure 5A-4). When the offer curve equals the relative price of cloth in equal to the slope of the Foreign's imports of cloth, which equal Foreign's imports, are OK. Foreign's imports of cloth, which equal Home's imports, are OK.

The representation of international equilibrium helps us see that equilibrium is in a sense general equilibrium, in which supply and demand are equilibrated in both markets at the same time.
CHAPTER 6
Economies of Scale, Imperfect Competition, and International Trade

The models of comparative advantage already presented were based on the assumption of constant returns to scale. That is, we assumed that if inputs to an industry were doubled, industry output would double as well. In practice, however, many industries are characterized by economies of scale (also referred to as increasing returns), so that production is more efficient the larger the scale. This chapter discusses the industry with more than double the industry's production.

A simple example can help convey the significance of economies of scale for international trade. Table 6.1 shows the relationship between input and output of a hypothetical industry. Widgets are produced using only one input, labor. The table shows how the amount of labor required depends on the number of widgets produced. To produce 10 widgets, for example, requires 15 hours of labor, while to produce 25 widgets requires 30 hours. The presence of economies of scale may be seen from the fact that doubling the input of labor from 15 to 30 more than doubles the industry's output—in fact, output increases by a factor of 2.5. Equivalently, the existence of economies of scale may be seen by looking at the average amount of labor used to produce each unit of output. If output is only 5 widgets, the average labor input per widget is 2.5 hours, while if output is 25 widgets, the average labor input falls to 1.2 hours.

We can use this example to see why economies of scale provide an incentive for international trade. Suppose a world consisting of two countries, America and Britain, both of whom have the same technology for producing widgets, and suppose that initially each country produces 10 widgets. According to the table, this requires 15 hours of labor in each country, so the world as a whole has 30 hours of labor produce 20 widgets. But now suppose that we could combine total production of widgets in one country, say America, and let America employ 30 hours of labor in the widget industry. In a single country that 30 hours of labor can produce 25 widgets. So by concentrating production of widgets in America, the world economy can become a lot of labor to produce 75 percent more widgets.

But where does America find the extra labor to produce widgets, and what happens to the labor that was employed in the British widget industry? To get the labor to expand its production of widgets, America must either create or absorb the production of others; these goods will then be produced in Britain instead, using the labor formerly employed in the industries whose production has expanded in America. Imagine that there are many goods subject to economies of scale in production, and give these numbers: 1.2, 2.5, 3.5, 5.0. To take advantage of economies of scale, each of the countries must concentrate on producing only a limited number of goods. Thus, for example, America might produce goods 1, 3.5, and so on, while Britain produces 2, 4.5, and so on. If each country produces only some of the goods, then each good can be produced at a larger scale than would be the case if each country tried to produce everything, and the world economy can thereby produce more of each good.

How does international trade alter the story? Consumers in each country will still want to consume a variety of goods. Suppose that industry 1 ends up in America and industry 2 in Britain, yet American consumers of good 2 will have to pay goods imported from
Economies of Scale and Market Structure

In the example in Table 6-1, we represented economies of scale by assuming that the labor input per unit of production is smaller the more units produced. We did not say how this production increase was achieved—whether existing firms simply produced more, or whether there was an increase in the number of firms. To analyze the effects of economies of scale on market structure, however, one must know about what kind of production increase occurred. When the cost per unit depended on the size of the industry, but not necessarily on that of the firm. The distinction between external and internal economies can be illustrated with a hypothetical example. Imagine an industry that initially consists of six firms, each producing 100 widgets, for a total industry output of 1000 widgets. Now suppose two cases. First, the industry were to double in size, so that it now consists of 24 firms, each one still producing 100 widgets. It is possible that the costs of each of these will fall as a result of the increased size of the industry; for example, a larger industry may allow more efficient provision of research and development services. If this is the case, the industry exhibits external economies of scale. That is, the efficiency of firms is increased by having a larger industry, even though each firm is the same size or before.

Second, suppose the industry's output were held constant at 1000 widgets, but the number of firms is cut in half so that each of the remaining six firms produce 170 widgets. The costs of production fall in this case, then there are internal economies of scale: A firm is more efficient if its output is larger.

External and internal economies of scale have different implications for the structure of industries. An industry whose economies of scale are purely external is that, where there are no advantages to large firms with respect to costs of entry. In contrast, internal economies of scale are achieved by large firms because they are able to produce more efficiently than smaller firms. If a small firm produces 10 widgets, it will be more efficient to produce 100 widgets, as the cost per unit will be lower. Therefore, the large firm will have a cost advantage over small firms and will be able to produce at a lower cost. This advantage allows the large firm to expand its market share.
A monopolistic firm chooses an output at which marginal revenue is equal to marginal cost. The demand curve D, because of monopolistic competition, portrays the difference between price and average cost directly.

Marginal Revenue and Price. For our analysis of the monopolistic competition model later in this section it is important to determine the relationship between the price the monopolistic receive per unit and marginal revenue. Marginal revenue is always less than the price—but how much less? The relationship between marginal revenue and price depends on the demand curve. First, it depends on how much output the firm is already selling. If this firm is selling very many units it will not lose much by cutting the price it receives on these units. Second, the gap between price and marginal revenue depends on the slope of the demand curve, which tells you how much the monopolist has to cut the price to sell one more unit of output. If the curve is very flat, then the monopolist can sell an additional unit with only a small price cut and will therefore not have to lower the price on other units he would have sold otherwise very much, so marginal revenues will be close to the price per unit. On the other hand, if the demand curve is very steep, selling an additional unit will require a large price cut, implying marginal revenue much less than price.

We can be more specific about the relationship between price and marginal revenue if we assume that the demand curve is linear. In this case the difference between price and marginal revenue is constant.

\[ Q = A - B \times P, \]  

**CHAPTER 6: Economics of Scale, Imperfect Competition, and International Trade**

where \( Q \) is the number of units the firm sells, \( P \) is the price it charges per unit, and \( A \) and \( B \) are constants. We show in the appendix to this chapter that in this case marginal revenue is

\[ MR = P - MR, \]  

implies

\[ P = MR - Q. \]  

Equation (6-2) shows that the gap between price and marginal revenue depends on the initial value of the firm and the slope parameter \( B \) of its demand curve. If sales quantity, \( Q \), is higher, marginal revenue is lower, because the decrease in price required to sell a greater quantity costs the firm more. The greater is \( B \), that is, the more elastic the demand curve, the higher is the given increase in price and the smaller marginal revenue is in the price of the good. Equations (6-1): crucial for our analysis of the monopolistic competition model of trade (pp. 162-163).

**Average and Marginal Costs.** The average cost of marginal revenue represent the average costs of selling the goods. The marginal cost is the average cost per unit, which is the total cost divided by output. The downslope slope reflects our assumption that these are economies of scale, so that the larger the firm's output the lower its cost per unit. AC represents the firm's marginal cost (the amount it costs the firm to produce one extra unit). We know from basic economics that when average costs are a decreasing function of output, marginal cost is always less than average cost. Then AC lies below AC.

Equation (6-2) relates price and marginal revenue. There is a corresponding formula relating average and marginal cost. Suppose the costs of a firm, C, take the form

\[ C = f + c \times Q, \]  

where \( f \) is a fixed cost and \( c \) is the cost of producing one unit, \( f \) is the firm's marginal cost, and \( Q \) is the number of units the firm sells. This is called a linear cost function. The fixed cost is in linear cost function gives rise to economies of scale, because the larger the firm's output, the lower its cost per unit. Specifically, the firm's average cost (total cost divided by output) is

\[ \text{Average cost} = AC = C/Q = f/Q + c. \]  

This average cost declines in \( Q \) or revenue because the fixed cost is spread over a larger output. If, for example, \( f = 5 \) and \( c = 1 \) the average cost of producing 25 units is \( 5/25 = 1.5 \) and the average cost of producing 25 units is \( 5/25 = 1.2 \). These numbers may look familiar, because they were used to construct Table 6-1. The relationship between output, average costs, and marginal costs given in Table 6-1 is shown graphically in Figure 6. Average cost approaches infinity at zero output and approaches marginal cost at very large output.

The profit-maximizing output of a monopolist is that at which marginal revenue (the revenue gained from selling an extra unit) equals marginal cost (the cost of producing an
extra cost, that is, at the intersection of the MC and MR curves. In Figure 6-1 we can see that the plant at which the profit margin curve in excess of average cost is zero, which is greater than average cost. When $P > AC$, the monopoly is earning some monopoly profits.  

Monopolistic Competition

Monopoly profits rarely go unassayed. A firm making high profits normally attracts com-

petition. Such situations of pure monopoly are rare in practice. Instead, the usual market structure in industries characterized by internal economies of scale is one of oligopoly several firms, each of them large enough to affect prices, but none with an unassailable monopoly.

The general analysis of oligopoly is a complex and controversial subject because oligo-
polies, the pricing policies of firms are interdependent. Each firm in an oligopoly will be

choosing its price, considering not only the responses of consumers but also the re-

sponses of its competitors. These responses, however, depend on the firm's competitors' expectations about the firm's behavior—and we are therefore in a complex game in which

firms are trying to second-guess each other's strategies. We will briefly discuss the general

problems of modeling oligopoly behavior. However, there is a special case of oligopoly,

known as monopolistic competition, which is relatively easy to analyze. Since 1960 monop-

olistic competition models have been widely applied in international trade.

In monopolistic competition models, two key assumptions are made to get around the

problem of interdependence. First, each firm is assumed to be able to differentiate its

products from that of its rivals. That is, because they want to buy this firm's particular prod-

uct, the firm's customers will not switch to buy other firms' products because of a slight price difference. Product differentiation assures that each firm has a monopoly in its particular product within an industry and is therefore somewhat insulated from competition. Second, each firm is assumed to take the prices charged by its rivals as given—that is, it ignores the impact of its own price on the prices of other firms. As a result, the monopolistic competi-
tion model implies that even though each firm is really facing competition from other firms, it behaves as if it were a monopoly—hence the model's name.

Are there any monopolistically competitive industries in the real world? Some industries may be reasonable approximations. For example, the nonresidential industry in Europe, where a number of major producers (Bosch, General Motors, Volkswagen, Renault, Peugeot, Fiat, Volvo—and more recently, Nissan) offer sufficiently different yet world-class competing automobiles, may be fairly well described by monopolistically competitive neoclassic.

The main appeal of the monopolistic competition model is not, however, its realism, but its simplicity. As we will see in the next section of this chapter, the monopolistic competition model gives us a very clear view of how economies of scale can give rise to monopoly ben-

eficial trade.

Before we can examine trade, however, we need to develop a basic model of monopolis-
tic competition. Let us therefore analyze an industry consisting of a number of firms. These firms produce differentiated products, that is, goods that are not exactly the same to

that no substitutability for one another. Each firm is therefore a monopolist in the sense that it is the only firm producing its particular good, but the demand for its good depends on the number of other similar products available and on the prices of other firms in the industry.

Assumptions of the Model

We begin by describing the demand facing a typical monopolistically competitive firm. In general, we would expect a firm to sell more the larger the total demand for its industry's product and the higher the prices charged by its rivals. On the other hand, we expect the firm to sell less the greater the number of firms in the industry and the higher its own price. A particular equation for the demand facing a firm that has these properties is

\[ Q = S \times \left[ 100 - 2 \times (P - F) \right] \]

(6-5)

where $Q$ is the firm's sales, $S$ is the total sales of the industry, $F$ is the number of firms in the industry, $S$ is a constant representing the responsiveness of a firm's sales to its price, $P$ is the price charged by the firm itself, and $F$ is the average price charged by its competitors. Equation (6-5) also gives the following intensive factorization: If all firms charge the same price, each will have a market share of $F$. A firm charging more than the average price of other firms will have a smaller market share, a firm charging less than an average price. It is helpful to assume that total industry sales $S$ are unaffected by the average price $P$ charged by firms in the industry. That is, we assume that firms can gain customers only in

\begin{align*}
\text{If } P &< P^* \text{, then } Q = S \\
\text{If } P &> P^* \text{, then } Q = S
\end{align*}

\[ Q < S, \text{ where } P > P^* \Rightarrow Q < S \]
each other's expense. This is an unrealistic assumption, but it simplifies the analysis and helps focus on the competition among firms. In particular, it means that $\delta$ is a measure of the cost of the market and that if all firms charge the same price, each sells $20$ units. Next, we see the costs of a typical firm. Here, we assume that the total and average cost of a typical firm are determined by equations (6-3) and (6-4).

**Market Equilibrium.** To model the behavior of this monopolistically competitive industry, we assume that all firms in this industry are symmetric; that is, the demand function and cost function are identical for all firms (even though they are producing and selling somewhat differentiated products). When the individual firms are symmetric, the state of the industry can be described without examining the features of all firms in detail. All we really need to know to describe the industry is how many firms there are and what price the typical firm charges. To analyze the industry, for example, we can ignore the effects of interfirm trade; we need to determine the number of firms and the average price they charge. Once we have a model for determining $n$ and $P$, we can see how they are affected by interfirm trade.

Our method for determining $n$ and $P$ involves three steps. (1) First, we derive a relationship between the number of firms and the average cost of a typical firm. We show that this relationship is upward sloping; that is, the more firms there are, the lower the output of each firm, and thus the higher its cost per unit of output. (2) We next show the relationship between the number of firms and the average price each firm charges, which must equal $P$ in equilibrium. We show that this relationship is downward sloping: the more firms there are, the more intense is competition among firms, and as a result the lower the prices they charge. (3) Finally, we argue that when the price exceeds average cost, additional firms will enter the industry, whereas when the price is less than average cost, existing firms will exit. So in the long run the number of firms is determined by the intersection of the curve that relates average cost to $n$ and the curve that relates price to $n$.

1. The number of firms and average cost. As a first step toward determining $n$ and $P$, we ask how the average cost of a typical firm depends on the number of firms in the industry. Since all firms are symmetric in this model, it equilibrates when all charge the same price. But when all firms charge the same price, so that $P = \bar{C}$, equation (6-3) tells us that $Q = S(\bar{C})$, that is, each firm's output $Q$ is a fraction of the total output at that price. But we saw in equation (6-4) that average cost depends linearly on a firm's output. We therefore conclude that average cost depends on the size of the market and the number of firms in the industry:

$$AC = \bar{C} = c + \frac{k}{Q} + c.$$  

Equation (6-4) tells us that other things equal, the more firms there are in the industry, the higher is average cost. The spread-sloping relationship between $n$ and average cost is shown in Figure 6-3.

2. The number of firms and the price. Meanwhile, the price the typical firm charges also depends on the number of firms in the industry. In general, we would expect that the more firms there are, the more intense will be the competition among them, and hence the lower the price. This seems to be true in this model, but proving it takes a moment. The basic trick is to show that each firm faces a straight-line demand curve of the form we showed in equation (6-4), and then to use equations (6-3) to determine prices. First recall that in the monopolistically competitive model firms are assumed to take each other's prices as given. Thus, each firm ignores the possibility that if it changes its price other firms will also change theirs. If each firm sets $P$ as given, we can rewrite the demand curve (6-4) in the form:

$$Q = (S(\bar{C}) - S) \cdot B - P.$$  

The number of firms in a monopolistically competitive market, and the price they charge, are determined by two relationships. On one side, the more firms there are, the more intense the competition, and hence the lower is the industry price. This relationship is represented by $PP$ on the other side, the more firms there are, the less each firm wants and therefore the higher is its average cost. This relationship is represented by $CC$. If price exceeds average cost (if the $PP$ curve is above the $CC$ curve), the industry will be making profits and additional firms will enter the industry; if price is less than average cost, the industry will be incurring losses and firms will leave the industry. The equilibrium price and number of firms occurs when price equals average cost, as at the intersection of $PP$ and $CC$. 

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$\bar{C} = \bar{C} = c + \frac{k}{Q} + c.$  

Equation (6-4) tells us that other things equal, the more firms there are in the industry, the higher is average cost. The spread-sloping relationship between $n$ and average cost is shown in Figure 6-3.
where $p$ is the parameter in equation (6.5) that measured the sensitivity of each firm's market share to the price it charges. Now this is the same form as (6.1), with $\beta = 1$, and $p = 0$. The coefficient of the linear term in price is the slope coefficient $\beta$. When we plug these values back into the formulas for marginal revenue (6.2), we have a marginal increase for a typical firm of

$$MR = P - Q(pS + b).$$

(6.8)

Profit-maximizing firms will set marginal revenue equal to their marginal cost $c$, so that

$$MR = P - c = Q(pS + b) = c.$$

which can be rearranged to give the following equation for the price charged by a typical firm:

$$P = c + Q(pS + b).$$

(6.9)

We have already noted, however, that if all firms charge the same price, each will sell an amount $Q = \frac{c}{pS}$. Plugging this back into (6.9) gives us a relationship between the number of firms and the price each firm charges:

$$P = c + \frac{c}{pS}.$$  

(6.10)

Equation (6.10) says algebraically that the more firms there are in the industry, the lower the price each firm will charge. Equation (6.10) is shown in Figure 6.3 as the downward-sloping curve $PP$.

3. The equilibrium number of firms. Let us now ask how Figure 6.3 means. We have summarized an industry by two curves. The downward-sloping curve $PP$ shows that the more firms there are in the industry, the lower the price each firm will charge. This makes sense. The more firms there are, the more competition each firm faces. The upward-sloping curve $CC$ tells us that the more firms there are in the industry, the higher the average cost of each firm. This also makes sense: If the number of firms increases, each firm will sell less, so firms will not be able to move as far down their average cost curve.

The two schedules intersect at price $P$, corresponding to the number of firms $N$. The significance of $N$ is that it is the zero-profit number of firms in the industry. When there are $N$ firms in the industry, their profit-maximizing price is $P$, which is equal to their average cost $AC$.

Theorem: It is straightforward to show that $N$ equals $c/AC$.

As we now argue is that the long-run output of the number of firms in the industry tends to move toward $N$, that is, firms are exiting the industry's long-run equilibrium.

To see why, suppose that $c$ were less than $N$, say $c < N$. Then the price charged by each firm would be $P$, while their average cost would be only $AC$. Thus firms would be making monopoly profits. Conversely, suppose that $c$ were greater than $N$, say $c > N$. Then firms

would charge only the price $P$, while their average cost would be $AC$. Firms would be selling losses.

Over time, firms will enter and exit the industry as profits vary. Firms only have money. The number of firms will rise over time if it is less than $N$, but will fall if it is greater. This means that $N$ is the equilibrium number of firms in the industry and $P$, the equilibrium price.

We have now developed a model of a monopolistically competitive industry in which we can determine the equilibrium number of firms and the average price that firms charge. We can use this model to derive some important conclusions about the role of economics of scale in international trade. Before we do so, we shall take a moment to note some limitations of the monopolistic competition model.

\section*{CHAPTER 6: Economies of Scale, Imperfect Competition, and International Trade}

\begin{theorem}

The monopolistic competition model explains certain key elements of behavior where there are economies of scale and thus imperfect competition. However, few industries are well described by monopolistic competition. Instead, the most common market structure is one of small-group oligopoly, where only a few firms are actively engaged in competition. In this situation, the key assumption of the monopolistic competition model, which is that each firm will behave as if it were a true monopolist, is likely to break down. Instead, firms will be aware that their actions influence the actions of other firms and will try to influence these interdependence interactions.

Two kinds of behavior arise in the oligopoly oligopoly setting that are excluded by assumption from the monopolistic competition model. The first is collusive behavior. Each firm may keep its price higher than the apparent profit-maximizing level in part as an understanding that the other firm will do the same, since each firm's profits are higher if its competitor charges high prices, such an understanding can mean the profits of all the firms at the expense of the consumer. Collusive price-setting behavior may be managed through explicit agreements (cartels) in the United States or through tacit coordination devices such as allowing one firm to act as a price leader for the industry.

Firms may also engage in price competition, but that affects the behavior of competitors in a disadvantageous way. For example, a firm may build extra capacity now to use it later in their potential price cuts facing entering industry.

These possibilities for both collusion and strategic behavior makes the analysis of oligopoly a complex matter. There is no generally accepted model of oligopoly behavior. Each model makes the accurate model for a monopolistic industry problematic.

The monopolistic competition approach to trade is appropriate because it avoids these complications. Even though it may leave out some features of the real world, the monopolistic competition model is widely accepted as a way to provide a first cut at the role of economics of scale in international trade. This analysis is not a substitute for the work of biologists, but is a model that can lead to important conclusions.

\end{theorem}
CHAPTER 6

Economies of Scale, Imperfect Competition, and International Trade

As an increase in the size of the market allows each firm, either by long-run equilibration or by equilibrating by moving into a larger market, it has lower average cost. This is represented by a downward-sloping curve from OC to OC'. The result is a simultaneous increase in the number of firms (and hence in the variety of goods available) and fall in the price of each.

\[ M = F(\text{producers}) + \text{markets} \]

\[ Q = S \times (1/n) - (1/n^2) \times (P - F) \]

where \( Q \) is the number of manufacturers, \( S \) is the total supply of the industry, \( n \) is the number of firms, \( P \) is the price that firm charges, and \( F \) the average price of other firms.\n
The size of the market does not enter into this equation, so an increase in \( S \) does not shift the PP curve.
also assume that the cost function for producing automobiles is described by equation (6-3), with a fixed cost \( F = 510,000 \text{ dollars} \) and a marginal cost \( c = 500 \text{ dollars per automobile} \) (again, these values are chosen to give nice results). The total cost is

\[
C = 750,000 + (Q \times 2).
\]

The average cost curve is therefore

\[
AC = \frac{750,000}{Q} + 200.
\]

Now suppose there are two countries, Home and Foreign. Home has annual sales of 900,000 automobiles; Foreign has annual sales of 1.8 million. The two countries are assumed, for the moment, to have the same cost of production.

Figure 6-6a shows the PP and CC curves for the Home auto industry. We find that in the absence of trade, Home would have six automobile firms, selling at a price of $10,000 each. (It is also possible to solve for \( c \) and \( P \) algebraically, as shown in the Mathematical Postscript to this chapter.) To confirm that this is the long-run equilibrium, we need to show both that the pricing equation (6-10) is satisfied and that the profit equals average cost.

Substituting the actual values of the marginal cost, \( c \), the demand parameter, \( b \), and the number of Home firms, \( n \), into equation (6-10), we find

\[
P = 10,000 - \frac{c}{n} = 10,000 \times 6 = 60,000 = 6000,
\]

so the condition for profit maximization—that marginal revenue equals marginal cost—is satisfied. Each firm sells 150,000 units, or 150,000 automobiles. Its average cost is therefore

\[
AC = \frac{750,000}{150,000} + 200 = 10,000.
\]

Since the average cost of $10,000 per unit is the same as the price, all monopoly profits have been competed away. Then six firms, selling at a price of $10,000, with each firm producing 150,000 cars, is the long-run equilibrium as the Home market.

What about Foreign? By drawing the PP and CC curves (point b) in Figure 6-6b, we find that when the market is for 1.8 million automobiles, the average cost is \( AC = \frac{750,000}{180,000} = 4,166.66 \). That is, in the absence of trade Foreign's market would support eight firms, each producing 200,000 automobiles, and selling them at a price of $7,500. We can again confirm that this solution satisfies the equilibrium conditions:

\[
P = 7500 - \frac{c}{n} = 7500 \times 8 = 60,000 = 7500,
\]

and

\[
AC = \frac{750,000}{144,000} + 200 = 5000 = 8750.
\]

Now suppose it is possible for Home and Foreign to trade automobiles continuously with one another. This creates a new, integrated market (point c) in Figure 6-6c) with total sales of 2.3 million. By drawing the PP and CC curves one more time, we find that the integrated market
PART I  International Trade Theory

Table 4-2 Hypothetical Example of Foreign Trade

<table>
<thead>
<tr>
<th>Country</th>
<th>Before Trade</th>
<th>Foreign Trade</th>
<th>Integrated Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Market</td>
<td>500,000</td>
<td>1,000,000</td>
<td>2,500,000</td>
</tr>
<tr>
<td>Foreign Market</td>
<td>1,000,000</td>
<td>2,500,000</td>
<td>5,000,000</td>
</tr>
<tr>
<td>Integrated Market</td>
<td>2,500,000</td>
<td>5,000,000</td>
<td>10,000,000</td>
</tr>
</tbody>
</table>

CHAPTER 6  Economics of Scale, Imperfect Competition, and International Trade

In a world without economies of scale, there would be a single exchange of manufactures for food.

Suppose that Home has 500,000 cars and sells them at a price of $2,000. The conditions for profit maximization and zero profits are again satisfied:

\[ P = $2000 = c + 10b \times a = $2000 = 10(150,000 \times 10) = $2000 = $3000, \]

and

\[ AC = ($750,000,000/250,000) = $3000 = $800. \]

We summarize the results of creating an integrated market in Table 4-2. The table compares each market along with the integrated market. The integrated market supports more firms, each producing at a larger scale and selling at a lower price than either national market did on its own.

Clearly everyone is better off as a result of integration. In the larger market, consumers have a wider variety of choice, each firm produces more, and the firm is able to offer its product at a lower price.

To realize these gains from integration, the countries must engage in international trade. To achieve economies of scale, each firm must concentrate its production in one country—either Home or Foreign. Yet it must sell its output in consumers in both markets. So each product is produced in only one country and exported to the other.

Economies of Scale and Comparative Advantage

One example of a monopolistically competitive industry-says about the pattern of trade that results from economies of scale. The model assumes that the cost of production is the same in both countries and that trade is possible. Trade allows firms to concentrate on production in one country, so that more can be produced in one country than in the other. To see more about the patterns of trade that result from economies of scale, we will look at the profit-maximization problem, which we have considered in detail and think about how economies of scale interact with competitive advantage to determine the pattern of international trade.

Let us imagine a world economy consisting of, as usual, of two countries—Home and Foreign. Each of these countries has two firms in the industry that we have studied in detail. Each market is perfectly competitive, and each firm is a price taker. In the two-country model, the profit-maximization problem that we have considered in detail can be applied to this model, with the following exceptions.

- The number of firms is fixed, rather than being determined by the profit-maximization problem.
- The cost of production is the same in both countries, so there is no cost advantage to concentrating production in one country.
- The market is perfectly competitive, and each firm is a price taker, so the price is determined by the supply and demand for the good in the market.
- The profit-maximization problem can be applied to this model, with the following exceptions:
  - The number of firms is fixed, rather than being determined by the profit-maximization problem.
  - The cost of production is the same in both countries, so there is no cost advantage to concentrating production in one country.
  - The market is perfectly competitive, and each firm is a price taker, so the price is determined by the supply and demand for the good in the market.

In a world without economies of scale, there would be a single exchange of manufactures for food.
CHAPTER 6 \nEconomics of Scale, Imperfect Competition, and International Trade

The Significance of Intra-industry Trade

About one-fourth of world trade consists of intra-industry trade, that is, two-way exchanges of goods within similar industrial classifications. Intra-industry trade plays a particularly large role in the trade in manufactured goods among advanced industrial nations, which accounts for most of world trade. Once time, the industrial countries have become increasingly similar in their levels of technology and in the availability of capital and skilled labor. Since the major trading nations have become similar in technology and resources, there is often no clear comparative advantage within an industry, and much of international trade therefore takes the form of two-way exchanges; what is important—probably driven in large part by economics of scale—rather than intra-industry specialization driven by comparative advantage.

Table 6.3 shows measures of the importance of intra-industry trade for a number of U.S. manufacturing industries in 1992. The measures shown is intra-industry trade ratios (10). These ratios range from 0.49 for container transport—an industry in which U.S. exports and imports are nearly equal—to 0.04 for footwear, an industry in which the United States has large imports but virtually no exports. The measure would be zero for an industry in which the United States was only an exporter or only an importer, but it would be one for an industry in which U.S. exports exactly equaled U.S. imports.

Table 6.4 shows that in many industries a large part of trade is intra-industry trade (closer to one) rather than inter-industry trade (closer to zero). The industries are rated by the relative importance of intra-industry trade, those with higher intra-industry trade ratios, industries with high levels of intra-industry trade tend to be sophisticated manufactured goods such as electronics, pharmaceuticals, and power-generating equipment. These goods are exported primarily by advanced nations and are probably subject to similar economic conditions of scale in production. At the other end of the scale, the industries with very little intra-industry trade are typically labor-intensive products, such as footwear and apparel. These are goods that the United States imports primarily from less developed economies, where comparative advantage in cost and is the primary determinant of U.S. trade with these countries.10

---

10 For more precise, the standard formula for calculating the importance of intra-industry trade in a manufacturing sector is:

\[ I = \frac{2(2S - O)}{2S} \]

where \( I \) is the intra-industry trade ratio, \( S \) is the value of exports, and \( O \) is the value of imports. Both \( S \) and \( O \) are measured in U.S. dollars. The ratio ranges from 0 to 1, with a value of 0 indicating no intra-industry trade and a value of 1 indicating complete intra-industry trade. For intra-industry trade to be driven by economies of scale, the intra-industry trade ratio should be higher for industries with high levels of intra-industry trade.11

---

11 The general form of the foreign trade in intermediate goods and services equation is as follows:

\[ X = F(\text{goods}) + S(\text{services}) \]

where \( X \) is the total trade, \( F \) is the foreign trade in goods, and \( S \) is the foreign trade in services. The equation suggests that the trade in goods and services is influenced by the trade in intermediate goods and services.
Why Intraindustry Trade Matters

Table 5.3 shows that a sizable part of international trade is intraindustry trade rather than the intraindustry trade we studied in Chapters 3 through 5. But does the importance of intraindustry trade change any of our conclusions? First, intraindustry trade produces extra gains from international trade, even above and beyond those comparative advantages, because intraindustry trade allows countries to benefit from larger markets. As we have seen, by engaging in intraindustry trade a country can simultaneously reduce the number of products it produces and increase the variety of goods available in domestic consumption. By producing fewer varieties, a country can produce each at larger scales, with higher productivity and lower costs. At the same time, consumers benefit from the increased range of choices. In our numerical example of the gains from integrating a market, home consumers found that intraindustry trade expanded their range of choice from six domestic models to ten even as it reduced the price of an auto from $8,000 to $6,000. As the case study of the North American auto industry indicates (p. 143), the advantages of creating an integrated industry in two countries can be substantial in reality as well.

In our earlier analysis of the distribution of gains from trade (Chapters 2 and 4), we were pessimistic about the prospects that everyone will benefit from trade, even though international trade could potentially raise everyone’s income. In those discussions, earlier, trade had all its effects through changes in relative prices, which in turn have very strong effects on the distribution of income. Suppose, however, that intraindustry trade is the dominant source of gains from trade. This will happen (1) when countries are similar in many ways—factor supplies, so that there is much intraindustry trade, and (2) when factor economies and product differentiation are important, so that the gains from larger scales and increased choice are large. In these circumstances, the distributional effects of trade will be small and there will be substantial extra gains from intraindustry trade. The model may well be this despite the effects of trade on incomes distribution, everyone gains from trade.

When will this be the case? Intraindustry trade tends to be prevalent between countries that are similar in their capital-labor ratios, skill levels, and so on. Thus, intraindustry trade will tend to dominate as countries at a similar level of economic development. Come from this trade will be large when economies of scale are strong and

products are highly differentiated. This is more common of differentiated manufactured goods than of necessities or more traditional sectors (such as textiles or footwear). Trade without extra economic distribution effects, then, is more likely to happen in manufacturing trade between advanced industrial countries.

This conclusion is borne out by previous experience, particularly in Western Europe. In 1957 the major countries of continental Europe established a free trade area in manufactures, the Common Market, or European Economic Community (EEC). (The United Kingdom entered the EEC later in 1972.) The results was a rapid growth of trade. Trade within the EEC grew much as fast as world trade in a whole decade for 1960s. One might have expected this capital growth in trade to produce substantial distributional and political problems. The growth in trade, however, was almost entirely intradystry rather than interindustry, drastic economic dispositional did not occur. Instead of the workers in France’s chemical industry being hurt while those in Germany’s gained, the conflict arose between workers with the increased efficiency of the merged European industry. The result was that the growth in trade within Europe preserved far fewer social and political problems than anyone anticipated.

There is both a good and a bad side to this favorable view of intraindustry trade. The good side is that under some circumstances trade is relatively easy to live with, and therefore relatively easy to support politically. The bad side is that trade varies very different countries where scale economies and product differentiation are important even markets even among the advanced nations. As we shall see, the results are complex.

Intraindustry Trade in Action: The North American Auto Pact of 1964

An unusually clear-cut example of the role of economies of scale in promoting beneficial international trade is provided by the growth in automotive trade between the United States and Canada during the second half of the 1960s. While the same does not fit our model exactly, it does show that the basic concepts have been used in the real world. Before 1965, tariff protection by Canada and the United States produced a Canadian auto industry that was largely self-sufficient, neither importing nor exporting much. The Canadian industry was controlled by the same firms as the U.S. industry—a departure from our model, since we have not yet examined the role of multinational firms—and these firms faced a cheaper or have largely captive production systems than pay the taxes. Thus the Canadian industry was in effect a minimum version of the U.S. industry, at about one-third the scale.

The Canadian stimulation of U.S. firms found that small scale was a substantial handicap. This not because Canadian plants had to be smaller than their U.S. counterparts. Perhaps more important, U.S. plants could also be "dedicated"—that is, devoted to producing

**CASE STUDY**

**Intraindustry Trade in Action: The North American Auto Pact of 1964**

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**Economics of Scale, Imperfect Competition, and International Trade**

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**PART I**

**International Trade Theory**
The neoclassical competition model helps us understand how increasing returns promote international trade. As we noted earlier, however, this model assumes away many of the issues that can arise when firms are imperfectly competitive. Although it recognizes that imperfect competition is a necessary consequence of economies of scale, the neoclassical competition analysis does not focus on the possible consequences of imperfect competition itself for international trade.

In reality, imperfect competition has some important consequences for international trade. The most striking of these is that firms do not necessarily charge the same price for goods that are exported and those that are sold to domestic buyers.

The Economics of Dumping

In imperfectly competitive markets, firms sometimes charge one price for a good when that good is exported and a different price when it is sold domestically. In general, the practice of charging different consumer prices different prices is called price discrimination. The common economic form of price discrimination in international trade is dumping, a pricing practice in which a firm charges a lower price for exported goods than it does for the same goods sold domestically. Dumping is controversial inside its trade policy, where it is widely regarded as an "unfair" practice to be subject to special rules and penalties. We will discuss the policy dispute surrounding dumping in Chapter 5. For now, we present some basic economic analysis of the dumping phenomenon.

Dumping occurs only if two conditions are met. First, the industry must be imperfectly competitive, so that firms set prices rather than taking market prices as given. Second, domestic firms must be large enough to dominate the market and exert prices.

For export, given these conditions, a monopolistic firm may find it profitable to engage in dumping. Given these conditions, a monopolistic firm may find it profitable to engage in dumping.

An example may help to show how dumping can be a profit-maximizing strategy. Suppose a firm that currently sells 1,000 units of a good at home and 1,000 units abroad. Currently selling the good at $2 per unit domestically, it gets only $1.50 per unit on export sales. One might imagine that the firm could conclude that additional domestic sales are much more profitable than additional exports.

Support, however, that expanded sales by one unit, in either market, would require reducing the price by $0.01. Reducing the domestic price by a penny, then, would increase sales by one unit—directly adding $19.99 in revenue, but reducing the receipts on 1,000 units that would have sold at the $2.00 price by $10. So the marginal revenue from the extra unit sold is only $0.99. On the other hand, the price charged to foreign customers and thereby expanding exports by one unit would directly increase revenue by only $1.49. The indirect cost of reduced receipts on the 100 units that would have been sold at the original price, however, would be only $1; so that marginal revenue on export sales would be $13.99. It would therefore be more profitable in this case to expand exports rather than domestic sales, even though the price received on exports is lower.

This example could be reversed, with the incentive being to charge less on domestic than foreign sales. However, price discrimination in favor of exports is more common. Since international markets are imperfectly integrated due to high transportation costs and production trade barriers, domestic firms usually have a larger share of home markets than they do of foreign markets. In this sense usually means that their foreign sales are more affected by their pricing than their domestic sales. A firm with a 20 percent market share needs not cut its price as much to double its sales as it does on a 20 percent share. So firms typically see themselves as having less monopoly power, and a greater incentive to keep their prices lower in foreign markets than in their 100 percent domestic market.

Figure 6.1 offers a diagrammatic example of dumping. It shows an industry in which there is a simple monopolistic domestic firm. The firm sells two markets: a domestic market, where it faces the demand curve D, and an export market. In the domestic market, we assume the assumption that sales are highly responsive to the price the firm charges to an extent, the firm can sell as much as it wants at the price P. The horizontal line P, which is then the demand curve for the firm in the foreign market. We assume that the price is p, so that the firm can charge a price p higher for domestically sold goods than it does for export goods. We assume that the marginal cost curve the total output, which can be used on either market.

To maximize profits, the firm must set marginal revenue equal to marginal cost in each market. Marginal revenue on domestic sales is defined by the curve MRP, which lies below the demand curve. Export sales take place at a constant price P, as the marginal revenue for an additional unit exported is MP = P. To summarize, the marginal cost is equal to marginal revenue in both markets. It is necessary to produce the quantity to sell this quantity Q, to sell it on the domestic market, and to export Q = Q - Q. The cost of producing an additional unit is in this

at a single model or component—for example, Canadian producers had to produce varieties of insulin for markets and use less specialized machinery, and so on. The Canadian auto industry had a labor productivity about 30 percent lower than the United States.

In an effort to remove these problems, the United States and Canada agreed in 1964 to establish a free trade area in automobiles (subject to certain exemptions). This allowed the automobile importers in Canada to compete on the Canadian market. The overall level of Canadian production and employment was, however, maintained. This was achieved by importing from the United States products no longer made in Canada and by substituting Canadian input instead.

In 1956, Canada exported $6.1 million worth of competitive products to the United States while importing $5.1 million worth. By 1964 the numbers were $2.4 and $2.5 million, respectively. In other words, both exports and imports increased sharply in interindustry trade in textiles.

The gains seem to have been substantial. By the early 1970s the Canadian industry was competitive in the U.S. market by 50-70 percent.
CHAPTER 6 Economics of Scale, Imperfect Competition, and International Trade

more price-responsive in one market than in another. In this case we have assumed export demand is infinitely price-responsive.

Dumping is widely regarded as an unfair practice in international trade. There is no good economic justification for regarding dumping as particularly harmful, but U.S. trade law prohibits foreign firms from dumping goods into the market and unreasonably lowers prices when such dumping is discovered.

The situation shown in Figure 6-8 is simply an extreme version of a wider class of situations in which firms have an incentive to sell at a lower price than the price they charge domestic consumers.

CASE STUDY

Antidumping as Protectionism

In the United States and a number of other countries, dumping is regarded as an unfair competitive practice. Firms that have been injured by foreign firms who have dumped their products in the domestic market at below-market prices can appeal, through a quasi-judicial procedure, to the Commerce Department for relief. If their complaint is ruled valid as "antidumping duty," it is imposed, equal to the calculated difference between the actual and "fair" price of imports. In practice, the Commerce Department accepts the great majority of complaints by U.S. firms against unfair foreign selling. The determination that the unfair pricing has actually caused injury, however, is in the hands of another agency, the International Trade Commission, which rejects about half of its cases.

Inventories have never been very happy with the idea of selling dumping at a protected price. For one thing, price discrimination between markets may be a perfectly legitimate business strategy—like the discount the airline offers to students, senior citizens, and travelers who are willing to fly on a weekend. Also, the legal definition of dumping deviates substantially from the economic definition. Since it is often difficult to prove that foreign firms charge higher prices to domestic than export customers, the United States and other nations instead often try to calculate a supposed fair price based on estimates of foreign production costs. This "fair" price is the price at which perfectly normal domestic producers can sell. A firm may well be willing to sell at a price lower, while having to charge prices higher in a new market. In spite of almost universal negative assessments from economists, however, formal complaints about dumping have been filed with growing frequency since about 1970. As of April 2003, the United States had one dumping case or "countervailing" duties (which are supposed to offset foreign subsidies) on 265 items from 40 different countries. Among the 38 items from China subject to duties were canned peppers, coarse hemp textiles, paper clips, paintbrushes, sparklers, and freshwater fishball saltfish. Is this just a cynical abuse of the law, or does it reflect a real increase in the importance of dumping? The answer may be a little of both.
Why may dumping have increased? Because of the stevedore pact which countries have opened up their markets. Since 1950 trade liberalization and deregulation have opened up international competition in a number of previously isolated industries. For example, it used to be considered unwise for telephone companies to buy equipment from domestic manufacturers. With the breakup of AT&T in the United States and the privatization of phone companies in other countries, this is no longer the case everywhere. But in Japan and several European countries the old idea still applies. It is not surprising that the manufacturers of telephone equipment in these countries would continue to charge high prices at home while offering lower prices to customers in the United States—or at least that they would be accused of doing so.

The analysis of dumping suggests that price discrimination can actually give rise to international trade. Suppose there are two monopolies, each producing the same good, one in Houston and one in Florence. To simplify the analysis, assume that these two firms have the same marginal cost. Suppose also that there are some costs of transportation between the two markets, so that if the firms charge the same price there will be no trade. In the absence of trade, each firm’s monopoly would be unchallenged.

If we introduce the possibility of dumping, however, trade may emerge. Each firm will limit the quantity it sells in its home market, recognizing that if it tries to sell more it will drive down the price on its existing domestic sales. If a firm can sell a little more in the other market, however, it will add to its profits even if the price is lower than in the domestic market, because the negative effect on the price of existing sales will fall on the other firm, not on itself. So each firm has an incentive to “steal” the other market, selling a few units at a price that (net of transportation costs) is lower than the home market price but still above marginal cost.

If both firms do this, however, the result will be the emergence of indus even though there was (by assumption) no initial difference in the price of the good in the two markets, and even though there are some transportation costs. Even more particularly, there will be two-way trade in the same product. For example, a cremen plant in country A might be shipping cotton to country B while a cotton plant in D is doing the reverse.

The situation in which dumping leads to two-way trade in the same product is known as reciprocal dumping.

This may seem like a strange case, and it is admittedly probably rare in international trade for exactly identical goods to be shipped in both directions at once. However, the reciprocal dumping effect probably tends to increase the volume of trade in goods that are not identical.

Is such peculiarly nonsystems trade socially desirable? The answer is ambiguous. It is obviously wasteful to produce the same good, or consume substitutions, both for for once transportation is costly. However, notice that the emergence of reciprocal dumping is our story

The Theory of External Economies

In the neoclassical production model of trade it is assumed that the economies of scale that grow as the international trade occur at the level of the individual firm. That is the only particular firm’s output of a product, the lower the average cost. The inevitable result of such economies of scale at the level of the firm is imperfect competition, which is turn allows such practices as dumping.

As we pointed out earlier in this chapter, however, not all scale economies apply at the level of the individual firm. For a variety of reasons, it is often the case that concentrating production of an industry in one or two locations reduces the industry’s costs, even if the individual firms in the industry cannot save. When economies of scale apply at the level of the industry rather than at the level of the individual firm, they are called external economies. The analysis of external economies goes back more than a century to the basic economist Alfred Marshall, who was struck by the phenomenon of “industrial districts” — geographical concentration of industry that could not be easily explained by natural resources. Marshall’s idea is the most famous example included such concentrations of industry as the cluster of cutlery manufacturers in Sheffield and the cluster of luxury firms in Northampton. Modern examples of industries where these seem to be powerful arguments include the semiconductor industry, concentrated in California’s famous Silicon Valley; the investment banking industry, concentrated in New York; and the movie entertainment industry, concentrated in Hollywood.

Marshall argued that there were three main reasons why a cluster of firms may be more efficient than an individual firm in isolation: the ability of a cluster to support special suppliers; the way that a geographically concentrated industry allows labor market pooling; and the view that a geographical concentration industry helps foster knowledge spillovers. Some of these factors continue to be valid today.

Specialized Suppliers

In many industries, the production of goods and services—and in an even greater extent the development of new products—requires the use of specialized equipment or support services, yet as independent companies does not provide a large enough market for these services to keep the suppliers in business. A localized industrial cluster can solve this problem by bringing together many firms that collectively provide a large enough market to support a wider range of specialized suppliers. This phenomenon has been extensively documented in Silicon Valley: A 1994 study reveals how, as the local industry grew, “engineers left established semiconductor companies to start firms that specialized in capital goods such as diffusion systems, batch and scan, and, and materials and components new to photolithography, metrology, and specialized chemicals. . . . This independent equipment sector promoted the continuing formation of semiconductor firms by focusing individual producers from the expensive of developing capital equipment internally and by spreading the costs of
development. It also reinforces the tendency toward industrial localization, as most of these specialized inputs are not available elsewhere in the country.8

As the quote suggests, the availability of this dense network of specialized suppliers has given high-technology firms in Silicon Valley some considerable advantages over firms from elsewhere. They seem to be more efficient because there are so many firms competing to provide them, and firms can concentrate on what they do best, contracting out other aspects of their business. For example, some Silicon Valley firms that specialize in growing highly sophisticated computer chips for particular customers have chosen to become "firms," in that they do not have any business in which they can be fabricated. Instead, they concentrate on designing the chips, and then have another firm actually fabricate them.

A company that tried to enter the industry in another location—for example, in a country that did not have a comparable industrial cluster—would have to go elsewhere to access Silicon Valley's suppliers and would either have to provide them for itself or be faced with the task of trying to deal with Silicon Valley-based suppliers at long distance.

Labor Market Pooling

A second source of external economies is the way that a cluster of firms can create a pooling market for workers with highly specialized skills. Such a pooling market is to the advantage of both the producers and the workers as the producers are less likely to suffer from labor shortages, while the workers are less likely to become unemployed.

The point can best be made with a simplified example. Imagine that there are two computer firms that demand the same kind of specialized labor, say, two data analysts that make use of experts in computer animation. Both employers are, however, uncertain about how many workers they will want to hire. If demand for its product is high, both companies will want to hire 150 workers, but if in low, they will only want to hire 50. Suppose also that there are 200 workers with this special skill. Now compare two strategies: one with both firms and all workers in the same city, the other with the firms and 100 workers in two different cities. It is straightforward to show that both the workers and their employers are better off if everyone is in the same place.

First, consider the situation from the point of view of the companies. If they are in different locations, whenever one of the companies is doing well it will be combined with a labor shortage and it will hire 150 workers, but if it is doing poorly, it will only hire 50. If the firms are near each other, however, it is at least possible that one will be doing well when the other is doing badly, so this reduces the risk that all workers will be unemployed. So by having one near each other, the companies increase the likelihood that they will be able to take advantage of business opportunities.

From the workers' point of view, having the industry concentrated in one location is also an advantage. If the industry is divided between two cities, then whenever one of the firms has a low demand for worker supply will be unemployment; the firm will be willing to hire only 10 of the 100 workers that need their help. But if the industry is concentrated in a single city, the labor demand is just one firm with some uncertainty in its output by high demand from the other. As a result, workers will have a lower risk of unemployment.

8See the book listed in Further Reading by R. M. M., p. 45.

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Again, price advantages have been documented for Silicon Valley, where it is common both for companies to expand rapidly and for workers in change careers. The "reality of Silicon Valley," that was gained practically now that the "reality of a firm is a simple location makes it easy to switch employers, pegging one engineer in saying that it's easier that huge copiers as fast as new people are very similar. You've done that in another district at the end of everything. This flexibility makes Silicon Valley an attractive location both for highly skilled workers and for the companies that employ them.

Knowledge Spillovers

It is by now a cliché that in the modern economy knowledge is at least as important an input as factors of production like labor, capital, and raw materials. This is especially true in highly innovative industries, where being only a few months behind the cutting edge in production techniques or product design can put a company in a major disadvantage.

But where does the specialized knowledge that is crucial to success in innovative industries come from? Companies can acquire technology through their own research and development efforts. They can also try to learn from companies by studying their products and, in some cases, taking them apart to "reverse engineer" their design and manufacture. An important source of technical know-how, however, is the informal exchange of information and ideas that take place as part of a personal level. And this kind of informal diffusion of knowledge often occurs in places most likely to become concentrated in a fairly small area, so that engineers of different companies mix socially and talk freely about technical issues.

Marshall described this process memorably when he wrote that in a district with many firms in the same industry, "The mysterious of the trade became as easy, but it was one of the secrets... Good work and tightly supplied... It is easy to bring in others and consisted with suggestions of their own; and then it becomes the source of further new ideas."9

A journalist described how these knowledge spillovers worked during the 1960s in Silicon Valley (and gave an excellent sense of the extent of sophisticated knowledge in the industry) as follows: "Everywhere there was a small place, the wagon wheel, Chas Yuma, Redwood, where members of 100 men, but only 100 will be available. If the firms are near each other, however, it is at least possible that one will be doing well when the other is doing badly, so this reduces the risk that all workers will be unemployed. So by having one near each other, the companies increase the likelihood that they will be able to take advantage of business opportunities.

From the workers' point of view, having the industry concentrated in one location is also an advantage. If the industry is divided between two cities, then whenever one of the firms has a low demand for worker supply will be unemployment; the firm will be willing to hire only 10 of the 100 workers that need their help. But if the industry is concentrated in a single city, the labor demand is just one firm with some uncertainty in its output by high demand from the other. As a result, workers will have a lower risk of unemployment.

9Ibid., p. 35.
11Ibid., p. 33.
External Economies and Increasing Returns

A geographically concentrated industry is able to support specialised suppliers, provide a prodigious labor market, and facilitate knowledge spillovers in a way that a geographically dispersed industry cannot. But a country cannot have a large concentration of firms in an industry unless it possesses a large industry. Thus the theory of external economies indicates that when these external economies are important, a country with a large industry will, other things being equal, be more efficient in that industry than a country with a small industry.

On the other side, external economies can give rise to increasing returns to scale at the level of the national industry. While the details of external economies in practice are often quite subtle and complex (as in the example of Silicon Valley above), it can be useful to abstract from the details and express internal economies simply by assuming that an industry’s costs are lower, the larger the industry. If we ignore possible imperfections in competition, this means that the industry will have a forward-looking supply curve. The larger the industry’s output, the lower the price at which firms are willing to sell their output.

External Economies and International Trade

External economies, like economies of scale that are internal to firms, play an important role in international trade, but they may be quite different in their effects. In particular, external economies can cause countries to get “locked in” to undesirable patterns of specialisation and can even lead to losses from international trade.

External Economies and the Pattern of Trade

When there are external economies of scale, a country that has large production in some industry will tend, other things being equal, to have low costs of producing that good. This gives rise to an obvious curiosity, since a country that can produce a good cheaply will also therefore tend to produce a lot of that good. Strong external economies tend to create existing patterns of inter-industry trade, whatever their original sources. Countries that start out as large producers in certain industries, for whatever reason, tend to remain large producers. They may or may not, even if some other country could potentially produce the goods more cheaply.

Figure 6.9 illustrates this point. We show the cost of producing a watch as a function of the number of watches produced annually. Two countries are shown: “Switzerland” and “Thailand.” The Swiss cost of producing a watch is shown as $AC^{SWITZ}$, the Thai cost as $AC^{THAI}$. Switzerland represents the world demand for watches, which we assume can be satisfied either by Switzerland or by Thailand.

Suppose that the economies of scale in watch production are entirely external to firms, and that the same applies to the demand. Then each country produces a fixed amount of watches, and the Swiss country produces twice as many watches as the Thai country. At this level of production, the Swiss country is more efficient, but the Thai country produces a good that is more cheaply available to Swiss consumers.

We assume that the Thai cost curve lies below the Swiss curve, say because Thai wages are lower than Swiss. This means that at any given level of production, Thailand could manufacture watches more cheaply than Switzerland. One might hope that this would always imply that Thailand will in fact supply the world market. Unfortunately, this need not be the case. Suppose that Switzerland, for historical reasons, established its watch
TINSELTOWN ECONOMICS

What is America's most important export sector? The answer may seem to some a
triviality: it is agriculture, above all else. By any measure, however, the two biggest
exporters in the United States are the entertainment industry, which
earned more than $30 billion in overseas sales in 1984. American-made movies and
television programs are shown almost everywhere on Earth. The export market has also
become vital to Hollywood's economic health; in particular, many more
consumers abroad than at home are fans of the pictures made there.

Why is it that the United States is the world's dominant
exporter of entertainment? There are several factors at work,
advantages arising from the sheer size of the
American market. A film that grosses powerfully in
French or Italian markets, which are far smaller than
those in the United States, cannot justify the
huge costs of production. Even American</p>
The learning curve shows that unit cost is lower the greater the cumulative output of an industry. A country that has extensive experience in an industry C) may have lower unit costs than another country with less or no experience, even if the second country's learning curve (L) is lower, for example, because of lower wages.

measured by the cumulative output of the industry in time. For example, the cost of producing a ton of steel might depend negatively on the total number of tons of steel produced by a country since the industry began. This kind of relationship is often illustrated by a learning curve that relates unit cost to cumulative output. Such learning curves are illustrated in Figure 6-11. They show that the cost of production decreases because of the effect of experience. The learning curves fall with cumulative production over time, rather than with the current rate of production, as is true of a dynamic increasing returns.

Like ordinary economic theory, dynamic economic theory can lock in an initial advantage or head start in an industry. In Figure 6-11, the learning curve L is that of a country that pioneered an industry, while c is that of another country that has lower input costs—i.e., lower wages—but less production experience. Provided that the first country has a sufficiently large head start, the potential lower costs of the second country may not allow it to enter the market. For example, suppose the first country has a cumulative output of tons, giving it a cost of C, while the second country has never produced the good. Then the second country will have an initial start-up cost C that is higher than the current unit cost of C, the established industry.

Dynamic scale economies, like external economies, are points in time. Potentially, dynamic increasing returns argue that a country could have low enough costs to produce a good at a gain even if it had lower production experience, but that the lower costs of experience could be competitive. Such an industry might increase its long-term welfare even by encouraging the production of the good by a subsidy or by preventing a foreign country from entering the market until the industry could stand on its own feet. The argument for temporary protection of industries to enable them to gain experience is known as the infant industry argument and has played an important role in debates over the role of trade policy in economic development. We will discuss the infant industry argument in greater detail in Chapter 6. (For now we simply note that situations like that illustrated in Figure 6-11 are often hard to identify in practice in those involving nondynamic increasing returns.)

CHAPTER 6

Econornics of Scale, Imperfect Competition, and International Trade

length in Chapter 6, but for now we simply note that situations like that illustrated in Figure 6-11 are often hard to identify in practice in those involving nondynamic increasing returns.

Summary

1. Trade need not be the result of comparative advantage. Instead, it can result from increasing returns or economies of scale, that is, from a tendency of output costs to be lower with larger output. Economics of scale give countries an incentive to specialize and trade even in the absence of differences between countries in their resources or technology. Economics of scale can also exist (depending on the size of the firm) or externally (depending on the size of the industry).

2. Economies of scale normally lead to a breakdown of perfect competition, so that trade in the presence of economies of scale must be analyzed using models of imperfect competition. Two important models of this kind are the monopolistic competition model and the duopoly model. A third model, that of external economies, is consistent with perfect competition.

3. In monopolistic competition, an industry consists of a number of firms producing differentiated products. These firms act as individual monopolists, but affiliated firms compete a product in an industry. Monopolistic firms are composed entirely of external economies and are affected by the size of the market. A larger market will support a larger number of firms, each producing at larger scale and thus lower average cost, than a smaller market.

4. International trade allows creation of an integrated market that is larger than any one country's market, and that makes it possible simultaneously to offer consumers a greater variety of products and lower prices.

5. In the monopolistic competition model, trade may be divided into two kinds. Two-way trade is differentiated products that are sold in different markets; trade that exchanges the products of one industry for the products of another is called interindustry trade. Interindustry trade reflects economies of scale; interindustry trade reflects comparative advantage. Interindustry trade does not generate the same strong effects on income distribution as interindustry trade.

6. Dumping occurs when a monopolistic firm charges a lower price on exports than it charges domestically. It is a profit-maximizing strategy; when export sales are more price-elastic than domestic sales, and when firms can effectively segment markets, that is, prevent domestic customers from buying goods intended for export markets. Reciprocal dumping occurs when two monopolistic firms dump into each other's market; reciprocal dumping can be a cause of international trade.

7. External economies are economies of scale that occur at the level of the industry instead of the firm. They give an important role to history and accident in determining the pattern of international trade. Where external economies are important, a country starting with a large industry may enjoy an advantage even if another country could potentially produce the same goods more cheaply. When external economies are important, countries can conceivably lose from trade.
CHAPTER 6 Economies of Scale, Imperfect Competition, and International Trade

Key Terms
- average cost, p. 125
- dumping, p. 142
- dynamic increasing returns, p. 156
- essential economies of scale, p. 112
- forward-looking supply curve, p. 150
- oligopoly, p. 126
- oligopolistic competition, p. 126
- output, p. 128
- price discrimination, p. 142
- pure competition, p. 125
- predatory dumping, p. 146
- price-responsive supply, p. 147
- quality, p. 137
- quality differences, p. 137
- quality spillovers, p. 147
- labor market pooling, p. 147
- learning by doing, p. 134
- marginal cost, p. 125
- market, p. 123
- monopolistic competition, p. 126
- oligopolists, p. 128
- price discrimination, p. 142
- monopolistic competition, p. 125
- specialized suppliers, p. 147
- knowledge spillovers, p. 147
- lager market pooling, p. 147
- learning by doing, p. 134
- market, p. 123
- monopolistic competition, p. 126
- oligopolists, p. 128
- price discrimination, p. 142
- monopolistic competition, p. 125
- specialized suppliers, p. 147
- knowledge spillovers, p. 147

Problems
1. For each of the following examples, explain whether this is a case of external or internal economies of scale:
   a. Most musical wind instruments in the United States are produced by a few large firms in South Carolina.
   b. All Honda's sold in the United States are either imported or produced in Marysville, Ohio.
   c. All airplanes for Airbus, Europe's only producer of large aircraft, are assembled in Toulouse, France.
   d. Hartford, Connecticut, is the insurance capital of the northeastern United States.
   e. In perfect competition, firms set price equal to marginal cost. Why isn't this possible when there are internal economies of scale?
   f. It is often argued that the existence of increasing returns is a source of conflict between countries, since each country benefits from it. Can this be correct? What are the industries characterized by increasing returns in terms of the degree of competition in these industries? Evaluate this view in terms of the degree of competition these industries are characterized by.
   g. Suppose the two countries considered in the numerical example on pages 133-136 were to integrate their automobile market with a third country with an annual output of 3.75 million automobiles. How many firms, the output per firm, and the price per automobile in the new integrated market after trade?
Determining Marginal Revenue

In our exposition of monopoly and monopolistic competition, we found it useful to have an algebraic statement of the marginal revenue faced by a firm given the demand curve's form. Specifically, we asserted that if a firm faces the demand curve

\[ Q = A - B \times P. \]

then its marginal revenue is

\[ MR = P - \left(\frac{1}{B}\right) \times Q. \]

In this appendix we demonstrate why this is true.

Notice first that the demand curve can be rearranged to solve the price as a function of the firm's sales rather than the other way around. By rearranging (6A-1) we get

\[ P = (AB) - (1/B) \times Q. \]

The revenue of a firm is simply the price it receives per unit multiplied by the number of units it sells. Letting \( R \) denote the firm's revenue, we have

\[ R = P \times Q = (AB) - (1/B) \times Q \times Q. \]

Let us next ask how the revenue of a firm changes if it changes its sales. Suppose that the firm decides to increase its sales by a small amount \( dQ \), so that the new level of sales is \( Q = Q + dQ \). Then the firm's revenue after the increase in sales, \( R' \), will be

\[
\begin{align*}
R' &= P \times (Q + dQ) \\
&= (AB) - (1/B) \times (Q + dQ) \\
&= (AB) - (1/B) \times Q + (1/B) \times dQ \\
&= (AB) - (1/B) \times Q + (1/B) \times Q \times dQ \\
&= (AB) - (1/B) \times Q - (1/B) \times Q \times dQ.
\end{align*}
\]

Equation (6A-5) can be simplified by substitution in forms (6A-1) and (6A-4) to get

\[ R' = R + P \times dQ - (1/B) \times Q \times dQ - (1/B) \times Q \times dQ. \]

(6A-6)

When the change in sales \( dQ \) is small, however, its square \((dQ)^2\) is very small (e.g., the square of .1 is .01, but the square of 1/10 is 1/100). So for a small change in \( Q \), the last term in (6A-6) can be ignored. This gives us the result that the change in revenue from a small change in sales is

\[ R' - R = P - (1/B) \times Q \times dQ. \]

(6A-7)
CHAPTER 7 International Factor Movements

International Labor Mobility

We begin our discussion with an analysis of the effects of labor mobility. In the modern world, restrictions on the flow of labor are less—just about every country imposes restrictions on immigration. Thus labor mobility is less prevalent in practice than capital mobility. It is important, however; it is also simpler in some ways to analyze that capital movements, for reasons that will become apparent later in the chapter.

A One-Good Model Without Factor Mobility

As the analysis of trade, the best way to understand factor mobility is to begin with a world in which labor is not economically integrated. Then we consider what happens when international transactions are allowed. Let's assume that we have, as usual, a two-country world consisting of Home and Foreign, each with one factor of production, land and labor. We assume for the moment, however, that this world is more simple than the one we examined in Chapter 4. In that in the two countries produce only one good, which we will simply refer to as "cabbage." Thus there is only one good for ordinary trade, the exchange of different goods, in this world. The only way for these economies to become integrated with each other is via movements of either land or labor. Labor abuse by definition cannot move, so this is a model of integration via international labor mobility.

Before we introduce factor mobility, however, let us analyze the determinants of the level of output in each country. Land (L) and labor (L) are the only scarce resources. Thus the output of each country will depend, other things equal, on the quantity of these factors available. The relationship between the supply of factors on one side and the supply of the economy on the other is referred to in the literature as the economy's production function, which we shall denote by \( Q(L, L) \).

We have already encountered the idea of the production function as Chapter 3. As we noted there, a useful way to look at a production function is to ask how output depends on the supply of one factor of production, holding the quantity of the other factor fixed. This is shown in Figure 7.1, which shows how a country's output \( Q \) as its employment of labor is varied, holding fixed the supply of land, the figure is the same as Figure 3.1. The slope of the production function measures the increase in output that would be gained by using a little more labor and it is referred to as the marginal product of labor. As the curve is drawn in Figure 7.1, the marginal product of labor is assumed to fall as the rise of labor to land ratio.

This is the typical case. As a country seeks to employ more labor as a given amount of land, it must move to increasingly labor-intensive techniques of production, and that will normally become increasingly difficult the further the substitution of labor for land goes.
Figure 7.2, corresponding to Figure 3.2, contains the same information as Figure 7.1 but plots it in a different way. We now show directly how the marginal product of labor depends on the quantity of labor employed. We also illustrate that the real wage earned by each unit of labor is equal to labor's marginal product. This will prove as long as the economy is perfectly competitive, which we assume to be the case.

What about the income earned by landowners? As we showed in the appendix to Chapter 5, the total output of the economy can be increased by the same under the marginal product curve. Of that total output, wages earned by workers equal the real wage rate times the employment of labor, and hence equal the indicated area on the figure. The remainder, also shown, equals rents earned by landowners.

Assume that Home and Foreign have the same technology but different overall labor-capital ratios. If Home is the labor-abundant country, workers in Home will earn less than those in Foreign, while land in Home earns more than in Foreign. This obviously creates an incentive for factors of production to move. Home workers would like to move to Foreign, Foreign landowners would also like to move their land to Home, but we are assuming that this is impossible. Our only assumption is that workers want to move and see what happens.

International Labor Movement

Now suppose that workers are able to move between our two countries. Workers will move from Home to Foreign. This movement will reduce the Home labor force and raise the real wage in Home, while increasing the labor force and reducing the real wage in Foreign. If there are no obstacles to labor movement, this process will continue until the marginal product of labor is the same in the two countries.

Figure 7.3 illustrates the cause and effects of international labor mobility. The horizontal axis represents the total world labor force. Workers employed in Home are measured from the left, the workers employed in Foreign from the right. The vertical axis shows the marginal product of labor in Home; the right vertical axis shows the marginal product of labor in Foreign. Initially we assume that there are OL workers in Home, OUST workers in Foreign.
Introduction.

We consider briefly how the analysis is modified when we add some of the complications we have discussed above.

We need to remove the assumption that the two countries produce only one good. Suppose, then, that the country produces two goods, one more labor intensive than the other. We already know from our discussion of the factor proportions model in Chapter 4 that in this case trade offers an alternative to factor mobility. Home can be a source export labor and import land by exporting the labor-intensive good and importing the land-intensive good. It is possible in principle for such trade to lead to a complete equalization of factor prices without any need for factor mobility. If this happened, it would of course remove any incentive for labor to move from Home to Foreign.

In practice, while trade is indeed a substitute for international factor movement, it is not a perfect substitute. The reasons are those already summarized in Chapter 4. Complete factor price equalization is not observed in the real world because countries are sometimes too different in their resources to remain unexploited; there are barriers to trade, both natural and artificial, and there is efficiency in technology as well as resources between countries.

We might wonder on the other side whether factor movements do not remove the incentive for international trade. Again, the answer is that while a simple model involving factors of production can make international trade in goods unimportant, in practice there are substantial barriers to free movement of labor, capital, and other primary movable resources. And some resources cannot be brought together—Canadian forests and California sunshine cannot be brought together.

Extending the simple model of factor mobility, then, does not change its fundamental message. The main point is that trade in goods is, in part, economics of scale; very much like trade in goods is good, it occurs for much the same reasons and produces similar results.

Case Study

Wage Convergence in the Age of Mass Migration

Although there are substantial movements of people between countries in the modern world, the only recent age of labor mobility—when migration was a major source of population growth in some countries, while emigration caused population in other countries to decline—was in the late nineteenth and early twentieth centuries. In a global economy newly integrated by railways, steamships, and telegraph cables, and not yet subject to many legal restrictions on migration, tens of millions of people moved long distances in search of a better life. Chinese moved to Southeast Asia and California, Italians to Africa and the Caribbean; a substantial number of Japanese moved to Brazil. Above all, people from the periphery of Europe—Scandinavia, Ireland, Italy, and Eastern Europe—moved in large numbers to the United States, but also Canada, Argentina, and Australia.

Did this process cause the kind of real wage convergence that our model predicts? Indeed it did. The accompanying table shows real wages in 1880, and the change in these wages up to the eve of World War I, for four major "destination" countries and for four important "origin" countries. As the table shows, at the beginning of the period real wages were much higher in the destination than the origin countries. Over the next four decades real wages rose in all countries, but except for a surprisingly large increase in Canada, they increased much more rapidly in the origin than the destination countries, suggesting that migration actually did move the world toward (although not by any means all the way to) wage equalization.

As documented in the case study on the U.S. economy, legal restrictions put an end to the age of mass migration after World War I. For that and other reasons (notably a decline in world trade, and the direct effects of two world wars), convergence in wages came to a halt and even reversed itself for several decades, only to resume in the postwar years.

<table>
<thead>
<tr>
<th>Country</th>
<th>1880 Real Wage (U.S. = 100)</th>
<th>Percentage Increase in Real Wages, 1870-1913</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>33</td>
<td>51</td>
</tr>
<tr>
<td>Australia</td>
<td>110</td>
<td>11</td>
</tr>
<tr>
<td>Canada</td>
<td>86</td>
<td>121</td>
</tr>
<tr>
<td>United States</td>
<td>100</td>
<td>47</td>
</tr>
<tr>
<td>Origin countries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ireland</td>
<td>43</td>
<td>84</td>
</tr>
<tr>
<td>Italy</td>
<td>23</td>
<td>112</td>
</tr>
<tr>
<td>Norway</td>
<td>54</td>
<td>193</td>
</tr>
<tr>
<td>Sweden</td>
<td>24</td>
<td>290</td>
</tr>
</tbody>
</table>

PART 1  International Trade Theory

CASE STUDY

Immigration and the U.S. Economy

During the twentieth century, the United States has experienced two great waves of immigration. The first, which began in the late nineteenth century, was brought to an end by restrictive legislation introduced in 1924. A new wave of immigration began in the mid-1960s, spurred in part by a major revision of the law in 1965. There is thus a rising number of illegal immigrants; the U.S. government estimates their number at 200,000 to 300,000 per year.

In the period between the two great waves of immigration, immigrants probably had little effect on the U.S. economy for two reasons. First, they were not very numerous. Second, the immigration laws allowed visas based on the 1920 ethnic composition of the U.S. population; as a result, immigrants came mainly from Canada and Europe, and so their educational level was fairly similar to that of the people already here. After 1965, however, immigrants came primarily from Latin America and Asia, where workers on average were substantially less educated than the average American worker.

The accompanying chart illustrates this effect by showing the ratio of immigrants to native-born workers by education level in the years 1980 and 1990. As you can see from the table, the ratio of immigrants to native-born rose in all categories, but by far the largest increase occurred among workers who had not completed high school. This immigration, other things being the same, tended to make less-educated workers more abundant and less highly educated workers scarce. This suggests that immigration may have played a role in the widening wage gap between less and more educated workers over the same period.

However, this cannot have been the whole story. Despite the effects of immigration, the fraction of U.S. workers without a high school education dropped over the decade, while the fraction with a college education rose. In overall, educated workers became more abundant, and their relative wage has increased—probably as a result of technological changes that placed an increasing premium on education.

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Immigrants as % of native-born workers, 1980</th>
<th>Immigrants as % of native-born workers, 1990</th>
<th>Change, 1980-1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>High school dropouts</td>
<td>12.2</td>
<td>26.2</td>
<td>14.0</td>
</tr>
<tr>
<td>High school</td>
<td>4.4</td>
<td>6.1</td>
<td>1.7</td>
</tr>
<tr>
<td>Some college</td>
<td>5.4</td>
<td>6.9</td>
<td>1.5</td>
</tr>
<tr>
<td>College</td>
<td>7.5</td>
<td>9.2</td>
<td>2.2</td>
</tr>
</tbody>
</table>


CHAPTER 7  International Factor Movements

International Borrowing and Lending

International movements of capital are a prominent feature of the international economic landscape. It is tempting to analyze these movements in a very parallel to our analysis of labor mobility and to this is a useful exercise. There are many more important differences, however; when we speak of international labor mobility, it is clear that workers are physically moving from one country to another. International capital movements are not so simple. When we speak of capital flows from the United States to Mexico, we do not mean that U.S. residents are literally being shipped and sprayed. We mean instead that U.S. residents are literally being shipped and sprayed. We mean instead that U.S. residents to Mexico the right to send more than they earn in income for a purpose to repay in the future.

The analysis of financial aspects of the international economy is the subject of the second half of this book. It is important to realize, however, that financial transactions do not exist simply on paper. They have real consequences. International borrowing and lending, in particular, can be interpreted as a kind of international trade. The trade is not of course good for anyone in a time of boom but of goods today for goods in the future. This kind of trade is known as intertemporal trade; we will have much more to say about it later in the text. But for present purposes a simple model will be sufficient to make our point.1

1Intertemporal Production Possibilities and Trade

Even in the absence of international capital movements, any economy faces a trade-off between consumption now and consumption in the future. Economists usually do not count all of their current income; none of their stock unless the form of investment in machines, buildings, and other forms of productive capital. The more investment an economy undertakes now, the more it will be able to produce and consume in the future. To invest more, however, an economy must release resources by consuming less (workers here are unimportant resources, a possibility we temporarily disregard). Thus there is a trade-off between current and future consumption.

Let's imagine an economy that consumes only one good and will exist for only two periods, which we will call present and future. Then there will be a trade-off between present and future production of the consumption good, which we can summarize by drawing an intertemporal production possibilities frontier. Such a frontier is illustrated in Figure 7.4. It looks like the production possibilities frontiers we have been drawing between two goods at a point in time.

The shape of the intertemporal production possibilities frontier will differ among countries. Some countries will have production possibilities that are biased toward present output, while others are biased toward future output. We will ask what real differences these biases correspond to in a market, but first let's simply suppose that there are two
countries. Hans and Foreign, with different intranational production possibilities. Hans's possibilities are based on current consumption, while Foreign's are based on future consumption.

Reasoning by analogy, we already know what to expect, in the absence of international borrowing and lending, that we would expect the relative price of future consumption to be higher in Hans than in Foreign, and that if we open the possibility of trade over time, we would expect the relative price of future consumption to increase in Hans. This may, however, seem a little puzzling. What is the relative price of future consumption, and how does trade on over time?

The Real Interest Rate

How does a country trade over time? Like an individual, a country can trade over time by borrowing or lending. Consider what happens when an individual borrows. He is initially able to spend more than his income or, in other words, consume more than his production. Later, however, he must repay the loan with interest, and therefore in the future he consumes less than he produced. By borrowing, then, he has in effect traded future consumption for current consumption. The same is true of a borrowing country.

Clearly the price of future consumption in terms of present consumption has something to do with the interest rate. As we will see in the second half of this book, in the real world the determination of interest rates is complex and by the possibility of changes in the overall price level. For now, however, we bypass the problem by supposing that interest rates are specified in "real" terms. When a country borrows, it gets the right to purchase some quantity of consumption at present in return for repayment of some larger quantity in the future. Specifically, the quantity of repayment in future will be \( (1 + r) \) times the quantity borrowed at present, where \( r \) is the real interest rate on borrowing. Since the supply of one unit of consumption is present for \( (1 + r) \) units in future, the relative price of future consumption is \( (1 + r)^{-1} \).

The model we have just laid out is now complete. If borrowing and lending are allowed, the relative price of future consumption, and thus the world real interest rate, will be determined by the world relative supply and demand for future consumption. Hence, where intranational production possibilities are biased toward present consumption, we expect present consumption and import future consumption. That is, Hans will tend to Foreign in the long period and receive repayment in the near.

Intertemporal/Comparative Advantage

We have assumed that Hans's intranational production possibilities are biased toward present production. But what does this mean? The concept of international comparative advantage is somewhat different from that just given to ordinary trade.

A country that has a comparative advantage in future production of consumption goods is one that in the absence of international borrowing and lending would have a lower relative price of future consumption, that is, a higher real interest rate. This high real interest rate corresponds to a high marginal investment, that is, a high return to diverting resources from current production of consumption goods to production of capital goods, construction, and other activities that enhance the economy's future ability to produce. So countries that borrow in international markets will be those that have high production investment opportunities available relative to their current productive capacity, while countries that lend will be those where such opportunities are not available domestically.

The pattern of international borrowing and lending in the 1970s illustrates the point. Table 22-3 compares the international lending of three groups of countries: industrial countries, non-developing countries, and major oil exporters. From 1974 to 1981, the oil exporters lent $315 billion, the industrial countries borrowed $105 billion, and the (much larger) non-developing countries borrowed a smaller amount, $200 billion. In the light of our model, is this surprising? During the 1970s, as a result of a substantial increase in oil prices, oil exporters accumulated large foreign exchange reserves with very high current income. They did not, however, find any comparable opportunities in their domestic investment opportunities. That is, they had a comparative advantage in current consumption. With small populations, limited resources, and little expertise in industrial or other production, their natural reaction was to invest much of their increased earnings abroad. By contrast, rapidly developing countries such as Brazil and South Korea experienced much higher incomes in the future and saw high productive investment opportunities in their growing industrial sector. They had a comparative advantage in future income, and lent with little interest in the present. Thus in this time frame (1974 to 1981) the oil exporters also exported current consumption by lending their money, in part, to less-developed countries.

Direct Foreign Investment and Multinational Firms

In the last section we focused on international borrowing and lending. This is a relatively simple transaction, in that the borrower makes no demand on the lender other than that of repayment. An important part of international capital movement, however, takes a different form: that of direct foreign investment. By direct foreign investment we mean international
We have argued repeatedly in this book that the economic growth of newly industrializing economies (NIEs) stems from a higher real-wage structure, which in turn is a result of high wages in these countries. In Chapter 7 we described the economic growth that has taken place in the NIEs, first as a result of favorable conditions, then as a result of favorable conditions that were set in motion by the rapid growth of the capital stock. Because each worker in these countries is highly skilled, the growth of the capital stock is rapid, and therefore the capital stock is large enough for these countries to be able to use their high wages to attract foreign capital. In this chapter we will describe the economic growth that has taken place in the NIEs, first as a result of favorable conditions, then as a result of favorable conditions that were set in motion by the rapid growth of the capital stock. Because each worker in these countries is highly skilled, the growth of the capital stock is rapid, and therefore the capital stock is large enough for these countries to be able to use their high wages to attract foreign capital.
PART I International Trade Theory

But why do firms seek out certain countries? Economics do not have as fully developed a theory of multinational enterprise as they do of many other issues in international economics. There is some theory on the subject, however, which we now review.

The Theory of Multinational Enterprise

The basic necessary element of a theory of multinational firms can best be seen by looking at an example. Consider the European operations of American auto manufacturers, Ford and General Motors. For example, tell many cars in Europe, but nearly all those cars are manufactured in plants in Germany. Consequently, we should realize that there are two obvious alternatives. On the one side, instead of producing in Europe, the U.S. firms could produce in the United States and export to the European market. On the other side, the West market could be served by European producers such as Volkswagen and Renault. Why, then, do we see this particular arrangement, in which the two-firm product is dominant in different countries?

The modern theory of multinational enterprise stems by distinguishing between the two questions of which this larger question is composed. First, why is a good produced in two or more different countries rather than one? This is known as the question of location. Second, why is production in different locations done by the same firm rather than by separate firms? This is known, for reasons that will become apparent in a moment, as the question of internationalization. We need a theory of location to explain why Europe does not import automobiles from the United States; we need a theory of internationalization to explain why Europe's auto industry is not independently controlled.

The theory of location is not a difficult one to principle. It is, in fact, just the theory of trade that we developed in Chapters 2 through 4. The location of production is often determined by the needs of the market, or, in other words, where the demand is greatest. Consider the production of automobiles. American consumers need to be observed in the United States, where prices are low. Consequently, American producers have little reason to export products to Europe, as European demand is small. Conversely, European producers face little competition from American producers, as European demand is high. Consequently, European producers have little reason to export products to the United States, as American demand is small. This is why we see the two-firm product in different countries.

The theory of internationalization is more complex. Why not have independent independent companies in Europe? Why do we see so many independent companies that are not multinational? The answer is that there are some important differences between multinational's operations in different countries. The output of one subsidiary is often an input into the production of another. Or technology, developed in one country may be used in other. Or management may carefully coordinate the activities of plants in several countries. These characteristics are what make the multinational firm unique, and so the firm possesses a competitive advantage over the independent firm. But international transactions need not be carried out inside the firm. Costs can be reduced in an open market, and technology can be licensed to other firms. Firms that are closely related may be economically and technologically integrated, but international transactions need not be carried out inside the firm.

Multinational Firms in Practice

Multinational firms play an important part in world trade and investment. For example, about half of U.S. imports are transactions between "related parties." By this we mean that the buyer and the seller are to a significant extent owned and presumably controlled by the same firm. Thus half of U.S. imports can be regarded as transactions between branches of multinational firms. At the same time, 28 percent of U.S. assets abroad consists of the value of foreign subsidiaries of U.S. firms. Do U.S. international trade and investment, while not dominated by multinational firms, are as important as exports conducted by such firms.

The role of multinational firms in world trade and investment is much more evident in the case of foreign-owned firms. Foreign-owned multinational firms play an important role in certain economies and are an increasingly important role in the United States. Table 3-1 compares the role of foreign-owned firms in the manufacturing shares of three major economies. (Some in much larger share of manufacturing than the economy as a whole.) The table is illuminating, especially for Americans who are not used to the idea of working for foreign-owned firms. 

CHAPTER 7 International Factor Movements
TABLE 7-1
France, Japan, and United States: Share of Foreign Direct Investment in Manufacturing Value Added and Employment

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>36.7</td>
<td>23.9</td>
<td>29.3</td>
<td>21.1</td>
</tr>
<tr>
<td>Japan</td>
<td>20.3</td>
<td>10.7</td>
<td>21.1</td>
<td>14.0</td>
</tr>
<tr>
<td>United States</td>
<td>8.0</td>
<td>8.3</td>
<td>13.4</td>
<td>8.0</td>
</tr>
</tbody>
</table>


foreign direct investment (FDI) is a form of investment where a country invests in another country by establishing a subsidiary, acquiring an existing company, or making a long-term investment in a company's equity. FDI is different from portfolio investment, which involves the purchase of stocks or bonds in companies from another country, without necessarily controlling the company.

The importance of FDI to the U.S. economy is significant. According to the U.S. Department of Commerce, foreign direct investment in the United States has increased steadily over the past two decades, with the United States consistently ranking as one of the top destinations for FDI worldwide.

The benefits of FDI for the United States include increased job creation, higher wages for workers, and the spread of technology and management practices.

The disadvantages of FDI include job losses due to outsourcing, the potential for lower wages in the United States, and the possibility of job displacement.

FDI can also have a positive impact on the balance of payments, as foreign investment can bring in foreign capital, which can help to finance the country's import needs.

However, it is important to note that FDI can also lead to the loss of jobs in the United States, as companies may choose to relocate their manufacturing facilities to countries with lower labor costs.
When foreign direct investment surged again, in the late 1990s, the situation was very different: now the wave of investment was driven by perceptions of U.S. strength rather than weakness. The United States was experiencing a considerable economic boom, meanwhile, Europe's growth was modest, and Europe languished in the middle of a decade of economic stagnation. Given the revived economic dominance of the United States, newly entry large companies to the global market, it had to have a stake in the U.S. economy. And as companies flowed to the United States, mainly by acquiring control of existing U.S. companies. Whether this was a good idea is another question, the merged acquisition of Chrysler by the German company Daimler-Benz, discussed in p. 177, became a celebrated example of how investing in America could go wrong. The political pressure for foreign investors in the 1990s was utterly different from that given to the previous wave. It's not clear to what extent Americans were even aware of the wave of money pouring in; Michael Conlin gave up on economics and went back to writing show business. To the extent that the liters of direct investment was noticed, it was perceived as a tribute to U.S. strength, not as a threat. At the time of writing, foreign direct investment was still in progress, even though the U.S. boom officially came to an end in 2001.

TAKEN FOR A RIDE?

In November 1998 German Daimler-Benz, the makers of Mercedes-Benz, acquired control of America's Chrysler corporation for $46 billion—about $15 billion more than the market value of Chrysler's stock at the time. The new merged company was named DaimlerChrysler.

For the deal to make business sense, the combined company had to be worth more than the two companies were worth separately. In fact, given the premiums that Daimler-Benz paid to acquire Chrysler, the merger is effective to create at least $15 billion in value. Where could this gain come from?

The answer, according to executives in both companies, was that there would be "synergies" between the two companies—that is, whole would be more than the sum of the parts because each company would supply something the other lacked. Synergies were not controlled. They pointed out that although both companies were in the automobile business they operated almost completely different market niches: Daimler-Benz had bulk its reputation on classy luxury sedans, while Chrysler was much more down-market; its signature vehicles were minivans and SUVs. So it was easier to imagine how others would be much gain in terms of either marketing or production efficiencies. In the case, where would the extra value come from?

In some places, a clear that from generating synergies, the deal had at least initially created new problems, particularly in Chrysler. For simply, the cultural difference between the two companies—partly a matter of national style, partly a matter of the personalities involved—created a great deal of misunderstanding and bad feelings. The initial deal was supposedly a merger of equals, but it soon became clear that the German company was the senior partner; many Chrysler executives left within a year of the merger. Partly as a result of those defections, Chrysler's product development and marketing lagged; within two years after the deal, Chrysler had gone from large profits to large losses. Those developments were reflected in a pledge to the new company's stock price: two years after the merger, far from being worth more than the sum of the two companies before the deal, DaimlerChrysler was worth less than either company alone.

CHAPTER 7
International Factor Movements

Summary

1. International factor movements can sometimes substitute for trade, so it is not surprising that international migration of labor is similar to the gains and effects to international trade based on differences in resource. Labor moves from countries where it is abundant to countries where it is scarce. This movement raises total world output, but it also generates strong income distribution effects, so this some groups are hurt.
2. International borrowing and lending can be viewed as a kind of international trade, but one that involves states of money, differs from hours or consumer goods. For instance, trade of one good for another. The relative price at which this intertemporal trade takes place is one plus the real rate of interest.
3. Multinational firms, while they often serve as vehicles for international borrowing and lending, primarily exist as ways of avoiding control over activities taking place in two or more different countries. The theory of multinational firms is not as well

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Foreign direct investment, percent of GNP (annual average)

Source: U.S. Commerce Dept.

1.5

1.0

0.5

0.0


177
PART 1 International Trade Theory

Developed as other parts of international economics. A basic framework can be presented that stresses the crucial choices that explain the existence of a multitude of bilateral trade, the benefits that accrue to the countries involved, and the implications of these activities for the world economy. This basic framework is integrated into a single frame. The implications for multinational corporations are examined briefly in chapter 10. The implications of multinational corporations for the world economy are discussed in some cases of vertical integration.

Key Terms

- Direct foreign investment, p. 169
- Foreign exchange, p. 169
- Inadequate production-potential
- TRANS. p. 167
- Inadequate trade, p. 167

Problems

1. In Home and Foreign there are two factors of production, land and labor, used in production only one good. The land supply in each country and the technology of production are exactly the same. The marginal product of labor in each country depends on employment as follows:

<table>
<thead>
<tr>
<th>Number of Workers Employed</th>
<th>Marginal Product of Labor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>17</td>
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<td>5</td>
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<td>6</td>
<td>15</td>
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<td>7</td>
<td>14</td>
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<td>8</td>
<td>13</td>
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<td>9</td>
<td>12</td>
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<tr>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>11</td>
<td>10</td>
</tr>
</tbody>
</table>

Initially, there are 10 workers employed in Home, but only 2 workers in Foreign. Find the effect of free movement of labor from Home to Foreign on employment, production, real wages, and the income of landowners in each country.

2. Suppose that the abundant country is land-abundant and the other country is labor-abundant and that the two countries produce the same textile and have only one good. How can the countries be mutually beneficial? Draw the line on the graph in Chapter 6, and analyze the conditions under which trade between the two countries eliminates the incentive for labor to migrate. Then, by using the analysis in Chapter 5, show that a tariff on one country will create an incentive for labor migration.

Further Reading


3. Explain the analogy between international borrowing and lending and ordinary international trade.

4. Which of the following countries would you expect to have international production facilities biased toward current consumption goods, and which biased toward future consumption goods?

a. A country like Argentina or Canada in the late century, that has only recently been opened for large-scale settlement and receiving large numbers of immigrants?

b. A country, like the United Kingdom in the late eighteenth century or the United States today, that leads the world technologically in a way that makes it a leader in world export markets, and which has large natural resources?

c. A country that has discovered large oil reserves that can be exploited with little new investment (like Saudi Arabia)?

d. A country that has discovered large oil reserves that can be exploited only with large new investment (like Norway, where oil lies under the North Sea)?

5. Which of the following are direct foreign investments, and which are not?

a. A Saudi Arabian company buys $10 million of IBM stock.

b. A Swiss businessperson buys a New York apartment building.

c. A French company merges with an American company; stockholders in the U.S. company exchange their stocks for shares in the French firm.

d. An Italian firm builds a plant in Russia and manages the plant as a coentreprise to the Russian government.

e. The Korea Computer Company has decided to open a Brazilian subsidiary. Brazilian import restrictions have protected the firm from selling into that market, while the firm has been wanting to sell its computer parts in Brazil. Can the firm now exploit its technological advantage in the U.S. market? Analysis of Korea’s decision is in terms of the theory of multinational enterprises.
APPENDIX TO CHAPTER 7

More on Intertemporal Trade

This appendix contains a more detailed examination of the two-period intertemporal trade model described in the chapter. The concepts used are the same as those used in Chapter 3 to analyze international exchanges of different consumption goods at a single point in time. In the present setting, however, the trade model explains international patterns of investment and borrowing and the determination of the intertemporal terms of trade (that is, the real interest rate).

First consider Figure 3A-1, which shows intertemporal production possibility frontier. In it, the quantities of present and future consumption goods produced in home depend on the amount of present consumption goods invested to produce future goods. As currently available resources are diverted from present consumption to investment, production of present consumption, \( Q_p \), falls and production of future consumption, \( Q_f \), rises. Increased investment therefore shifts the economy up and to the left along the intertemporal production possibility frontier.

The appendix showed the price of future consumption in terms of present consumption is given by \( 1 + r \), where \( r \) is the real interest rate. Measured in terms of present consumption, the value of the economy's total production over the two periods of its existence is therefore

\[
V = Q_p + Q_f (1 + r).
\]

**Diagram 3A-1: Determining Home's Intertemporal Production Pattern**

At a world real interest rate of \( r \), investors best maximize the value of production over the two periods by the economy exists.

- \( Q_p \): Present consumption
- \( Q_f \): Future consumption
- \( r \): Real interest rate
- \( Q_f(1 + r) \): Value of future consumption
- \( Q_p + Q_f(1 + r) \): Value of total production over two periods
Figure 7A-1 shows the familiar lines corresponding to the relative price $1/1 + r$ for different values of $r$. These are straight lines with slope $-1/1 + r$ (because future consumption is on the vertical axis). As in the individual utility model, firms' decisions lead to a production pattern that minimizes the value of production at market prices, $Q_f + Q_p = n$. Production therefore occurs at point $Q_f$; the economy moves the instant the amount, leaving $Q_p$, available for present consumption and producing an amount $Q_f$ of future consumption when the first-period interest pays off.

Notice that at point $Q$, the excess future consumption that would result from investing in an additional unit of present consumption (in equals $1/1 + r$). It would be inefficient in production to invest beyond point $Q$ because the economy could do better by lending additional present consumption to foreigners instead. Figure 7A-1 implies that in the world real interest rate $r$, which imposes the international rate, causes investors to fail.

Figure 7A-2 shows how home's consumption pattern is determined for a given world interest rate. Let $D_f$ and $D_p$ represent the demands for present and future consumption goods, respectively. Since production is at point $Q$, the economy's consumption possibilities are the two periods are limited by the intertemporal budget constraint:

$$D_f + D_p(1 + r) = Q_f + Q_p(1 + r).$$

This constraint states that the value of future consumption over the two periods (measured in terms of present consumption) equals the value of consumption goods produced in the two periods (also measured in present consumption units). For another way, production, and consumption must lie on the same curve as first.

### Intertemporal Production and Consumption Pattern

![Diagram showing intertemporal production and consumption pattern.](image-url)

**CHAPTER 7 International Factor Movements**

Point $Q$, where home's budget constraint reaches the highest available indifference curve, shows the present and future consumption levels chosen by the economy. Home's demand for present consumption, $Q_p$, is matched by its production of present consumption, $Q_p$, so it exports (that is, leaves) $Q_f$. $Q_f$ units of present consumption to foreigners. Correspondingly, home imports $Q_p$ units of future consumption from abroad whose first-period levels are repaid to it with interest. The intertemporal budget constraint ensures that $Q_f + Q_p = (1 + r)Q_f - (1 + r)Q_p$ or the trade is internationally balanced.

Figure 7A-3 shows how income and consumption are determined in foreign. Foreign is assumed to have a comparative advantage in producing future consumption goods. The diagram shows that at a real interest rate $r$, foreign borrows consumption goods in the first period and repays this loan using consumption goods produced in the second period. Because of its relatively rich domestic investment opportunities and its relatively preferential for present consumption, foreign is an importer of present consumption and an exporter of future consumption.

As in Chapter 5 (pp. 148), international equilibrium can be portrayed by an offer curve diagram. Recall that a country's offer curve is the result of clearing its desired exports against its desired imports. Now, however, the exchange plays involve present and future consumption. Figure 7A-4 shows that the equilibrium real interest rate is determined by the intersection of the Home's offer curve $Q_f = Q_p$ and Foreign offer curve $Q_f = Q_p$. The ray $Q_f$ has slope $1 + r$ where $r$ is the equilibrium real interest rate. At point $E$, Home's desired export of present consumption equals Foreign's desired import of present consumption. Put another way, at point $E$, Home's desired five-period leading equals Foreign's desired first-period borrowing. Supply and demand are therefore equal in both periods.
CHAPTER 8
The Instruments of Trade Policy

Previous chapters have answered the question, "Why do nations trade?" by describing the causes and effects of international trade and the functioning of a trading world economy. While this question is interesting in itself, it is much more meaningful if it helps answer the question, "What should a nation's trade policy be?" Should the United States use a tariff or an import quota to protect its automobile industry against competition from Japan and South Korea? Who will benefit and who will lose from an import quota? Will the benefits outweigh the costs?

This chapter examines the policies that governments adopt toward international trade, policies that involve a number of different actions. These actions include taxes on some international transactions, subsidies for others, agreements to limit the value or volume of particular imports, and many other measures. The chapter provides a framework for understanding the effects of the most important instruments of trade policy.

Basic Tariff Analysis

A tariff, the simplest form of trade policy, is a tax levied when a good is imported. Specific tariffs are levied as a fixed charge for each unit of goods imported (for example, $1 per barrel of oil). Ad valorem tariffs are taxes that are levied as a percentage of the value of the imported goods (for example, 25 percent U.S. tariff on imported wheat). In either case, the effect of the tariff is to raise the cost of importing goods in a country.

Tariffs are one of the oldest forms of trade policy and have traditionally been used as a means of raising government income. Until the introduction of income tax, for instance, the U.S. government raised much of its revenue from tariffs. Their true purpose, however, has usually been not only to provide revenue but to protect particular domestic sectors. In the early nineteenth century the United Kingdom used tariffs (the Corn Laws) to protect its agriculture from foreign competition. In the late nineteenth century both Germany and the United States protected their new industrial sectors by imposing tariffs on imports of manufactured goods. The importance of tariffs has declined in modern times, because modern governments usually prefer to protect domestic industries through a variety of nontariff barriers, such as import quotas (restrictions on the quantity of imports) and export restraint (restrictions on the quantity of exports)—usually imposed by the government at the importing country's request. Nonetheless, an understanding of the effects of a tariff remains a vital tool for understanding other trade policies.

In developing the theory of trade in Chapters 5 through 7 we adopted a general equilibrium perspective. That is, we were mainly interested in the export price in one country as the entire world economy has repercussions elsewhere. However, it is less often the case that trade policies toward one sector can be reasonably well understood without going into detail about the repercussions of that policy in the rest of the economy. For the most part, then, trade policy can be examined in a partial equilibrium framework. When the effects on the economy as a whole become salient, we will refer back to the general equilibrium analysis.

Supply, Demand, and Trade in a Single Industry

In many countries there are two countries: home and foreign. If both have similar resource and production costs, which can be considerably distorted between the countries. In each country wheat is a simple competitive industry in which the supply and demand curves are functions of the market price. Normally home supply and demand will depend on price in terms of home currency, and foreign supply and demand will depend on price in terms of foreign currency. But we assume that the exchange rate between the currencies is not affected by whatever trade policy is undertaken in this chapter. Thus the price in both markets is in terms of home currency.

Trade will occur in such a manner that prices are different in the two countries. Suppose that in the absence of trade the price of wheat is higher in home than it is in foreign. Now allow foreign trade. Since the price of wheat in home exceeds the price in foreign, shippers begin to move wheat from foreign to home. The export of wheat raises its price in foreign and lowers its price in home until the differences in prices has been eliminated.

To determine the world price and the quantity traded, it is helpful to define two new curves: the home import demand curve and the foreign export supply curve, which are derived from the underlying domestic supply and demand curves. Note that demand is the excess of home consumers demand over what home producers supply; foreign export supply is the excess of what foreign producers supply over what foreign consumers demand.

Figure 8-1 shows how the home import demand curve is derived. At the price $P^h$ home consumers demand $Q^h$, while home producers supply only $Q^h$; so home import demand is $Q^h = Q^h$. At the price $P^h$ the home supply and demand are equal in the absence of trade, so the home import demand curve intersects the price axis at $P^h$ (import demand corners at $Q^h$).

Figure 8-2 shows how the foreign export supply curve $Q^f$ is derived. At the price $P^h$ foreign producers supply $Q^f$, while foreign consumers demand only $Q^f$; on the amount of the total supply available for export is $Q^f$; as foreign producers raise the quantity they supply to $Q^f$ and foreign consumers lower the amount they demand to $Q^f$, in the quantity of the total supply available to export rises to $Q^f = Q^f$. Because the supply of goods available for export varies as the price rises, the foreign export supply curve is upward.
The equilibrium world price is where Home import demand (MD curve) equals foreign export supply (ES curve).

**Home demand** = **Home supply** = **Foreign supply** = **Foreign demand**

By adding and subtracting from both sides, this equation can be rearranged to say that

**Home demand** + **Foreign demand** = **Home supply** + **Foreign supply**

or, in other words,

**World demand** = **World supply**.

**Effects of a Tariff**

From the point of view of home consumers shopping abroad, a tariff is just like a tax on importation. If Home imposes a tax of $2 on every bushel of wheat imported, consumers will be unwilling to move the wheat unless the price difference between the two markets is at least $2.

Figure 8-4 illustrates the effects of a specific tariff of $2 per unit of wheat (shown as in the figure). In the absence of a tariff, the price of wheat would be equalized at $P^w_0$ in both Home and Foreign as seen at point 1 in the middle panel, which characterizes the world market. Why the tariff is exact, however, is not due to any change in demand. Home to Foreign to Home to Foreign the price point exceeds the Foreign price by at least $2. If the $2 is being shipped, however, there will be an excess demand for wheat in Home and an excess supply in Foreign. Thus the price in Home will rise and that in Foreign will fall until the price difference is $2.

Introducing a tariff, then, drives a wedge between the prices in the two markets. The tariff raises the price in Home to $P^w_1$ and lowers the price in Foreign to $P^w_2$. In Home producers supply more at the higher price, while consumers demand less, so that fewer imports are demanded (as you can see in the move from point 1 to point 2 on the MD curve).
A tariff raises the price in Home while lowering the price in Foreign. The volume traded declines.

In Foreign the lower price leads to reduced supply and increased demand, and thus a smaller export supply (as seen in the move from point 1 to point 3 on the XS curve). Thus the volume of trade, calculated from the free trade volume, to QF, the volume with a tariff. At the same volume QF, Foreign export demand equals Foreign export supply when P^F = P^H.

The increase in the price in Home, from P^H to P^H', is less than the amount of the tariff, because part of the tariff is reflected in a decline in Foreign's export price and thus is not passed on to Home consumers. This is the normal result of a tariff and any trade policy that limits imports. The size of this effect, on the exporters' price, however, is often more than expected. For small countries, the price of a small amount of the good to import is usually raised to a higher level than the increase in the import price. Thus, the increase in the import price has a small effect on the world market for the good.

The effects of a tariff in the "small country" case, where a country cannot affect foreign prices, are illustrated in Figure 8.3. In this case a tariff raises the price of the imported good in the country importing the tariff, by an amount equal to the tariff. This is reflected in a rise in the price of the imported good from P^F to P^F', while the volume consumed rises from D^F to D'. As a result of the tariff, thus, imports fall in the country imposing the tariff.

Measuring the Amount of Protection

A tariff as an imported good raises the price received by domestic producers of that good. This effect is often the tariff's principal objective—to prevent domestic producers from the low prices that would result from import competition. In analyzing trade policy, it is important to ask how much protection a tariff or other trade policy actually provides. This answer is usually expressed as a percentage of the price that would prevail under free trade. An import quota on sugar could, for example, raise the price received by U.S. sugar producers by 45 percent.

Measuring protection would seem to be straightforward in the case of a tariff. If the tariff is an ad valorem tax proportional to the value of the imports, the tariff rate itself should measure the amount of protection. If the tariff is specific, dividing the tariff by the price net of the tariff gives us the ad valorem equivalents.

These are two problems in trying to calculate the rate of protection: First, if the small country assumption is not a good approximation, part of the effect of a tariff will be to lower foreign export prices rather than to raise domestic prices. This effect of trade policies on foreign export prices is sometimes significant. 3

The second problem is that tariffs may have very different effects on different stages of production of a good. A simple example illustrates this point. Suppose that export taxes fall on the world market for $3000 and that the ports out of which the merchandise is made sell for $6000. Let's compare two countries: one that wants to develop an auto assembly industry and one that already has an assembler industry and wants to develop a parts industry.

To encourage a domestic auto industry, the first country gives a 25 percent tariff on imported autos, allowing domestic assemblers to charge $4000 instead of $6000. In this case it would be wrong to say that the manufacturer receives only 25 percent protection.

1As theory (though not practice) in goods, a tariff could actually lower the price received by domestic producers (the Monopolistic discussion in Chapter 5).
Before the tariff, domestic assembly would take place only if it could be done for $3000 (the difference between the $9000 price of a competing automobile and the $6000 cost of parts) or less, even if it would take place even if it costs as much as $8000 (the difference between the $18,000 price and the cost of parts). That is, the 25 percent tariff rate provides an assembly with an effective rate of protection of 100 percent.

Now suppose the country, to encourage domestic production of parts, imposes a 10 percent tariff on imported parts, raising the cost of parts to domestic manufacturers from $6000 to $6600. Even though there is no change in the tariff on assembled automobiles, this policy makes it less advantageous to assemble domestically. Before the tariff it would have been worth assembling a car locally if it could be done for $3200 ($1000 - $2200), after the tariff local assembly takes place only if it can be done for $4400 ($2000 - $6600). The tariff on parts, then, while providing positive protection to parts manufacturers, provides negative effective protection to assembly at the rate of 30 percent (1.00 - 0.70).

Restricting similar in that these in this example but less economized is making different calculations to measure the degree of effective protection granted to particular industries by tariffs and other trade policies. Trade policies aimed at promoting economic development, for example (Chapter 10), often lead to states of effective protection much higher than the tariff rates themselves.

### Costs and Benefits of a Tariff

A tariff raises the price of a good in the importing country and lowers it in the exporting country. As a result of these price changes, consumers lose in the importing country and gain in the exporting country. Production gain in the importing country and loss in the exporting country. In addition, the government imposing the tariff gains revenue. To contrast these costs and benefits, it is necessary to quantify them. The method for measuring costs and benefits of a tariff depends on two concepts common to microeconomic analysis: consumer surplus and producer surplus.

#### Consumer and Producer Surplus

Consumer surplus measures the remanent consumer gains from a purchase by the difference between the price he actually pays and the price he would have been willing to pay. If, for example, a consumer would have been willing to pay $60 for a loaf of bread but the price is only $5, the consumer surplus gained by the purchase is $5. Consumer surplus can be derived from the demand curve (Figure 8.5). For example, suppose the maximum price at which consumers will buy 10 units of a good is $8.

$$ V = P \times Q $$

#### Supply of Goods

Producer surplus measures the remanent producer gains from a purchase by the difference between the price he actually receives and the price he would have been willing to accept. If, for example, a producer would have been willing to sell an apple for $1.50 but the price was only $1, the producer surplus gained by the sale is $0.50. The producer will supply the quantity at which marginal revenue equals marginal cost. In Figure 8.6, the producer surplus is the area under the supply curve above a given price level. The producer surplus is measured by the area under the supply curve and above the price level.

#### Elasticity of Demand and Supply

The elasticity of demand is the percentage change in quantity demanded divided by the percentage change in price. The elasticity of supply is the percentage change in quantity supplied divided by the percentage change in price. If the price changes, the quantity supplied changes. The elasticity of demand and supply determines the degree of price elasticities of demand and supply. The elasticity of demand and supply determines the degree of price elasticities of demand and supply.

#### Cross Elasticity of Demand

Cross elasticity of demand is the percentage change in the demand for one good divided by the percentage change in the price of another good. The cross elasticity of demand is positive if the two goods are substitutes and negative if the two goods are complements. The cross elasticity of demand is calculated using the following formula:

$$ E_{xy} = \frac{\% \text{ change in quantity demanded of } x}{\% \text{ change in price of } y} $$

#### Income Elasticity of Demand

Income elasticity of demand is the percentage change in the quantity demanded of a good divided by the percentage change in income. The income elasticity of demand determines the degree of income elasticities of demand. The income elasticity of demand determines the degree of income elasticities of demand.

### Conclusion

Thus, the textile unit of the good purchased must be worth $10 to consumers. If it is more expensive, they will not purchase it; if it is too expensive, they will have been willing to purchase it even if the price was higher. Now suppose that to get consumers to buy 11 units the price must be set to $9. Then the producers must be worth only $9 to consumers. Suppose that the price is $9. Then consumers are just willing to purchase the eleventh unit of the good and thus receive no consumer surplus from purchasing the eleventh unit. They would have been willing to pay $10 for the tenth unit, however; and thus receive $1 in consumer surplus from that unit. They would have been willing to pay $12 for the ninth unit, since they receive $3 of consumer surplus on that unit, and so on.

Generalizing from this example, if P is the price of a good and Q is the quantity demanded at that price, the consumer surplus is calculated by subtracting P times Q from the area under the demand curve to get T (Figure 8.7). If the price is P, the quantity demanded is Q and the consumer surplus is measured by the area labeled A. If the price falls to P, the quantity demanded rises to Q and consumer surplus rises to r equal to the additional area B.

The producer surplus is an analogous concept. A producer willing to sell a good for $2 but receiving a price of $5 gains a producer surplus of $3. The same procedure used to derive consumer surplus from the demand curve can be used to derive producer surplus from the supply curve. If P is the price and Q is the quantity supplied at that price, then producer surplus is P times Q minus the area under the supply curve up to Q (Figure 8.8). If the price is P, the quantity supplied will be Q, and producer surplus is measured by the area. If the price rises to P, the quantity supplied rises to Q, and producer surplus rises to p equal to the additional area C.

Some of the difficulties related to the concepts of consumer and producer surplus are technical issues of calculations that we can safely disregard. More important is the question of...
PART 2 International Trade Policy

CHAPTER 1 The Instruments of Trade Policy

The costs and benefits of a tariff to the importing country.

**Consumer surplus** is equal to the area under the demand curve and above the price.

**Producer surplus** is equal to the area above the supply curve and below the price.

Whether the direct gains to producers and consumers in a given market accurately measure the actual gains. Additional benefits and costs not captured by consumer and producer surplus are in the case of the case for trade policy analysis discussed in Chapter 9. For now, however, we will focus on costs and benefits as measured by consumer and producer surplus.

Measuring the Costs and Benefits

Figure 8-9 illustrates the costs and benefits of a tariff for the importing country. The tariff raises the domestic price from \( P_0 \) to \( P_t \) but lowers the foreign export price from \( P_t \) to \( P' \) (refer back to Figure 8-4). Domestic production rises from \( OQ' \) to \( OQ \), while domestic consumption falls from \( OQ' \) to \( OQ \). The costs and benefits to different groups can be expressed in terms of the areas of five regions, labeled \( a, b, c, d, e \).

Consider first the gains to domestic producers. They receive a higher price and therefore have higher producer surplus. As we saw in Figure 8-4, producer surplus is equal to the area below the price but above the supply curve. Before the tariff, producer surplus was equal to the area below \( P_0 \) but above the supply curve; with the price rising to \( P_t \), this surplus rises by the area labeled \( e \). That is, producers gain from the tariff.

Domestic consumers also face a higher price, which reduces their welfare. As we saw in Figure 8-3, consumer surplus is equal to the area above the price but below the demand curve. Since the price consumers face rises from \( P_0 \) to \( P_t \), the consumer surplus falls by the area indicated by \( a + b + c + d \). So consumers are hurt by the tariff.

There is a third player here as well: the government. The government gains by collecting tariff revenue. This is equal to the tariff rate \( r \) times the volume of imports \( Q_t = OQ' - OQ \).

Since \( T = P_t - P_0 \), the government's revenue is equal to the sum of the two areas \( c + e \).

Since there gains and losses accrue to different people, the overall cost-benefit evaluation of a tariff depends on how much we value a dollar's worth of benefits to each group. If, for example, the producer gain matters more to wealthy owners of resources, while the
other Instruments of Trade Policy

Tariffs are the simplest trade policies, but in the modern world most government interventions in international trade take other forms, such as export subsidies, import quotas, voluntary export restraints, and local currency requirements. Fortunately, once we understand tariffs it is not too difficult to understand these other trade instruments.

Export Subsidies: Theory

An export subsidy is a payment to a firm or individual that ships a good abroad. Like a tariff, an export subsidy can be either specific (a fixed sum per unit) or ad valorem (a proportion of the value exported). When the government offers an export subsidy, exporters will export the good up to the point where the domestic price exceeds the foreign price by the amount of the subsidy. The effects of an export subsidy on prices are exactly the reverse of those of a tariff (Figure 8.11). The price in the exporting country rises from \( P_3 \) to \( P_5 \), because the price in the importing country falls from \( P_4 \) to \( P_3 \); the price rise is thus less than the subsidy. The increase of exports produces a greater government subsidy (the amount of exports times the amount of the subsidy) than is the case with a tariff. The net welfare loss is therefore the sum of the areas \( b + e + f + g \). Of these, \( b \) and \( e \) represent consumption and production distortion losses of the same kind that a tariff produces. In addition, and in common to a tariff, the export subsidy incurs the costs of trade by lowering the price of the export in the foreign market from \( P_5 \) to \( P_3 \). This leads to the additional terms of trade loss \( f + g \) equal to \( P_3 - P_2 \times \) the quantity exported with the subsidy. So an export subsidy resembles a tax on domestic producers and thus reduces the size of the gains from trade.
Europe's Common Agricultural Policy

Since 1957, all Western European nations—Germany, France, Italy, Belgium, the Netherlands, and Luxembourg—have been members of the European Economic Community, they were later joined by the United Kingdom, Ireland, Denmark, Greece, and, most recently, Spain and Portugal. Now called the European Union (EU), its two biggest effects are on trade policy. First, the members of the European Union have removed all tariffs with respect to each other, creating a customs union (discussed in the next chapter). Second, the agricultural policy of the European Union has developed into a massive export subsidy program. The European Union's Common Agricultural Policy (CAP) began not as an export subsidy, but as an effort to guarantee high prices to European farmers by keeping the European Union buy agricultural products wherever the prices fell below specified support levels. To prevent this policy from drawing in large quantities of imports, it was initially backed by tariffs that reflect the difference between European and world agricultural prices.

Since the 1970s, however, the support prices set by the European Union have turned out to be so high that Europe, which would under free trade be an importer of most agricultural products, now producing more than consumers were willing to buy. The result was that the European Union faced steep losses to buy and store huge quantities of food. At the end of 1983, European nations had stored 780,000 tons of beef, 1.2 million tons of butter, and 13 million tons of wheat. To avoid unlimited growth in these stocks, the European Union turned to a policy of subsidizing exports to dispose of surplus production.

Figure 8-11 shows how the CAP works. It is, of course, exactly like the export subsidy shown in Figure 8-11, except that Europe would usually be an importer under free trade. The support price is set not only above the world market level but also above the price that would ensure demand and supply even without imports. To export the resulting surplus, an export subsidy is paid that offset the difference between European and world prices. The subsidized exporters themselves tend to increase the world price, increasing the required subsidy. Cost-benefit analysis would clearly show that the combined costs to European consumers and taxpayers exceed the benefits to producers.

Despite the considerable net cost of the CAP to European consumers and taxpayers, the political strength of farmers in the EU has been so strong that the program has faced little effective internal challenge. The main pressure against the CAP has come from the United States and other food-exporting nations, who complain that Europe's export subsidies drive down the price of their own exports. During the Uruguay round of trade negotiations (discussed in Chapter 9), the United States initially demanded a complete end to European subsidies by 2000. These demands were eventually scaled back considerably, but even to the objection of European farmers to any cuts nearly caused the negotiations to collapse. In the end, the EU agreed to cut subsidies by about a third over six years.

\[
\text{Support price} = \text{World price} + \text{Export subsidy}
\]

\[
\text{Imports} = (\text{Support price} - \text{World price}) \times \text{Quantity, O}
\]

\[
\text{Exports} = \text{Quantity, O} - \text{Imports}
\]

\[
\text{Export subsidy} = \text{Support price} \times \text{Imports}
\]

\[
\text{Revenue} = \text{World price} \times \text{Imports} - \text{Export subsidy}
\]

\[
\text{Net cost of subsidy} = \text{Export subsidy} - \text{Revenue}
\]
Import Quotas: Theory

An import quota is a direct restriction on the quantity of some good that may be imported. The restriction is usually enforced by issuing licenses to some group of individuals or firms. For example, the United States has a quota on imports of foreign cheese. The only firms allowed to import cheese are certain trading companies, each of which is allocated the right to import a maximum number of pounds of cheese each year. The size of each firm's quota is based on the amount of cheese it imported in the past. In some important cases, notably sugar and apples, the right to sell in the United States is given directly to the governmental agencies of importing countries.

It is important to avoid the misconception that import quotas enforce limit imports without raising domestic prices. An import quota always raises the domestic price of the imported good. When imports are limited, the immediate result is that the initial price the demand for the good exceeds domestic supply plus imports. This causes the price to be bid up until the market clears. In the end, all importers will raise domestic prices by the same amount as a tariff that limits imports to the same level (except in the case of domestic monopoly, when the quota raises prices more than the tariff, see the second appendix to this chapter).

The difference between a quota and a tariff is that with a quota the government receives no revenue. When a quota instead of a tariff is used to restrict imports, the sum of money that would have appeared in government revenue with a tariff is kept by whatever receives the import licenses. Importers are able to pass on higher prices and retain them at a higher price in the domestic market. The profit received by the holders of import licenses is known as quota rents. In assessing the costs and benefits of an import quota, it is crucial to determine who gets the rents. When the rents as well as the domestic market are assigned to governments of exporting countries, as is often the case the transfer of rents abroad makes the rents of a quota substantially higher than the equivalent tariff.

CASE STUDY

An Import Quota in Practice: U.S. Sugar

The U.S. sugar problem is similar in its origins to the European agricultural problem: A domestic price guarantee by the federal government has led to U.S. prices above world market levels. Unlike the European Union, however, the domestic supply in the United States does not exceed domestic demand. Thus the United States has been able to keep domestic prices at the target level with an import quota on sugar.

A special feature of the import quota is that the rights to sell sugar in the United States are allocated to foreign governments, who then allocate these rights to their own residents. As a result, most produced by the sugar quaxan export to the United States.

The sugar import quota holds imports to about half the level that would occur under free trade. The result is a far higher price of sugar to the consumer, the reduced supply of sugar producers, and the reduced demand of U.S. consumers. There is an offsetting gain in revenue because the quota rents are collected by foreign governments.

Figure B-13 on page 201 shows an estimate of the effects of the sugar quota. The quota restricted imports to approximately 3.13 million tons; as a result, the price of sugar in the United States was a bit more than 40 percent above the world market level. The figure shows how the assumption that the United States is "small" in the world sugar market, that is, not removing the quota would not have a significant effect on the price. According to this estimate, free trade would roughly double sugar imports, to 6.12 million tons.

The welfare effects of the import quotas are indicated by the areas a, b, c, and d. Consumers from the United States lose the surplus b + c + d, with a total value of $1.446 billion. Part of this consumer loss represents a transfer to U.S. sugar producers, who gain the producer surplus of $1.086 billion. Part of the loss represents the production distortion (d = $0.259 billion) and the consumption distortion (c = $0.078 billion). The rent to the foreign governemnts that receive import quotas has been transferred to area c, equal to $0.395 billion.

The estimates are based on data in Hufbauer and Johnson (1995, cited in Further Reading). This presentation simplifies eight of their models, which assumes the consumers would be willing to pay somewhat more for U.S. sugar even under free trade.
The net loss in the United States is the difference (A + B) plus the quota rents (C), a total of $980 million per year. Notice that most of this net loss comes from the fact that foreigners get the import capital.

The sugar quota discussion is an extreme example of protectionism to provide benefits to a small group of producers, each of whom receives a large benefit, at the expense of a large number of consumers, each of whom bears only a small cost. In this case, the yearly consumer loss amounts to only about $2 per capita, or perhaps $25 for a typical family. Not surprisingly, the average American voter is unaware that the sugar quota exists, and so there is little effective opposition.

From the point of view of the sugar producers, however, the vote is a life-or-death issue. The U.S. sugar industry employs only about 13,000 workers, so the producer gains from the quota represent an implicit subsidy of about $90,000 per employee. It should be no surprise that sugar producers are very effectively organized in defense of their protection.

Opponents of protection often try to frame their criticism in terms of consumer and producer surplus being in terms of the cost to consumers of every job "saved" by an import tariff. Economists who have studied the sugar industry believe that even with free trade, most of the U.S. industry would survive: only 2000 or 3000 workers would be displaced. Thus, the consumer cost per job saved is more than $300,000.

Voluntary Export Restraints

A variant on the import quota is the voluntary export restraint (VER), also known as a voluntary restraint agreement (VRA). Welcome to the bureaucratic world of trade policy, where everything has a three-letter symbol! A VER is a quota as each imposed by the exporting country's side instead of the importer's. The most famous example is the limitation on auto exports to the United States enforced by Japan after 1984.

Voluntary export restraints are generally imposed in response to the requests of the importer and are agreed to by the exporter to forestall other trade restrictions. As we will see in Chapter 9, certain political and legal advantages have made VERs preferred instruments of trade policy in recent years. From an economic point of view, however, voluntary export restraints are exactly like an import quota where the licenses are assigned to foreign governments and are therefore very costly to the importing country.

A VER is always more costly in the importing country than a tariff that levies imports by the same amount. The difference is that what would have been reviewed under a tariff becomes rents earned by foreigners under the VER, so that the VER clearly produces fewer rents for the importing country.

A study of the effects of the three major U.S. voluntary export restraints—on textiles and apparel, steel, and automobiles—found that about two-thirds of the cost to consumers of these restraints is accounted for by the rents earned by foreigners. In other words, the link

value trends, by requiring that some minimum share of the price of a good represent domestic value added. Local content laws have been widely used by developing countries trying to shift their manufacturing base from assembly back into raw materials goods. In the United States, a local content bill for automobiles was proposed in 1982 but was never acted on.

From the point of view of domestic producers of parts, a local content regulation provides protection in exactly the same way that a quota does. From the point of view of the firm that must buy locally, however, the effects are somewhat different. Local content does not place a direct limit on imports. It allows firms to import more, provided that they also buy more domestically. This means that the effective price of inputs to the firm is an average of the price of imported and domestically produced inputs.

Consequently, for example, a car manufacturer in which the cost of imported parts is $60,000. Suppose that to purchase the same parts domestically would cost $10,000 and that assembly firms are required to use 30 percent domestic parts. Then they will face an average cost of parts of $9000 (0.3 x $6000 + 0.5 x $10,000), which will be reflected in the final price of the car.

The Effects of Trade Policy: A Summary

The effects of the major instruments of trade policy can be usefully summarized in Table 8.1, which compares the effect of four major types of trade policy on the welfare of consumers, producers, the government, and the nation as a whole.

This table does not look like an advertisement for interventionist trade policy. All four trade policy benefits producers and hurt consumers. The effects of the policies on economic welfare are relatively small, and few policies definitely hurt the nation as a whole, while tariffs and import quotas are potentially beneficial only to large countries that can drive down world prices.

Why, then, do governments so often act to limit imports or promote exports? Why is it so difficult a question to answer?
### Table 8.1: Effects of Alternative Trade Policies

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<tr>
<td>Tariff</td>
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<tr>
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<tr>
<td>Product surplus</td>
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<tr>
<td>Consumer surplus</td>
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<tr>
<td>Government revenue</td>
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<td>Overall national welfare</td>
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### Summary

1. In contrast to our earlier analysis, which stressed the general-equilibrium interaction of markets, the analysis of trade policy is usually sufficient to use a partial-equilibrium approach.

2. A tariff raises the wedge between foreign and domestic prices, raising the domestic price but lowering the tariff rate. An important and obvious special case, however, is that of a "small" country that cannot have any substantial influence on foreign prices. In the small-country case, a tariff raises the price they receive, the domestic consumers lose, for the same reason. There is also a gain in government revenue.

3. If we add together the gains and losses from a tariff, we find that the net effect on national welfare can be separated into two parts. There is an efficiency loss, which results from the distortions in the incentives facing domestic producers and consumers. On the other hand, there is a term of trade gain, reflecting the tendency of a tariff to drive down foreign export prices. In the case of a small country that cannot affect foreign prices, the second effect is zero, so that there is an enervating loss.

4. The analysis of a tariff can be readily adapted to other trade policy instruments, such as import subsidies, import quotas, and voluntary export restraints. An export subsidy causes efficiency losses similar to a tariff but compounds these losses by causing a determination of the terms of trade. Import quotas and voluntary export restraints differ from tariffs in that the government gains no revenue. Instead, what would have been government revenue accrues as rent to the owners of import licenses in the case of a quota and to foreigners in the case of a voluntary export restraint.

### Key Terms

- Voluntary export restraint, p. 180
- Consumer surplus, p. 192
- Efficiency losses, p. 195
- Import quota, p. 186
- Export subsidy, p. 187
- Export aid, p. 180
- Tariff, p. 186
- Terms of trade, p. 180
- Voluntary export restraint (VER), p. 180

### Problems

1. Home's demand curve for wheat is

\[ D = 100 - 20P. \]

Its supply curve is

\[ S = 20 + 20P. \]

2. Now add Foreign, which has a demand curve

\[ D' = 80 - 20P, \]

and a supply curve

\[ S' = 40 + 20P. \]

a. Derive and graph Foreign's export supply curve and find the price of wheat that would prevail in Foreign as the distance of trade.

b. Now allow Foreign and Home to trade with each other, at zero transportation cost. Find and graph the equilibrium under free trade. What is the world price? What is the volume of trade?

c. Home imposes a specific tariff of 50 on wheat imports.

a. Derive and graph the effects of the tariff on the following: (1) the price of wheat in each country; (2) the quantity of wheat supplied and demanded in each country; (3) the volume of trade.

b. Derive the effects of the tariff on the welfare of each of the following groups: (1) Home import-competing producers; (2) Home consumers; (3) the Home government.

c. Show graphically and calculate the terms of trade gain, the efficiency loss, and the total effect on welfare of the tariff.
4. Suppose that France had been a much larger country, with domestic demand

\[ D^f = 800 - 200P, \quad S^f = 400 + 200P. \]

(Note that this implies that the French price of wheat in the absence of trade would have been the same as in the text.)

Recalculate the free trade equilibrium and the effects of a 0.5 specific tariff by

Husen. Relate the differences in results to the discussion of the "small" country case

in the text.

5. The aircraft industry in Europe receives aid from several governments, according to some estimates equal to 20 percent of the purchase price of each aircraft. For

example, an aircraft that sells for $50 million may have cost $40 million to produce,

with the difference made up by government payments. At the same time, approxi-
mately half the purchase price of a "European" aircraft represents the cost of com-
ponents purchased from other countries (including the United States). If these esti-
mates are correct, what is the effective rate of protection received by European

aircraft producers?

6. Return to the example of problem 2. Suppose that free trade, instead of Foreign

countries, imposes a subsidy of 0.5 per unit. Calculate the effects on the price in each
country and on welfare, both of individual groups and of the economy as a whole, in

both countries.

7. The nation of Acemena is "small," unable to affect world prices. It imports wheat at
the price of $1.00 per bag. The demand curve is

\[ D = 400 - 10P. \]

The supply curve is

\[ S = 50 + 5P. \]

Determine the free trade equilibrium. Then calculate and graph the following effects of

an import quota that limits imports to 30 bags.

a. The increase in the domestic price
b. The quota rents
c. The consumption distortion loss
d. The production distortion loss

Further Reading:


collection of essays on tariffs and quotas under mercantilism.


CHAPTER 6 The Instruments of Trade Policy


of U.S. trade policies in 21 different sectors.


foreign and domestic producers face monopoly power, showing the small result in an

increase in the profits of both groups—at consumers' expense.

D. Research and A. Semojoh, "Calculating the Consumer and Net Welfare Costs of Import


with a description of how the framework is applied in practice to real industries.
Tariff Analysis in General Equilibrium

The title of this chapter takes us to a partial equilibrium approach to the analysis of trade policy. That is, it focuses on the effects of tariffs, quotas, and other policies in a single market without explicitly considering the repercussions for other markets. This partial equilibrium approach usually is adequate, and it is much simpler than a full general equilibrium framework that takes cross-market effects into account. Nonetheless, it is sometimes important to do the general equilibrium analysis. In Chapter 5 we presented a brief discussion of the effects of tariffs in general equilibrium. This appendix presents a more detailed analysis.

The analysis proceeds in two stages. First, we analyze the effects of a tariff in a small country, one that cannot affect its terms of trade; then we analyze the case of a large country.

A Tariff in a Small Country

Imagine a country that produces and consumes two goods, producers and food. The country is small, unable to affect its terms of trade; we will assume that it exports manufactured goods and imports food. Thus the country sells its manufactures to the world market at a price world price $p^w$ and buys food at a given world price $p^f$.

Figure A8.1 illustrates the position of the country in the absence of a tariff. The economy produces at the point on its production possibility frontier that is tangent to a line with slope $-p^w/p^f$, indicated by $Q^*$. This line also defines the economy's budget constraint, that is, the consumption points that can be afforded. The economy chooses the point on the budget constraint that is tangent to the highest possible indifference curve; this point is shown as $Q^*$.

Now suppose the government imposes an ad valorem tariff $t$ on food. Then the price of food facing both consumers and domestic producers rises to $p^f(1+t)$, and the relative price line therefore goes from $Q^*$ to a line with slope $-p^w/p^f(1+t)$.

The effect of this fall in the relative price of manufactures on production is straightforward. Output of manufactures falls, while output of food rises. In Figure A8.2, this shift in production is shown by the movement of the production points from $Q^*$, shown in Figure A8.1, to $Q^t$.

The effect on consumption is more complicated; the tariff increases revenue, which must be spent somewhere. In general, the precise effect of a tariff depends on exactly how the government spends the tariff revenue. Consider the case in which the government returns any tariff revenue to consumers. In this case the budget constraint of consumers is the line with slope $-p^w/p^f(1+t)$ that passes through the production point $Q^t$. Consumers can spend more than this, because in addition to the income they generate by producing goods, they receive the tariff revenue collected by the government.

How do we find the new budget constraint? Notice that trade must still be balanced at world prices. This is:

$$p^w (Q_T - Q_M) = p^f (Q_F - Q_M)$$

or

$$Q_T - Q_M = p^w/Q_F, Q_F - Q_M = p^f/Q_T$$

where $Q_T$ refers to output and $D$ to consumption of manufactures and food, respectively. The left-hand side of this expression therefore represents the value of exports at world prices, while the right-hand side represents the value of imports. This expression may be rearranged to show that the value of consumption exceeds the value of production at world prices:

$$p^w (Q_T - Q_M) = p^f (Q_F - Q_M)$$

This defines a budget constraint that passes through the production point $Q^t$, with a slope of $-p^w/p^f$. The consumption point must lie on this new budget constraint.

Consumers will not, however, choose the point on the new budget constraint at which this constraint is tangent to an indifference curve. Instead, the tariff causes them to consume less food and more manufactures. In Figure A8.3, the consumption point after the tariff is shown as $Q^t$. It lies on the new budget constraint, but on an indifference curve that is tangent to a line with slope $-p^w/p^f(1+t)$. This line lies above the line with the same slope that passes through the production point $Q^t$. The difference is the tariff revenue redistributed to consumers.

By examining Figure A8.3 and comparing it with Figure A8.1, we can see three important points.

1. Welfare is lower with a tariff than under free trade. That is, $Q^t$ lies on a lower indifference curve than $Q^*$.

2. The reduction in welfare comes from two effects. (a) The economy no longer produces at a point that maximizes the value of income at world prices. The budget constraint that passes through $Q^t$ lies inside the constraint passing through $Q^*$. (b) Consumers do not choose the welfare-maximizing point on the budget constraint; they do
CHAPTER 8

The Instruments of Trade Policy

A Tariff in a Large Country

To address the large country case, we use the offer curve technique developed in the appendix to Chapter 5. We consider two countries: Home, which exports manufactures and imports food, and an trading partner, Foreign. In Figure 8A3-3, Foreign’s offer curve is represented by $O^F$. Home’s offer curve in the absence of a tariff is represented by $O^H$. The free trade equilibrium is determined by the intersection of $O^F$ and $O^H$, at point 1, with a relative price of manufactures vs. the world market ($P^F/P^W$).

Now suppose that Home imposes a tariff. We then ask: how would its trade change if there were no change in its terms of trade? We already know the answer from the small country analysis: For a given world price, a tariff reduces both exports and imports. Thus if the world relative price of manufactures remains at ($P^F/P^W$), Home’s offer curve would shift in from point 1 to point 2. More generally, if Home imposes a tariff as its overall offer curve will shift in to a curve like $O^H'W$, passing through point 2.

The tariff reduces the country’s trade as in terms of trade that its offer curve shifts in. This implies, however, that the terms of trade must improve. The gain from improved terms of trade may offset the losses from the diversion of production and consumption, which reduces welfare in any given terms of trade.

But this shift in Home’s offer curve will change the equilibrium terms of trade. In Figure 8A3-3, the new equilibrium is at point 3, with a relative price of manufactures ($P^F/P^W) > (P^F/P^W)$. Thus, the tariff improves Home’s terms of trade.

The effects of the tariff on Home’s welfare are ambiguous. On one side, if the terms of trade did not improve, we have just seen from the small country analysis that the tariff would reduce welfare. On the other side, the improvement in Home’s terms of trade may increase welfare. So the welfare effect can go either way, just as in the partial equilibrium analysis.
Tariffs and Import Quotas in the Presence of Monopoly

The trade policy analysis in this chapter assumes that markets are perfectly competitive, so that all firms face prices as given. As we argued in Chapter 6, however, many markets for internationally traded goods are imperfectly competitive. The effects of international trade policies can be affected by the nature of the competition in a market.

When we analyze the effects of trade policy in imperfectly competitive markets, a new consideration appears: international trade limits monopoly power, and policies that limit trade may therefore increase monopoly power.

Even if a firm is already producing a good at a price below the competitive level, the firm will have an incentive to raise prices if imports are limited by a quota, or if a tariff is imposed. With import restrictions, the firm can raise its price above the competitive level and still maintain a competitive market.

The link between trade policy and monopoly power may be understated by examining a model in which a country imposes a tariff and its import-competing producers are controlled by only one firm. The country is small so world markets, so that the price of the import is unaffected by the trade policy. For this model, we examine and compare the effects of two tariffs, a quota, and an import quota.

The Model with Free Trade

Figure 1A shows free trade in a market where a domestic monopolist faces competition from imports. The domestic demand curve, D, is the domestic demand curve, and the foreign supply curve, S, is the world price of the good. Imports are available in unlimited quantities at that price. The domestic industry is assumed to consist of only one firm, whose marginal cost curve is MC.

If there were no trade in this market, the domestic firm would behave as an ordinary profit-maximizing monopolist. Corresponding to D is a marginal revenue curve MR, and the firm would choose the monopoly profit-maximizing level of output, Q*, and price, P*.

With free trade, however, the monopolist can charge P*, or indeed any price above that is just above the price of imports, and will produce. The international trade gives a firm the opportunity to increase its price above the competitive level.

Given the demand curve, the monopolist can be priced up to the point where marginal cost is equal to the world price, at Qg. At the price P*, domestic consumers will demand Qd units of the good, in imports will be Qg - Qd, and the domestic industry will produce Q*. This outcome, however, is exactly what would have happened if the domestic industry had been perfectly competitive. With free trade, then, the fact that the domestic industry is a monopoly does not make any difference to the outcome.

The Model with a Tariff

The effect of a tariff is to raise the minimum price the domestic industry can charge. If a specific tariff is placed on imports, the domestic industry can now charge P* + t(Figure 1B). The industry will not be able to raise its price all the way to the monopolist's price, however, because consumers will still want to import if the price rises above the world price plus the tariff. Thus, the tariff is used to set price equal to marginal cost, at Qg. The tariff raises the domestic price as well as the output of the domestic industry.
The monopoly is now free to raise prices, knowing that the domestic price of imports will not rise.

while demand falls to Q2 and thus imports fall. However, the domestic industry will produce the same output as if it were perfectly competitive.

The Model with an Import Quota

Suppose the government imposes a limit on imports, restricting their quantity to a fixed level Q. The monopoly knows that when it charges a price above P, it will not sell all of its output. Instead, it will sell whatever domestic demand is at that price, unless the allowed imports Q are smaller than the output Q at the market-clearing price P.

Thus the demand facing the monopolist will be domestic demand less allowed imports. We define the import quota demand curve in Figure B.5. It is parallel to the domestic demand curve D and shifted Q units to the left (Figure B.5).

Corresponding to P2, the new marginal revenue curve is MR2. The firm protected by an import quota maximizes profit by setting marginal cost equal to its new marginal revenue, producing Q2, and charging the price P2. (The license to import one unit of the good will thereby yield a rent of P2 - P).

Comparing a Tariff and a Quota

We now ask how the effects of a tariff and a quota compare. To do this, we compare a tariff at a quota that lead to the same level of imports (Figure B.5). The tariff level t leads to a level of imports Q, while the quota directly limited imports to Q.

We see from the figure that the results are not the same. The tariff leads to domestic production of Q, and a domestic price of P + t. The quota leads to a lower level of domestic production, Q2, and a higher price, P2. When protected by a tariff the monopolistic domestic industry behaves as if it were perfectly competitive; when protected by a quota it clearly does not.

The reason for this difference is that an import quota creates more monopoly power than a tariff. When monopolistic inducements are protected by tariffs, domestic firms know that if they raise their prices too high they will still be undercut by imports. An import quota, on the other hand, provides absolute protection. No matter how high the domestic price, imports cannot exceed the quota level.

This comparison seems to suggest that if governments are concerned about domestic monopoly power, they should prefer tariffs to quotas as instruments of trade policy. In fact, however, protection has increasingly drifted away from tariffs toward non-tariff barriers, including import quotas. To explain this, we need to look at considerations other than economic efficiency that motivate governments.
CHAPTER 9

The Political Economy of Trade Policy

In 1981, the United States asked Japan to limit its exports of steel to the United States. This initiated the process of intense trade and bilateral 115 countries to buy dominated autos, they clearly did not do so on another—there is a request by Japan on steel products—special the severe Japanese con-

In the chapter we examine some of the reasons governments either should or, at any rate, do not base their policy on economists’ cost-benefit calculations. The examination of the forces in the Chinese trade policy is very different, as is cluded in Chapter 9, which discusses the characteristic trade policy issues facing developing and advanced countries, respectively.

The first step toward understanding actual trade policies is to ask what reasons there are for governments not to intervene with trade—that is, what is the case for free trade. With this question answered, arguments for intervention can be examined as challenges to the assumptions underlying the case for free trade.

The Case for Free Trade

Few countries have anything approaching complete free trade. The city of Hong Kong, which is legally part of China but possesses a separate economic policy, may be the only modern country with no tariffs or import quotas. Nonetheless, none of the three Adam Smith economists have advocated free trade to its ideal extent. This is the reason for this advocacy are not quite as simple as the idea itself. At one level, theoretical models suggest that free trade will avoid the efficiency losses associated with protection. Many economists believe that free trade produces additional gains beyond the elimination of production and consumption distortions. Finally, even strong economics

Free Trade and Efficiency

The efficiency case for free trade is simply the reverse of the cost-benefit analysis of a tariff. Figure 9-1 shows the basic point once again for the case of a small country that current influence foreign-trade policies. A tariff causes a net loss in the economy measured by the area of the two triangles; it does so by distorting the economic incentives of both produ-

A number of efforts have been made to add the total costs of distortions due to tariffs and import quotas to particular economies. Table 9-1 presents some representative estimates. It is noteworthy that the costs of protection to the United States are measured as quite small relative to national income. This situation reflects two facts: (1) the United States is relatively less dependent on steel than other countries, and (2) with some major exceptions, U.S. steel is fairly fine. Of course, some smaller countries that impose very restrictive measures and quotas are estimated to lose as much as 10 percent of their potential national income to distortions caused by their trade policies.

Additional Gains From Free Trade

There is a widespread belief among economists that distortions of the kind reported in Table 9-1, even though they report substantial gains from free trade in some cases, do not represent the whole story. In small countries in general and developing countries in partic-

One kind of additional gain involves economies of scale. Protected markets not only fragment production internationally, but by reducing competition and raising prices, they also lead to many fores in the protected industry. With a proliferation of firms in narrow domestic markets, the scale of production of each firm becomes insufficient. A good example of how protection leads to inefficient scale is the case of the Argentine automotive industry, which emerged because of import restrictions. An efficient scale assembly plant would make from 50,000 to 200,000 automobiles per year, yet in 1964 the Argentine industry, which produced only 16,000 cars, had no less than 15 foreign firms. Economists argue that the need to face excessive assembly and the resulting inefficient scale of production is a reason for free trade that goes beyond the standard cost-benefit calculations.

Another argument for free trade is that by providing entrepreneurs with an incentive to seek new ways to export or compete with imports, free trade offers new opportunities for learning and innovation that are provided by a system of "managed" trade, where the gov-

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CHAPTER 1  The Political Economy of Trade Policy

If the additional gains from free trade are as large as some economists believe, the costs of distorting trade with tariffs, quotas, export subsidies, and so on are correspondingly larger than the conventional cost-benefit analysis measures.

Political Argument for Free Trade

A political argument for free trade reflects the fact that a political commitment to free trade may be a good idea in practice even though there may be better policies in principle. Economists often argue that trade policies or practices are dominated by special-interest politics rather than consideration of national costs and benefits. Economists sometimes view these as being a selective set of tariffs and export subsidies could increase national welfare, but in reality any government agency attempting to pursue a sophisticated program of intervention in trade would probably be captured by interest groups and convinced into a device for redistributing income to politically influential sectors. If this argument is correct, it may be better to avoid tariff-free trade with exceptions, even though on purely economic grounds free trade may not always be the best cost-effective policy.

The three arguments outlined in the previous section probably represent the standard view of most international economists. At least in the United States:

1. The conventionally measured costs of deviating from free trade are large.
2. There are other benefits from free trade that add to the costs of protectionist policies.
3. Any attempt to pursue sophisticated deviations from free trade will be subdued by the political process.

Nonetheless, there is an increasingly important argument for deviating from free trade, and those arguments deserve a fair hearing.

CASE STUDY

The Gains from 1992

In 1992 the nations of the European Community (now known as the European Union) agreed on what formally was called the Single European Act, with the intention to create a truly unified European market. Because the act was supposed to go into effect within five years, the measures it contained came to be known generally as "1992."

The usual thing about 1992 was that the European Community was already a customs union, that is, there were no tariffs or import quotas on more European trade. So what was left to demolish? The advocates of 1992 argued that there were still substantial barriers to international trade within Europe. Some of these barriers involved the costs of crossing borders, for example, the time that trucks carrying goods between France and Germany had to stop for formal inspections often meant long lines that were costly in time and fuel. Similar costs were imposed on business travelers, who might fly from London to Paris in an hour, then spend another hour waiting to clear immigration and customs. Differences in regulations also had the effect of limiting the integration of workers. For example, because health regulations on food

<table>
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| Case Study  |

| Brazil (1966) | 9.5  |
| Turkey (1970) | 5.4  |
| Philippines (1970) | 3.4  |
| United States (1983) | 0.06  |


Note: The data here represent the "current" and "future" estimates of the gains from free trade.
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The Political Economy of Trade Policy

While most variations in the discussion regarded 1 percent as a particularly reliable number, many economists quoted the Commission of the European Communities that the gains would be this large. There were, however, skeptics, who argued that the implications of market failures were so small that the gains would be negligible.

The most consistent complaint was that the Commission was using assumed things such as artificial barriers, to ensure that consumers are not actually doing anything as realistic as arbitration. The initially proposed regulations on artificial barriers, however, have already imposed a number of significant barriers to the free movement of goods and services: pink bargains (breakfast cereals) would have been banned, golden spaghetti, and many other items that are essential for everyday life in the Community, were likely to have been regulated.

But why engage in all this difficult bargaining? What were the potential gains from 1987? A major factor was the extent to which welfare gains were likely to be realized. Costs associated with the elimination of barriers amounted to more than a few per cent of the value of the goods shipped, representing a fraction of a per cent to the total income of the United States. Yet economic theory at the European Community (the administrative area of the European Community) argued that the gains would be much larger.

That reasoning rested on a large extent on the view that the elimination of the European market would lead to greater competition among firms and a more efficient scale of production. Much was made of the companies with the United States, a country whose purchasing power and population are similar to those of the European Union, but which is a better integrated market. Commission economists pointed out that in a number of industries Europe seemed to have markets that were segmented. Instead of treating the whole continent as a single market, firms seemed to have carved it into local areas served by relatively small-scale national producers. They argued that with all barriers to trade removed, there would be a consolidation of these producers, with substantial gains in productivity. These potential gains raised the overall estimated benefits from 1987 to several per cent of the total income of the European Union.

The Commission economists argued further that there would be indirect benefits, because the improved efficiency of the European economy would improve the trade-off between inflation and unemployment. As the end of a series of calculations, the Commission estimated a gain from 1987 of 7 percent of European income.

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PART 1. International Trade Policy

For a large country, there is an optimum tariff rate at which the marginal gain from increased terms of trade just equals the marginal loss from production and consumption distortion.

Optimal Tariff Rate: $T^*$

Prohibited Tariff Rate: $T^+$

National welfare

of trade argument rather than to use the tariff (given all other possibilities.) The optimum tariff rate is always positive.

What policy would be the terms of trade argument dictate for export sectors? Since an export subsidy increases the terms of trade, therefore unambiguously reduces national welfare, the optimal policy in export sectors must be a negative subsidy, that is, to tax exports rather than to provide a positive rate of investment that would stimulate all imports.

We now consider the terms of trade argument for the effects of protection. Since an increase in the price of exports raises the price of domestic goods, and hence the probability of output, it is always positive but less than the prohibitive tariff that would eliminate exports completely.

The policy of Saudi Arabia and other oil exporting countries has been to tax their exports of oil, raising the price of the rest. Although oil prices fell in the mids-1980s, it is hard to argue that Saudi Arabia would have been better off with free trade.

The terms of trade argument against free trade itself is essentially a negative of the positive argument, but more important limitations, however, most small countries have very little ability to affect the world prices of either their imports or their exports, so that there are few, if any, prohibitive rates. For big countries like the United States, the problem is that the terms of trade argument amounts to an argument for using national wealth to foster gains at other countries' expense.

The United States cannot afford to do this in some sense, but such a predatory policy would probably bring retaliation from other large countries. A cycle of retaliatory trade moves would, in such a scenario, the international interdictional trade policy coordination described by this chapter.

The terms of trade argument against free trade, then, is intellectually irresolvable but too useful to be useless. In practice, it is emphasized more by economists as a theoretical property that it is used by governments for trade policy.

The Domestic Market Failure Argument Against Free Trade

Leaving aside the issue of terms of trade, the basis for the welfare case for free trade rests on cost-benefit analysis using the concepts of consumer and producer surplus. Many economists have made a case against free trade based on the cornerstone argument that these concepts, producer surplus in particular, do not properly measure costs and benefits.

Why might producers receive not properly measure the benefits of producing a good? We consider a variety of reasons in the next two chapters. These include the possibility that one good in the world would otherwise be unamplifiable or unemployable, the existence of delays in the capital or labor markets that prevent resources from being transferred as rapidly as they should be in response to world high demand, and the possibility of technological differences from isolation that are not necessarily irreversible.

These cases are classified under the general heading of domestic market failures. That is, each of these examples is not in which some market in the country is not doing its job properly—the labor market is not clearing, the capital market is not allocating resources efficiently, and so on. Supposing, for example, that the production of some good yields experience that will improve the productivity of the economy as a whole but the firms in the sector cannot appropriate this benefit and therefore do not take it into account in deciding how much to produce. There is a market-based social benefit in additional production that is not captured by the producer surplus measure. This market-based social benefit can serve as a justification for tariffs or other trade policies.

Figure 9.3 illustrates the domestic market failure argument against free trade. In this diagram, it shows the conventional cost-benefit analysis of a tariff for a small country (which raises net trade to be analyzed.) Figure 9.3 shows the marginal benefits of production that is an under account of the producer surplus measure. The figure shows the effects of a tariff that raises the domestic price from $P_0$ to $P_0 + T$. Production then falls to $Q_0$ with a resulting production distortion indicated by the area labeled Consumer surplus falls from $PS_0$ to $PS_0'$, with a resulting consumption distortion indicated by the area $A$ if we consider only consumer and producer surplus, we would fail to see the costs of the tariff exceed its benefits.

Figure 9.3 shows, however, that this calculation understates the additional benefits that may raise the tariff preferable in free trade. The increase in output of a good that is not captured by the area under the marginal social benefit curve from $P_0$ to $P_0 + T$, indicated by $C$. In fact, by an argument similar to that in the previous case, we can show that if the tariff is small enough the area $B$ that always exceed the area $A$, and that there is some welfare-maximizing tariff that $A$ is a level of social welfare higher than that of free trade.

The domestic market failure argument against free trade in a particular case of a more general argument that seems to be in economics as the theory of the second best. This theory states that a hands-off policy is feasible in every market only if all other markets are working properly. If they are not, a government intervention that appears in one market, increase in another market may actually increase welfare by affecting the performances of market failures elsewhere. For example, if the labor market is malfunctioning and fails to deliver full employment, a policy of subsidizing labor-intensive exports, which would be unfeasible in a free-market economy, might not be a good idea. It would be better to fix the labor market, for example, by making wages more flexible, but if for some reason this cannot be done, intervening in other markets may be a "second-best" way of alleviating the problem.

When economists apply the theory of the second best in trade policy, they argue that interferences in the current functioning of an economy may justify intervening in its external economic relations. This argument is that international trade is not the source of the problem but suggests nonetheless that trade policy can provide at least a partial solution.
How Convincing Is the Market Failure Argument?

When they were first proposed, market failure arguments for protection seemed to withstand severe testing under scrutiny. After all, who would want to argue that the real economic problems we live in are free from market failures? In poorer nations, in particular, market imperfections seem to be legion. For example, unemployment and wage differentials between rural and urban areas exist in nearly all developed countries (Chapter 10). This evidence that markets work badly is so glaring that it is hard to believe that economists ever argued that market failures were nonexistent. Hence even we defect from the ideology that there are no problems that could not be solved.

There are two lines of defense for this view. The first argues that strategic market failures should be corrected by domestic policies aimed directly at the problem's sources; the second argues that economists cannot diagnose market failure well enough to prescribe policy. The point about strategic market failure calls for domestic policy changes, whereas international trade policies, can be made by cost-benefit analysis, modified to account for any unmeasured marginal social benefits. Figure 3-4 shows that a tariff reduces welfare, despite the production and consumption distortion it causes, because it leads to total production that yields societal benefits. If the same production process were adopted with a production subsidy rather than a tariff, however, the price to consumers would be increased and the consumer surplus would be increased. In other words, by targeting only the particular activity we want to encourage, that production subsidy would yield some of the side costs associated with a tariff. This example illustrates a general principle: where dealing with market failures, it is always preferable to deal with market failures directly as possible, because indirect
part 1 international trade policy

Income Distribution and Trade Policy

The discussion so far has focused on national welfare arguments for and against trade policies. It is appropriate to start there, both because a distinction between national welfare and the welfare of particular groups helps to clarify the issues and because the advocates of trade policies rarely claim they will benefit the nation as a whole. When looking at the actual policies of trade, however, it becomes necessary to deal with the reality that there is no such thing as national welfare; there are only the desires of individuals, which get more or less imperfectly reflected in the objectives of government.

How do the preferences of individuals get translated into the trade policies we actually see? There is no single, generally accepted answer to this question, but here is a growing body of economic analysis that explores models in which governments are assumed to be trying to maximize political success rather than an abstract measure of national welfare.

Electoral Competition

Political scientists have long sought a simple model of competition among political parties to show how the preferences of voters might be reflected in real-world policies. One model is as follows: Suppose that there are two competing parties, each of which is willing to provide whatever will enable it to win the next election. Suppose that policy can be described along a single dimension, say, the level of the tax rate. And finally, suppose that voters differ in the policies they prefer. For example, imagine that one party's supporters are more concerned with deficits and imports, whereas the other party is more concerned with jobs and wages. Which party will have the best shot of winning?

The answer is that they will both try to win the middle ground—specifically, both will tend to converge on the tax rate preferred by the median voter, the voter who is somewhere in the middle of the political spectrum. The reason is that the median voter is the one who is most likely to be close to the median voter, and the party that is closest to the median voter is the one that will win.

The difficulty of accommodating the right and left trade policy in a way that is acceptable to both parties is that the two parties are likely to have different views on what is best for the country. The difficulty of accommodating the right and left trade policy is that the two parties are likely to have different views on what is best for the country. The difficulty of accommodating the right and left trade policy is that the two parties are likely to have different views on what is best for the country.
sufficiently. Nonetheless, the median voter model of electoral competition has been very helpful as a way of thinking about how political decisions get made in the real world, where the effects of political decisions on economic efficiency may be more important than their effects on the median voter's welfare.

One way in which the median voter model does not seem to work very well, however, is in policy trade-off analysis. In this model, a policy should be chosen on the basis of how many voters it pleases. A policy that satisfies the interests of a few people but benefits a large number of people should be a political winner; a policy that satisfies widespread concerns but helps a small group should be a loser. In fact, however, most political policies are more likely to fit the latter than the former description. Recall the example of the U.S. sugar import quota, discussed in Chapter 6. According to the estimates presented there, the quota imposed a loss of more than $5 billion to U.S. consumers—data is on output, while most of that value results from the provision of a good ship to a few sugar industry workers and businesses. How can such a thing happen?
Who Gets Protected?

As a practical matter, which industries actually get protected from import competition? Many developing countries traditionally have protected a significant share of manufacturing, in a policy known as import-substituting industrialization. We discuss this policy in Chapter 2. The range of protections in advanced countries is much narrower, indeed, much protection is concentrated in a few sectors, agriculture and clothing.

Agriculture. There are not many farmers in modern economies—in the United States, agricultural employment only about 2 percent of the work force. Farmers are, however, widely seen as well-organized and politically effective groups, which has often been used to advocate very high rates of protection. We discuss Europe's Common Agricultural Policy in Chapter 8; the export subsidies that it provides mean that a number of agricultural products sell for two or three times world prices. In Japan, the government has traditionally based imports of rice, at least 70% of which in recent years has come from the world's market. This has helped slightly reduce the size of the market in the mid-1990s, but in the 1990s over the process of other nations, including the United States—Japan imposed a 1990-percentage tariff on rice imports.

The United States is by far the largest exporter, which means that tariffs on imports create higher prices. (Sugar is a classic example.) While farmers have reaped considerable subsidies from the federal government, the government's reluctance to pay money directly as opposed to imposing more or less hidden costs on consumers has limited the size of these subsidies. As a result of the government's reluctance, much of the government's spending on agriculture has gone to other major sectors: the clothing industry.

Clothing. The clothing industry consists of two parts: textiles (spinning and weaving of cloth and apparel) and apparel (manufacture of that cloth into clothing). Both industries, but especially the apparel industry, have been heavily protected because of tariffs and import quotas, not just in the United States and Canada, but also in other nations.

Apparel production has two key features. It is labor-intensive: A worker adds relatively little value, in some cases no value at all, to a finished garment, and so the value of a garment is often largely labor. And the technology is relatively simple. Thus, there is no great difficulty in transforming the technology even to very poor countries. As a result, the apparel industry is one in which low-wage nations have a strong comparative advantage and high-wage countries have a strong comparative disadvantage. It is also technologically a well-organized sector in advanced countries; for example, many American apparel workers have long been unionized by the International Ladies' Garment Workers' Union.

Table 9-3 gives an indication of the importance, the clothing industry in modern industrialized countries to the economy of any modern economy. As the table indicates, apparel and textiles together accounted for nearly three-fourths of the consumer costs of protection in 1990, and more than five-sixths of the overall welfare costs. What is peculiar is that because clothing imports are limited by the Multi-Fiber Agreement—which allows import licenses in exporting countries—even the welfare costs come with little distortion of production and consumption but from the transfer of gains back to foreign producers.

<table>
<thead>
<tr>
<th>Table 9-3</th>
<th>Effects of Protection on the United States (in billions of dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effect</td>
<td>Apparel</td>
</tr>
<tr>
<td>Consumer cost</td>
<td>21.6</td>
</tr>
<tr>
<td>Producer cost</td>
<td>9.0</td>
</tr>
<tr>
<td>Tariff revenue</td>
<td>3.55</td>
</tr>
<tr>
<td>Quota rent</td>
<td>3.44</td>
</tr>
<tr>
<td>Producer and consumer distortion</td>
<td>0.30</td>
</tr>
</tbody>
</table>

International Negotiations and Trade Policy

Our discussion of the politics of trade policy has emphasized the interdependence of trade and policy. Several key points can be made in defense of the politics that produce such outcomes.

1. **Interdependence of Trade and Policy:** The politics of trade are closely tied to broader economic and political factors. This interdependence suggests that trade policies are not isolated from other areas of policy making.

2. **Economic Interdependence:** The interdependence of trade and policy also implies that policies in one area can affect outcomes in another. For example, changes in trade policies can influence domestic economic conditions, which in turn can affect political support for such policies.

3. **Political Interdependence:** Similarly, changes in domestic political conditions can affect the willingness of policymakers to make trade concessions. This interdependence highlights the importance of understanding both economic and political factors in analyzing trade policy outcomes.

4. **Institutional Interdependence:** The interdependence of trade and policy also extends to the institutional arrangements that govern trade relations. These institutions, such as the World Trade Organization (WTO), are crucial in shaping how trade policies are formulated and implemented.

5. **Human Interdependence:** Finally, the interdependence of trade and policy underscores the role of human actors in shaping trade outcomes. Policy makers, business leaders, and other stakeholders play crucial roles in both formulating and implementing trade policies.

In conclusion, the politics of trade policy are complex and multifaceted. Understanding this interdependence requires a comprehensive approach that considers economic, political, and institutional factors. This approach will be essential for crafting effective trade policies that balance economic efficiency with political stability and social equity.

One way to think about the GATT-WTO approach to trade is to use a mechanical analogy: it's like a device designed to push a heavy object, the world economy, gradually up a slope—the push to free trade. To get those results requires both "thrust" to push the object in the right direction, as well as "backlash" to prevent backsliding. The principal function in the system is the process of "binding". When a tariff rate is "bound", the country imposing the tariff agrees not to raise the rate in the future. At present, almost all tariff rates in developed countries are bound, as are about three-quarters of the rates in developing countries. There is some wiggle room in bound tariffs: a country can raise a small if you give the agreement's deadlines, and usually means providing compensation by reducing other tariffs. In practice, binding has been highly effective, with very little backsliding in tariff rates over the years.

In addition to binding tariffs, the GATT-WTO system generally tries to prevent non-tariff interventions in trade. Export subsidies are not allowed, unless a big exception: back at the GATT, the United States resisted a "tangle" for agricultural exports, which has since been explained on a large scale by the European Union.

As we pointed out earlier, this chapter treats most of the recent cost of protection in the United States comes from import quotas. The GATT-WTO system is an effort to "unravel" existing import quotas, through a process that requires an expected net increase or decrease in quota or convert them to duties. How import quotas are generally forbidden except as necessary to deal with "market disruptions", an undefined phrase usually interpreted to mean serious of imports that threaten to put domestic sectors value of domestic.

The key move to make forward progress is the somewhat cynical proposition known as a "trade round", in which a large group of countries get together to negotiate a set of tariff reductions and other measures to liberalize trade. Eight trade rounds have occurred since the 1947, the last of which is known as the "Kennedy Round". In 1999, almost to start a new round in Seattle failed, we discuss the course of that failure and the events that surrounded it in Chapter 11. Two more here, as this book would end, a meeting at the Persian Gulf city of Delta formally began the new round.

The first five trade rounds under the GATT took the form of "unilateral" bilateral negotiations, where each country negotiated separately with a number of countries at once. For example, if Germany went to offer a tariff reduction that would benefit both France and Italy, it could ask both of them for import guarantees. The ability to make more extensive deals, together with the worldwide economic recovery from the war, helped to permit substantial tariff reductions.

The sixth multilateral trade agreement, known as the Kennedy Round, was completed in 1967. This agreement involved an average-bound 25 percent reduction in tariffs by the major industrial countries, except for specific industries whose tariffs were left untouched. The negotiations were over which industries to exempt rather than over the size of the cut for industries not given special treatment. Overall, the Kennedy Round reduced average tariffs by about 35 percent.

The so-called Tokyo Round of trade negotiations (completed in 1979) reduced tariffs by a formula more complex than that of the Kennedy Round. In addition, new codes were established in an effort to extend the proliferation of non-tariff barriers, such as voluntary export restraints and other marketing requirements. Finally, in 1984 an eighth round of negotiations, the so-called Uruguay Round, was completed. The provisions of the round were approved by the U.S. Congress and an international debate, we describe the results of these negotiations below.

The Uruguay Round
Major international trade negotiations inevitably open with a ceremony in one scenic locale and conclude with a somber speech in another. The eighth round of global trade negotiations started in April 1986 with a meeting in the remote resort of Punta Del Este, Uruguay. Hence the name Uruguay Round. The participants then met in Geneva, where they engaged in many years of offers and counteroffers, threats and counterthreats, and saw many ups and downs of offers being made and lost as the most experienced diplomat had difficulty staying awake. The round was scheduled for completion by 1994 but has hit numerous political difficulties. By late 1995 the negotiations finally produced a new document consisting of 400 pages of agreements, together with an accompanying document detailing the specific commitments of member nations with regard to particular countries and industries—about 22,000 pages in all. The agreement was signed in Marrakesh, Morocco, in April 1994, and ratified by the major nations after bitter political controversy in some cases, including the United States—by the end of the year.

As the length of the document suggests, the end results of the Uruguay Round are not that easy to summarize. The most important result today, however, is the agreement under two headings, trade facilitation and administrative reforms.

Trade Liberalization
The Uruguay Round, like previous GATT negotiations, set tariff rates around the world. The numbers can sound impressive: the average tariff imposed by advanced countries will fall almost 40 percent as a result of the round. However, tariff rates were already quite low. In fact, the average tariff rate will fall only from 3.3 to 3.9 percent, enough to produce only a small increase in world trade.

More important than the overall tariff reductions is the move to liberalize trade in two important sectors, agriculture and clothing.

Way to trade in agricultural products has been highly protected, Japan in particular. For example, Japan has regulations that limit the number of beeves it imports, and other foods several times as high as world average prices. Europe's massive export subsidies under the Common Agricultural Program were described in Chapter 8. As the beginning of the Uruguay Round the United States had an ambitious goal: free trade in agricultural products by the year 2000. The actual achievement was far more modest than still significant. The agreement required agricultural exports to reduce the value of subsidies by 30 percent, and the value of non-aided exports by 20 percent, over a 10-year period. Countries that protect their farmers with import quotas, like Japan, were required to replace quotas with tariffs, which may not fall by as much.

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CHAPTER 9 The Political Economy of Trade Policy

Before the WTO, there were international institutions in which Canada could press its case, but such proceedings tended to drag for years, even decades. And even when a ruling had been issued, there was no way to enforce it. This did not mean that the GATT's rules had no force: neither the United States nor other countries wanted to acquire a reputation as scofflaws, so they made considerable efforts to keep their actions "GATT-compliant". But gray-area cases tended to go unenforced.

The WTO contains a much more formal and effective procedure. Panels of experts are selected in both cases, essentially reaching a final conclusion in less than a year; even with appeals the procedure is not supposed to take more than 15 months. Suppose that the WTO concludes that a nation has, in fact, been violating the rules—and, in the meantime, refuses to change its policy. Then what? The WTO itself has no enforcement powers. What it can do is in the country that filed the complaint the right to retaliate. To use our Canadian example, the government of Canada might be given the right to impose restrictions on U.S. exports, without being considered in violation of WTO rules. In the case of the banana dispute described in the box on p. 243, a WTO ruling found the European Union in violation, when Europe complained retaliatory, the United States temporarily imposed tariffs on such means as designer handbags.

The hope and expectation is that few disputes will get this far. In many cases the threat of a dispute can itself deter the escalation to the more aggressive disputes.

Benefits and Costs

The economic impact of the Uruguay Round is difficult to estimate. What is known, though, is that the agreements reached are likely to have a major impact on Canadian exporters as well as importers. The agreement on services, for example, is likely to open up new markets for Canadian firms in a variety of sectors. The agreement on agricultural products is likely to lead to lower prices for consumers in Canada, while also increasing access to foreign markets for Canadian farmers. The agreement on intellectual property rights is likely to increase the value of Canadian cultural exports, while also protecting the interests of creators. The agreement on non-tariff barriers is likely to reduce the costs of doing business in other countries, making it easier for Canadian businesses to compete.

In summary, the Uruguay Round is expected to have a positive impact on the Canadian economy, leading to increased trade, lower prices, and stronger economic growth. However, it is important to note that the benefits and costs of these agreements will vary depending on the specific sectors and industries affected. It is also important to recognize that the implementation of these agreements will require ongoing effort and coordination from all levels of government and the private sector.
The very first application of the WTO's new dispute settlement procedures has also been one of the most significant since it went into effect. It illustrates the new system's effectiveness. To be sure, it showed that the organization can now, at least in theory, serve to ensure the protection of the environment.

The case went to one of U.S. pollution standards. These standards are not for the chemical composition of pollution but for the United States. A uniform standard would clearly have been legal under WTO criteria. The new standards included some loopholes; reductions in the United States, or those setting 15 percent of states, or their output in the United States, were given "exceptions" that depended on more than 1990 pollution levels. This provision generally set a less strict standard than was set for imported goods, and was itself remedied to preference for goods from other regions.

Voters, who think the environment's questionable figures on the United States, brought a complaint against the new socalled rules early in 1995. Venezuela alleged that the rules violated the principle of "national treatment" which says that imported goods should be subject to the same regulations as domestic goods. The regulations are not as an indirect form of protectionism. A year later the point appeared. The WTO ruled in Venezeula's favor. The United States appealed, but the appeal was rejected. The United States and Venezuela then negotiated a revised set of rules.

As one level, this speaks to the situation of the WTO during exactly what it was supposed to be doing. The United States introduced programs that pretty clearly violated the letter of its own principles, but a similar, less influential country applied against those measures, got forty quick results.

On the other hand, environmentalists were undoubtedly upset. The WTO ruling was a use of a mechanism that would make the rules more clear. Furthermore, there was little question that the clean-air rules were protectionist in good faith—that they were really intended to reduce pollution, not to exclude imports. Defenders of the WTO's point out that the United States clearly could have written a rule that did not discriminate against imports; the fact that it did not see a practical conclusion to the softening industry, which did in effect weaken the sort of protectionism. This may you can say is that the WTO's role is more difficult for U.S. envionmentalists to write a policy deal with the WTO.

In the philosophy of the globalization model, which we discuss in Chapter 11, the WTO's intervention against itself standards has taken on an economic stance. The rule is seen in one of the many examples of how the organization deploys domestic of its members, generating them from following socially and environmentally responsible policies. The reality of the case, however, is more nearly the opposite. If the United States had imposed a "clean"</noscript>
Chapter 4: The Political Economy of Trade Policy

The limits to the tariff war are due to the fact that the United States is a large, politically dominant power, whose economic and political power in the world can be used to influence the outcomes of trade negotiations. However, this power is not unlimited, and there are limits to the extent to which the United States can use its power to achieve its goals in trade negotiations.

The limits to the tariff war are also due to the fact that other countries have the ability to retaliate against the United States. This is especially true for countries that are major trading partners of the United States, such as Mexico, Canada, and China. These countries have the ability to impose tariffs on goods from the United States, which can hurt the United States economically. Moreover, these countries have the ability to use their economic power to influence the outcomes of trade negotiations.

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diverted trade instead of creating it—could actually have mobilized wealth. And sure enough, in 1990 a study prepared by the World Bank’s chief trade economist concluded that despite Mercosur’s success in increasing regional trade—but rather, because that success came at the expense of other trade—the net effects on the economies involved were probably negative.

In essence, the report argued that as a result of Mercosur, consumers in the member countries were being induced to buy expensive manufactured goods from their neighbors rather than cheaper but familiar imported goods from other countries. In particular, because of Mercosur, Brazil’s highly protected and somewhat inefficient auto industry had in effect acquired a captive market in Argentina, displacing imports from elsewhere, just like our own example in which French wine displaces American wine in the Italian market. “These findings,” concluded the initial draft of the report, “appear to consider the most convincing, and disturbing, evidence produced thus far concerning the potential adverse effects of regional trade arrangements.”

But that is not the whole, published report said. The initial draft had looked too bad, and a forensics of protest from Mercosur governments, Brazil in particular. Under pressure, the World Bank first delayed publication, then eventually inserted a version that included a number of caveats. Still, even in its published version the report made a fairly strong case that Mercosur, if not entirely counterproductive, nonetheless has produced a considerable amount of trade diversion.

Summary

1. Although few countries practice free trade, most economies continue to hold up free trade as a desirable policy. This advocacy rests on three lines of argument. First is a formal case for the efficiency gains from free trade that is simply the core benefit of analysis of trade policy made in recent. Second, many economists believe that free trade produces additional gains that go beyond this formal analysis. Finally, given the difficulty of translating complex economic analysis into policy, even those who do not see free trade as the best integrable policy see it as a useful tool of trade.

2. There is an inherently inexplicable case for deviating from free trade. One argument is that it is clearly valid in principle that countries can improve their terms of trade through optimal tariffs and export cases. This argument is not too important in practice, however. Small countries cannot have much influence on their import or export policies. In these cases they cannot use tariffs or other policies to raise their terms of trade. Large countries, on the other hand, can influence their terms of trade, but in imposing tariffs and taxes raise the risk of giving up trade agreements and provoking retaliation.

3. The other argument is that devising free trade as a way of dealing with domestic market failures. If domestic market, such as the labor market, fails to function properly, deriving from free trade can sometimes help reduce the consequences of this malfunctioning. The theory of the second best states that if our market fails to work properly it is no longer optimal for the government to abstain from intervention in other markets.

Trade Diversion in South America

In 1991 four South American nations, Argentina, Brazil, Paraguay, and Uruguay, formed a five-state area known as Mercosur. The pact had an immediate and dramatic effect on trade within the region. Leaders in the area promised to raise tariffs on goods imported from outside the Mercosur area and to provide various forms of assistance to domestic producers. The objective was to increase the volume of trade within the Mercosur area at the expense of trade with the rest of the world. The theory of trade diversion suggests that if the new trade that is diverted to the area is not offset by the increase in trade between the members of the area, then there will be a net reduction in trade within the region and an increase in trade outside the region. The theory of trade diversion suggests that if the new trade that is diverted to the area is not offset by the increase in trade between the members of the area, then there will be a net reduction in trade within the region and an increase in trade outside the region.
terf may raise welfare if there is a marginal social benefit to production of a good that is not obtained by producer surplus mechanisms.

4. Although market failures are probably common, the domestic market failure argument should not be applied too freely. First, it is an argument for domestic policies rather than trade policies; tariffs are often an inferior, "second-best" way to offset domestic market failure, which is often best treated at its source. Furthermore, market failure is difficult to analyze well enough to be a strong argument for the appropriateness of protectionist recommendations.

5. In practice, trade policy is determined by considerations of income distribution. No single way of modeling the politics of trade policy exists, but several useful ideas have been proposed. "Systematic" scientists often argue that policies are determined by competition among plutocrats, with a key to attract as many votes as possible. In the simpler cases, this leads to the adoption of policies that serve the interests of the median voter. While useful for thinking about many issues, however, this approach seems to yield unrealistic predictions for trade policies, which typically favor the interest of small, concentrated groups over the general public. Economic and political fields generally explain this by appealing to the problem of collective action. Because individuals may have little incentive to act politically on behalf of groups to which they belong, these groups will be overrepresented—typically small groups with a lot at stake—so often get policies that serve their interests in the expense of the median voter.

6. If trade policy were made as a purely domestic basis, progress toward free trade would be very difficult at best. In fact, however, international conferences have achieved substantial reductions in tariffs through a process of international negotiations. International negotiations help the cause of tariff reduction in two ways: they help broaden the constituency for free trade by giving exporters a direct stake, and they help governments avoid the moral disadvantages of trade restrictions that internationally confronted polities would bring.

7. Although some progress was made in the 1950s toward trade liberalization via bilateral and multilateral agreements, since World War II international coordination has taken place primarily through multilateral agreements under the auspices of the General Agreement on Tariffs and Trade. The GATT, a forum for negotiations and a set of rules of conduct, is the central institution of the international trading system. The most recent worldwide GATT agreement was the Kennedy Round agreement, the World Trade Organization (WTO), to monitor and enforce the agreement.

In addition to the overall reduction in tariffs that have taken place through multilateral negotiations, some groups of countries have negotiated preferential trading agreements under which they lower tariffs with respect to each other but not the rest of the world. Two kinds of preferential trading agreements are allowed under the GATT: customs unions, in which the members of the agreement set up common external tariffs, and free trade areas, in which they do not change tariffs on each other's products but set their own external tariffs against the outside world. Either kind of agreement has ambiguous effects on economic welfare. If joining such an agreement leads to replacement of high-cost domestic production by imports from other members of the agreement—the case of trade creation—a country gains. But if joining leads to the replacement of low-cost imports from outside the area with higher-cost goods from member nations—the case of trade diversion—a country loses.

Problems

1. "Few small countries like the Philippines, a move to free trade would have huge advantages. In a small, poor consumer, make his producers more competitive based on the real costs of goods, not artificial prices determined by government policy; it would allow escape from the confines of a narrow, domestic market; it would open new horizons for entrepreneurship; and, most important, it would help to clean up domestic politics." Separate out and identify the arguments for free-trade in this statement.

2. Which of the following are potentially valid arguments for tariffs or import subsidies, and which are not? Explain your answer.
   a. "The more oil the United States imports, the higher the price of oil will go in the near world shortage."
   b. "The growing exports of off-season fruit from Chile, which now accounts for 80 percent of the U.S. supply of such produce as winter grapes, are contributing to sharply falling prices for these foreign goods."
   c. "U.S. farmers don't just need higher interest for farmers—they need higher income for everyone who sells goods and services to the U.S. farm sector."
   d. "International agreements are the crude oil to technology; if we don't produce our own chips, the flow of information that is crucial to every industry that mass-automation will be impaired."
   e. "The real price of timber has fallen 40 percent, and thousands of timber workers have been forced to look for other jobs."

3. A small country can import a good at a world price of 80 per unit. The domestic supply curve of the good is

\[ S = 50 + \frac{P}{5}. \]

The demand curve is

\[ D = 800 - 10P. \]

In addition, each unit of production yields a marginal social benefit of 0.
PART 2 International Trade Policy

a. Calculate the total effect on welfare of a tariff of 20% on imported spirits.

b. Calculate the overall effect of a production subsidy of 2 per unit.

c. Why does the production subsidy produce a greater gain in welfare than the tariff?

d. What would be the survival probability of the industry?

4. Suppose the demand and supply are fairly elastic in the problem 3 but there is an

ii. marginal social benefit in production. However, for political reasons the government

c. impose a tariff of 25% on imported spirits. Calculate the effects on the government's objective of a

iii. tariff of 30% per unit. There is no point to the United States competing against trade policies in Japan

c. Europe. Each country has a right to do whatever it is to its own best interest. Instead of

d. struggling about foreign trade policies, the United States should be other countries

c. go their own ways and give up our own prejudices about free trade and follow suit.

Discuss both the economics and the political economy of this viewpoint.

5. Which of the following actions would be legal under GATT, and which would not?

a. A U.S. tariff of 20 percent against any country that exports more than twice as much to the United States as it imports from us.

b. A subsidy to U.S. wheat exports, aimed at maximizing some of the market lost to the European Union.

c. A U.S. tariff on Canadian lumber exports, not matched by equivalent reductions on other tariffs.

d. A Canadian excise tax on lumber exports, agreed to at the demand of the United States to place U.S. lumber producers.

e. A program of subsidized research and development in areas related to high-tec technology goods such as electronics and semiconductors.

f. Special government assistance for workers who lose their jobs because of import competition.

7. As a result of political and economic liberalization in Eastern Europe, there has been widespread speculation that Eastern European nations such as Poland and Hungary may join the European Union. Discuss the potential economic costs of such an expansion of the European Union, from the point of view of (1) Western Europe, (2) Eastern Europe, and (3) other nations.

Further Reading


basic reference on how and why trade policies are made in the United States.

Robert E. Baldwin. “Trade Policies in Developed Countries,” in Ronald W. Jones and Peter B.


A comprehensive survey of theory and evidence on a broad range of trade-related policies.


1982. Analytical essays on the economic and political issues raised when imports compete with

domestic producers.


ments for and against protectionism, ending with a set of proposals for strengthening free

trade.

CHAPTER 9 The Political Economy of Trade Policy


survey of economic arguments for and against protection.

Henry views. “Product Monopolies and 1913: Full Integration, Large Core.” The Journal of Economic

Perspectives (Fall 1992), pp. 7-26. A careful review of the possible economic effects of 1913. This

effect is to increase European markets. Notice the way it tries to test the common belief

that there will be large "spillovers" gains from entering trade barriers, even though the num-

creral scale of these barriers appear small.


view of the legal framework of international trade, with emphasis on the role of the GATT.

Erichmann, Senator, The New Frontier in Trade in National Affairs. Washington: North-Hol-


Economics, 1994. A succinct and widely available survey of the issues and accomplishments of

the new round GATT round, together with a survey of much of the relevant research.


Proving that the Optimum Tariff Is Positive

A tariff always improves the terms of trade of a large country but at the same time diminishes production and consumption. This appendix shows that for a sufficiently small tariff the terms of trade gain is always larger than the domestic loss. Thus there is always an optimal tariff that is positive.

To make the point, we focus on the case where all demand and supply curves are linear; that is, are straight lines.

**Demand and Supply**

We assume that Home, the importing country, has a demand curve whose equation is

\[ D = a - bP \]  \hspace{1cm} (RA-1)

where \( P \) is the internal price of the good, and a supply curve whose equation is

\[ Q = c + fP \]  \hspace{1cm} (RA-2)

Home’s import demand is equal to the difference between domestic demand and supply.

\[ D - Q = (a - c) - (b + f)P \]  \hspace{1cm} (RA-3)

Foreign import supply is also a straight line,

\[ Q^* = (Q^* - D^*) = e + hP_o \]  \hspace{1cm} (RA-4)

where \( P_o \) is the world price. The internal price in Home will exceed the world price by the tariff,

\[ P = P_o + t \]  \hspace{1cm} (RA-5)

**The Tariff and Prices**

A tariff drives a wedge between internal and world prices, driving the internal Home price up and the world price down (Figure 9A-1). In world equilibrium, Home import demand equals Foreign export supply:

\[ (a - c) - (b + f) \times (P_o + t) = e + hP_o \]  \hspace{1cm} (RA-4)

Let \( P_N \) be the world price that would prevail if there were no tariff. Then a tariff \( t \) will raise the internal price to

\[ P = P_N + t(1 + hP_o) \]  \hspace{1cm} (RA-7)

while lowering the world price to

\[ P_o = P_N - t(1 - hP_o) \]  \hspace{1cm} (RA-8)

For a small country, foreign supply is highly elastic, that is, \( h \) is very large. So for a small country a tariff will have little effect on the world price while raising the domestic price almost one-for-one.

**The Tariff and Domestic Welfare**

We now use what we have learned to derive the effects of a tariff on Home’s welfare (Figure 9A-2). \( Q^* \) and \( D^* \) represent the free trade levels of consumption and production. With a tariff the internal price rises, with the result that \( Q^* \) drops to \( Q^* \) and \( D^* \) falls to \( D^* \), where

\[ Q^* = Q^* + (hP_o + f + h) \]  \hspace{1cm} (RA-9)

and

\[ D^* = D^* - t(1 + hP_o) \]  \hspace{1cm} (RA-10)

The gain from a lower world price is the area of the rectangle in Figure 9A-2, the fall in the price multiplied by the level of imports after the tariff.
PART 2 International Trade Policy

Chapter 10
Trade Policy in Developing Countries

We have analyzed the instruments of trade policy and its objectives without specifying the context—that is, without saying much about the country undertaking those policies. Each country has its own distinctive history and its own distinctive economic policy. One obvious difference between countries is in their income levels. As Table 10-1 suggests, nations differ greatly in their per capita incomes. At one end of the spectrum are the developed or advanced nations, a club whose members include Western Europe, several countries largely settled by Europeans (including the United States), and Japan; these countries have per capita incomes that in many cases exceed $15,000 per year. Most of the world’s population, however, live in nations that are substantially poorer. The income range among these developing countries is itself very wide. Some of these countries, such as Singapore, are fast on the verge of being "preindustrial" to advanced country status, both in terms of official statistics and in the way they think about themselves. Others, such as Bangladesh, remain desperately poor. Nonetheless, for virtually all developing countries the attempt to close the income gap with more advanced nations has been a constant concern of economic policymakers.

Why are some countries so much poorer than others? Why have some countries that were poor a generation ago succeeded in making dramatic progress, while others have not? These are deeply disputed questions, and to try to answer them—or even to describe at length the answers that economists have proposed over the years—would take us outside the scope of this book. What we can say, however, is that changing views about economic development have had a major role in determining trade policy.

For about 30 years after World War II trade policies in many developing countries were strongly influenced by the belief that the key to economic development was creation of a strong manufacturing sector and that the best way to create that manufacturing sector was by protecting domestic manufacturers from international competition. The first part of this chapter describes the rationale for this strategy of import substituting industrialization,

1Developing countries is a term used by international organizations that have become oversimplified, even though some "less-developed" countries have had developing long periods of growth and are much more developed than some of the "less-developed" countries listed in the table (CBDC).
Table 10-1: Great Domestic Product Net Capital (1990 dollars)

<table>
<thead>
<tr>
<th>Country</th>
<th>GDP 1990</th>
<th>GDP 1995</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>33,000</td>
<td>22,100</td>
</tr>
<tr>
<td>Japan</td>
<td>23,400</td>
<td>22,100</td>
</tr>
<tr>
<td>Germany</td>
<td>11,300</td>
<td>11,300</td>
</tr>
<tr>
<td>Singapore</td>
<td>27,800</td>
<td>11,300</td>
</tr>
<tr>
<td>South Korea</td>
<td>11,300</td>
<td>11,300</td>
</tr>
<tr>
<td>Mexico</td>
<td>8,900</td>
<td>8,900</td>
</tr>
<tr>
<td>China</td>
<td>3,000</td>
<td>1,800</td>
</tr>
<tr>
<td>India</td>
<td>1,800</td>
<td>1,800</td>
</tr>
</tbody>
</table>


well as the critiques of that strategy that became increasingly common after about 1990, and the emergence in the late 1990s of a new conventional wisdom that stressed the virtues of free trade.

While the main concern of economic policy in developing countries has been the low overall level of income, it is also the case that many developing countries are characterized by large differences in income between regions and sections. This problem of economic dualism gives rise to some special policy issues and is the subject of the second part of this chapter.

Finally, while economists have debated these reasons for persistent large income gaps between regions, new to the mid-1990s widening group of East Asian countries has awakened the world to a series of spectacular rates of economic growth. The third part of this chapter is devoted to the interpretation of this “East Asian miracle,” and its (soon disputed) implications for international trade policy.

Import-Substituting Industrialization

From World War II until the 1970s, many developing countries attempted to accelerate their development by limiting imports of manufactured goods to foster a manufacturing industry serving the domestic market. This strategy became popular for a number of reasons, but theoretical economic arguments for import substitution played an important role in its rise. Probably the most important of these arguments was the infant industry argument, which we mentioned in Chapter 6.

The Infant Industry Argument

According to the infant industry argument, developing countries have a potential comparative advantage in manufacturing, but new manufacturing industries in developing countries cannot initially compete with well-established manufacturing in developed countries. To allow manufacturing to get a toehold, governments should temporarily support new industries, until they have grown strong enough to meet international competition. Thus it makes sense, according to the argument, to use tariffs or import quotas as temporary measures to get industrialization started. It is a historical fact that the world’s largest market economies all began their industrialization behind trade barriers: The United States and Germany had high tariff rates or manufacturing in the nineteenth century, while Japan had extensive import controls until the 1990s.

Problems with the Infant Industry Argument

The infant industry argument seems highly plausible, and in fact it has been pursued in many governments. Yet economists have pointed out many pitfalls in the argument, suggesting that it must be used cautiously.

First, it is not always good to try to move today into the industries that will have a comparative advantage in the future. Suppose that a country that is currently labor abundant is in the process of accumulating capital. When it accumulates enough capital, it will have a competitive advantage in capital-intensive industries. That does not mean it should try to develop those industries immediately. In the 1960s, for example, South Korea became an exporter of automobiles; it would probably not have been a good idea for South Korea to have tried to develop its own industry in the 1960s, when capital and skilled labor were still very scarce.

Second, promoting manufacturing does not go far unless the protection itself helps make industry competitive. Pakistan and India have protected their manufacturing sectors for decades and have recently begun to develop significant exports of manufactured goods. The goods they export, however, are light manufactures like textiles, not the heavy manufactures that they protected. A good case can be made that they would have developed their manufactured exports even if they had never protected manufacturing. Some economists have warned of the case of the “preindustrial industry,” where industry is initially protected, then becomes competitive for reasons that have nothing to do with the protection. In this case, infant industry protection ends up looking like a success but may actually have been a net cost to the economy.

More generally, the fact that it is easy to misunderstand and overestimate the benefit of building up an industry is not an argument for government intervention unless there is some domestic market failure. If an industry is supported to the point where it has enough excess capacity, labor, and other factors of production to be worth developing, then why don’t private investors develop the industry without government help? Sometimes it is argued that private investors take into account only the current returns in an industry and fail to take account of the future prospects, but this is not consistent with market behavior. In advanced countries at least, investors often base projects whose returns are uncertain and ill-defined on future. (Consider, for example, the U.S. bioethanol industry, which received hundreds of millions of dollars of capital years before it even made its simple commercial sale.)

Market Failure Justifications for Infant Industry Protection

To justify the infant industry argument, it is necessary to go beyond the plausible but questionable view that industries always need to be sheltered when they are new. Whether infant industry protection is justified depends on an analysis of the kind we discussed in Chapter 9. That is, the argument for protecting an industry in its early growth must be related to a particular sector of market failures that prevents private markets from developing the industry as quickly as they should. Speculative ventures of the infant industry argument have identified two market failures as reasons why infant industry protection may be a good idea important capital markets and the problem of appropriability.
The neoclassical capital scarcity paradigm for infant industry protection is as follows. If a developing country does not have a set of financial institutions (such as efficient stock markets and banks) that would allow savings from traditional sectors (such as agriculture) to be used to finance investment in new sectors (such as manufacturing), then growth of new industries will be monitored by the ability of firms in these industries to earn above-normal profits. Thus low initial costs or increasing returns even if the long-run returns on this investment are high. The free-trade policy is to create a better "voluntary" market, but protection of non-innovative sectors and thus even slower growth can be justified as a second-best policy option.

The empiricism approach argues for infant industry protection that takes many forms, but all have in common the idea that because for which they are not compensated. For example, firms that first enter an industry may have to incur "start-up" costs and face an initial overhang of or opening new markets. If other firms are able to follow their lead without incurring these start-up costs, the pioneers will be protected from seeing their returns from these overhangs. Thus, promoting free trade is a way to generate positive externalities, create intangible benefits (such as knowledge or new markets) in which they are unable to establish property rights. In some cases the social benefits from creation of a new industry will exceed its costs, yet because of the problem of appropriability, no private entrepreneur will be willing to create. The free-trade argument in its competitive form for their attractive combinations. When this is not possible, however, there is a second-best case for encouraging entry into a new industry by using tariffs or other trade policies.

Both the neoclassical capital markets argument and the appropriability case for infant industry protection are clearest specifications of the market failures justifying for neoclassical economists. The arguments apply specifically to infant industries and not to any industry. The general problems with the market failure approach remain, however. In practice it is difficult to estimate which industries truly warrant special treatment, and there is room for policy makers to promote development which end up being captured by special interests. Thus, there are many stories of infant industries that have never grown up and remain dependent on protection.

Promoting Manufacturing Through Protection

Although there are faults about the infant industry argument, many developing countries have used this rationale as a compelling reason to provide special support for the development of manufacturing industries. In principle such support could be provided in a variety of ways. For example, the United States has a program to promote investment in new industries, or it could focus its efforts on subsides for the support of some manufacturing goods in which they believe they can develop a competitive advantage. In most developing countries, however, the first strategy for industrialization has been to direct public investment toward the domestic market by using inside resources such as tariffs and quotas to encourage the development of domestic industries. The strategy of encouraging domestic industry by limiting imports of manufactured goods (in contrast to the strategy of import-substituting industrialization).

One might ask why a choice needs to be made. Why not encourage both import substitution and exports? The answer goes back to the general equilibrium analysis of in Chapter 5: A tariff that reduces imports also necessarily raises exports. By protecting import-substituting industries, countries draw resources away from current or potential export sectors. For a country's choice to solicit a substitute for imports is also a choice to discourage export growth. The reason why import substitution rather than export growth has usually been chosen as an industrialization strategy is a mixture of economics and politics. First, until the 1950s many developing countries were skeptical about the possibility of exporting manufactured goods (although this skepticism also fed into policies of infant industry argument for manufacturing protection). They believed that industrialization was necessarily based on a substitution of domestic industries for imports rather than on a growth of manufactured export. Second, in many cases import-substituting industrialization policies dovetailed naturally with existing political biases. We have already noted the case of Latin American nations that were complicit in developing subsidies for imports during the 1930s because of the Great Depression and during the first half of the 1960s because of the apparently disruptive of trade (Chapter 6). In these countries import substitution directly benefited powerful, established interest groups, while export promotion had no natural constituency.

It is also worth pointing out that some advocates of a policy of import substitution believed that the world economy was rigged against new nations, that the advantages of established industrial nations were simply too great to be overcome by newly industrializing economies. Economic proponents of this view called for a general policy of defining developing countries from advanced nations; but even among rival advocates of protectionist development strategies the view that the international economic system systematically works against the interests of developing countries remained common until the 1960s. The 1950s and 1960s saw the high tide of import-substituting industrialization. Developing countries typically began by promoting final stages of industry, such as final processing and automobile assembly. In the larger developing countries, domestic content standards completely replaced imported consumer goods (albeit the manufacturing was often carried out by foreign multinational firms). Over the possibilities for replacing consumer goods imported had been exhausted, these countries turned to protection of intermediate goods, such as automobile bodies, steel, and pharmaceuticals.

In more developed economies, the import substitution drive stopped short of its logical limit: Sophisticated manufactured goods such as computers, precision machine tools, and so on continued to be imported. Nonetheless, the larger countries pursuing import-substituting industrialization reduced their imports to remarkably low levels. Usually, the smaller a country's economic size (as measured, for example, by the ratio of total output to the larger will be the share of imports and exports in national income. Yet as Table 10.2 shows, tariffs, with a domestic market in less than 5 percent of the United States, expanded at an almost linearly reciprocal of its output than the United States did in 1999 Brazil is the most expensive case. In 1996, exports were only 5 percent of output, a sharp drop from those of the United States and for less than this of large industrial countries such as Germany.

As a strategy for encouraging growth of manufacturing, import-substituting industrialization has clearly worked. Latin America’s economic expansion was almost a linear share of its output from manufacturing as advanced nations. (Intra-generations less, but only because in poorer populations continue to spend a high proportion of its income on food.) For these countries, however, the encouragement of manufacturing was not a goal in itself, but a means to the end goal of economic development. We import-substituting industrialization promoted economic development? Has more studies been applied.
Although many economies approved of import-substitution measures in the 1950s and early 1960s, since the 1960s import-substitution industrialization has come under increasing attack. Indeed, much of the focus of economic analysis and of policymakers has shifted from trying to encourage import substitutions to trying to correct the damage done by bad import substitution policies.

**CASE STUDY**

The End of Import Substitution in Chile

Chile was one of the first countries to abandon the strategy of import-substituting industrialization. Until the early 1970s, Chile, a relatively affluent developing country with a strong agrarian tradition, had followed policies similar to those of other Latin American nations. A transformation began in the late 1960s, when the government moved to diversify exports and reduce dependence on foreign trade. This transformation was driven by the need to increase diversification and reduce vulnerability to external shocks. The new government sought to diversify its economy by encouraging the development of domestic industries and reducing reliance on imported goods.

By the mid-1970s, however, Chilean economic performance was beginning to look quite impressive. New exports, including coffee, copper, and other minerals, were contributing to faster economic growth and reduced dependence on foreign trade. This transformation was facilitated by the end of the 1970s, when the government began to liberalize its trade policies and reduce barriers to imports.

The impact of this change was significant. Chile’s economy began growing faster, and the country moved to a more open and diversified economic strategy. This transformation was facilitated by the end of the Cold War and the easing of economic sanctions against Chile.

Results of Favoring Manufacturing: Problems of Import-Substituting Industrialization

The shift away from import-substituting industrialization has had several important outcomes. First, the country’s economy has become more diversified, reducing its dependence on a few key exports. Second, the economy has become more open to international trade, allowing for greater efficiency and competitiveness.

However, the shift away from import substitution has also had some negative consequences. For example, the country’s economy has become more vulnerable to external shocks, and the country has experienced some economic fluctuations. Additionally, the shift away from import substitution has led to some social dislocation, as workers and industries have been affected by the changes in policy.

In conclusion, the shift away from import substitution has had both positive and negative consequences. While it has contributed to faster economic growth and greater openness, it has also led to some social and economic challenges. The country needs to continue to monitor and adjust its economic policies to ensure that it can continue to benefit from its new strategy.
PART 2  International Trade Policy

Table 10-3

<table>
<thead>
<tr>
<th>Country</th>
<th>1989</th>
<th>1965</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>259</td>
<td>2654</td>
</tr>
<tr>
<td>Philippines</td>
<td>40</td>
<td>24</td>
</tr>
<tr>
<td>Brazil</td>
<td>112</td>
<td>182</td>
</tr>
<tr>
<td>Chile</td>
<td>112</td>
<td>271</td>
</tr>
</tbody>
</table>


methods to promote their infant industries. That is, they have used subsidies and often overlapping import quotas, exchange controls, and domestic content rules instead of simple tariffs. It is often difficult to determine how much protection an administration is actually providing, and studies show that the degree of protection is often both higher and more variable across industries than the government intended. As Table 10-3 shows, some countries in Latin America and South Asia have been protected by regulations that set the equivalent of tariff rates of 200 percent or more. These high rates of effective protection have allowed industries to raise even when their cost of production is lower than the price of the imports they replace. Even the most enthusiastic advocates of market failure arguments for protection find rates of effective protection that high difficult to defend.

A further cost that has received considerable attention is the tendency of import restrictions to promote production at an inefficiently small scale. The domestic markets of even the largest developing countries are only a small fraction of the size of that of the United States or the European Union. Often, the whole domestic market is not large enough to allow an efficient scale production facility. Yet when this small market is protected, say by an import quota, if only a single firm were to enter the market it could earn monopoly profits. The competition for these profits typically leads several firms to enter a market that does not really even have room enough for one, and production is carried out at highly inefficient scale. The same for small countries the problem of scale is at its worst in Chapter 6, to operation in the production and export of a limited range of products and to import other goods. Import-substituting industrialization monitors this option by focusing industrial production on the domestic market.

Those who criticize import-substituting industrialization also argue that it has impoverished other products, such as income inequality and unemployment (discussed later in this chapter under Problems of the Dual Economy).

By the late 1950s, the critique of import-substituting industrialization had been widely accepted, not only by economists but by international organizations like the World Bank and even by policymakers in the developing countries themselves. Statistical evidence appeared to suggest that developing countries that followed relatively free trade policies had an average growth more rapidly than those that followed protectionist policies (although this statistical evidence has been challenged by some economists). This intellectual sea change led to a considerable shift in actual policies. In many developing countries removed import quotas and lowered tariff rates.

Problems of the Dual Economy

While the trade policy of less-developed countries is partly a response to their relative backwardness as compared with advanced nations, it is also a reaction to severe development within the countries. Often a relatively monolithic, capital-intensive, high-wage industrial sector is in the same country as a very poor traditional agricultural sector. The division of a single economy into two sectors first appears to be at very different levels of development in reference to an economic dualism, and in economy that looks like this is referred to as a dual economy.

Why does dualism have anything to do with trade policy? One answer is that dualism is probably a sign of workers working poorly. In an efficient economy, for example, workers would not earn radically different wages in different sectors. Whenever markets are working badly, there may be a market failure case for deviating from free trade. The presence of economic dualism is often used to justify tariffs that protect the apparently more efficient manufacturing sector.

A second reason for linking dualism to trade policy is that trade policy may itself have a great deal to do with dualism. An import-substituting industrialization has come under attack, some economists have argued that import-substitution policies have actually helped to create the dual economy or at least aggravate some of its symptoms.

The Symptoms of Dualism

There is no precise definition of a dual economy, but in general a dual economy is one in which there is a "modern" sector (typically producing manufactured goods that are protected from import competition) that consists roughly with the rest of the economy in a number of ways.

1. The value of output per worker is much higher in the modern sector than in the rest of the economy. In most developing countries, the goods produced by a worker in the manufacturing sector carry a price several times that of the goods produced by an agricultural worker. Sometimes this difference is as high as 10 to 1.

2. Accompanying the high value of output per worker is a higher wage rate. Industrial workers may earn ten times what agricultural laborers make (although their wages still seem low in comparison with North America, Western Europe, or Japan).

3. Although wages are high in the manufacturing sector, however, exports or capital are not necessarily higher. In fact, it often seems to be the case that capital-intensive heavy investments in the industrial sector.

4. The higher value of output per worker in the modern sector is at least partly due to a higher capital intensity of production. Manufacturing in less-developed countries typically has much higher capital intensity than agriculture (this is true of advanced countries, where agriculture is quite capital intensive). In the developing world, agricultural workers often work with primitive tools, while industrial facilities are not much different from those in advanced nations.

See Steven Edelstein, "Openness, Trade Liberalization, and Growth in Developing Countries," Journal of Economic Literature (September 1991) for a survey of evidence.
Economic Dualism in India

The economy of India presents a classic case of dualism. Although it contains huge cities, India remains overwhelmingly rural, with two-thirds of the labor force still employed in agriculture. However, these agricultural workers produce less than one-tenth of the value of India’s GDP. Much of the reason for this asymmetry is due to the past 50 years of government has consistently favored industry over agriculture, through both government and labor supplies. If industry is favored over agriculture, why aren’t more people employed in industry? The answer is that public policies have also led to a large wage differential between industrial and agricultural workers. There are minimum wage laws on the books for both industry and agriculture, but these laws are often almost entirely unenforced in the countryside, and apply mainly to companies with 100 workers or more. Unions also have considerable power in large enterprises, which often hire workers in such companies. And much Indian industry is owned by the government, which typically pays higher wages than the private sector.

Economic growth in India is limited by the large part of the economy that is manufacturing. The growth of manufacturing has been more slow than rapid, but the policies favoring industry, slow growth means that the original hope of fast economic growth in India was not at all met.

In the 1950s India embarked on economic reforms that produced some deregulation of the industrial sector. The very existence of such strong dualism means, however, that workers in the industrial sector were very much at an advantage to change the system.

Dual Labor Markets and Trade Policy

The symptoms of dualism are present in many countries and are clear signs of an economy that is not working well, especially in its labor markets. The trade policy implications of these symptoms have been a subject of great dispute among students of economic development.

In the 1950s many economists argued that wage differentials between manufacturing and agriculture provided another justification, beyond the labor shortage argument, for encouraging manufacturing at the expense of agriculture. This argument, known as the wage differentials argument, was based on the market failure premise. Suppose that, for some reason, an equivalent worker would receive a higher wage in manufacturing than he would in agriculture. Wherever a manufacturing firm decides to hire an additional worker, then, a greater marginal social benefit for which it receives no reward, because a worker gains a wage increase when he
The mountain of goods produced by the factories of the world is largely the result of the efficient use of labor. An efficient economy would result in maximum output which is achieved if labor is used efficiently. Inefficient use results in a lower output, which is still less than that achieved if the workers are not sufficiently motivated. The improvement in efficiency is significant, but it is only one of the many factors that affect the cost of production. For example, the cost of labor is a major factor, and if labor is overpaid, it can reduce the profit margin. On the other hand, if labor is underpaid, it can lead to a loss of productivity. Therefore, the management of labor is a crucial aspect of any business, and it is important to ensure that the workers are motivated and productive. This can be achieved through effective management practices, such as providing incentives and rewards, and making sure that the working conditions are conducive to productivity. In conclusion, efficient labor is a key factor in the success of any business. It is essential to ensure that the workers are motivated and productive, and that the working conditions are conducive to productivity.
the “East Asian miracle.” In particular, different observers place very different interpretations on the role of government policies, including trade policy, in fostering economic growth. To avoid the messiness of Asian economies decomposes the virtues of relatively free trade and a hands-off government policy; to others it demonstrates the effectiveness of tightly disciplined government intervention; and there are some economists who believe that trade and industrial policy rank third, or even fourth, respectively.

The Facts of Asian Growth

The World Bank’s definition of HPAs contains three groups of countries, whose “traits” began at different times. First is Japan, which began rapid economic growth soon after World War II and has now set its sights on competition with the United States and Western Europe; and we will leave the discussion of Japanese experience to Chapter 11, which treats trade and industrial policy in advanced countries. Then there are the “four tigers” – Hong Kong, Taiwan, South Korea, and Singapore. Finally, in the late 1970s and 1980s, rapid growth began in Malaysia, Thailand, Indonesia, and, more spectacularly, in China.

Each group achieved very high growth rates. Real gross domestic product in the “tiger” countries grew at an average of 8.8 percent from the mid-1960s until the 1997 Asian crisis, compared with 3.3 percent in the United States and Western Europe. Recent growth rates in the other Asian economies have been comparable, and China has improved growth rates of more than 10 percent (although there are some questions about the accuracy of Chinese statistics).

In addition to their very high growth rates, the HPAs have another distinguishing feature: They are open to international trade, and have become more so over time. In fact, the rapidly growing Asian economies, particularly in Latin America and South Asia. Table 10.2 shows exports as a share of gross domestic product for several of the HPAs; the numbers are remarkably high. In the case of both Singapore and Hong Kong, exports account of 100 percent of GDP. How is it possible for a country’s exports to exceed its total output? Gross domestic product represents the value added by an economy’s net of other value-added, particularly in a clothing factory in Hong Kong. As Table 10.5 shows, China’s exports are much lower than that of other developing countries. If China’s recent rapid growth rates are due to import-substituting policies, then its exports as a share of GDP may not provide a good measure of openness.

The undisputed fact, then, is that a group of Asian economies achieved very high rates of economic growth and did so via a process that involved rapid growth of exports and a relatively small amount of value added in the manufacturing sector. But what does this experience say about economic policy?

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Table 10.6: Average Rates of Protection, 1965-1985

<table>
<thead>
<tr>
<th>HPAs</th>
<th>Other Asia</th>
<th>South Asia</th>
<th>Sub-Saharan Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-performance</td>
<td>24</td>
<td>42</td>
<td>45</td>
</tr>
<tr>
<td>Low-performance</td>
<td>24</td>
<td>42</td>
<td>45</td>
</tr>
</tbody>
</table>


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Note: World Bank, The East Asian Miracle: Chapter 4 for source material and instrumental transformation of perception.
Industrial Policy in the MPHAs

Some commentators believe that the success of the MPHAs, far from demonstrating the effectiveness of free trade policies, actually represents a payoff to institutionalized intervention. In a study of "product cycle" theory, trade policy is viewed as an important determinant of the location of value-added activities. The MPHAs, for example, have been successful in attracting foreign investment in export-oriented industries. However, critics argue that this success has come at a cost, with the development of domestic industries being hindered by trade barriers and other forms of protectionism. The argument is that, while the MPHAs may have enjoyed economic success, this success has been achieved at the expense of longer-term economic development and sustainability.

Furthermore, the MPHAs' success in attracting foreign investment has been achieved through the use of various forms of protectionism, including tariffs, quotas, and other non-tariff barriers. This has led to the development of inefficient and uncompetitive domestic industries, which are unable to compete with foreign firms in the global market. As a result, the MPHAs have been criticized for their failure to develop dynamic and innovative domestic industries, and for excessively focusing on the short-term gains of foreign investors.

In conclusion, the success of the MPHAs in attracting foreign investment and promoting economic growth has been achieved through the use of protectionist policies. While this may have led to short-term gains, it has also come at the cost of longer-term economic development and sustainability. The MPHAs' success in attracting foreign investment has been achieved through the use of various forms of protectionism, including tariffs, quotas, and other non-tariff barriers. This has led to the development of inefficient and uncompetitive domestic industries, which are unable to compete with foreign firms in the global market. As a result, the MPHAs have been criticized for their failure to develop dynamic and innovative domestic industries, and for excessively focusing on the short-term gains of foreign investors.
Summary

1. Trade policy in less-developed countries can be analyzed using the same analytical tools used in advanced countries. The particular issues characteristic of developing countries are, however, different. In particular, trade policy in developing countries is concerned with two objectives: promoting industrialization and coping with the adverse development of the domestic economy.

2. Government policy to promote industrialization has often been justified by the infant industry argument, which says that new industries need a temporary period of protection from competition from established industries in other countries. The infant industry argument is valid only if it can be cast as a market failure argument for intervention. Two usual justifications are the existence of important capital outlays and the problem of appropriability of knowledge generated by innovating firms.

3. Using the infant industry argument as justification, many less-developed countries have pursued policies of import-substituting industrialization in which domestic industries are encouraged under the protection of tariffs or import quotas. Although these policies have succeeded in promoting manufacturing, by and large they have not led to economic growth and living standards. Many economists are now highly critical of the results of import substitution, arguing that it has resulted in high-cost, inefficient production.

4. Most developing countries are characterized by economic distress. A high-wage, capital-intensive industrial sector exists alongside a low-wage, low-tech sector. Such a high-wage industrial sector has a serious problem of overemployment.

5. The difference in wages between the modern and traditional sectors has sometimes been used as a case for greater protection of the industrial sector. This is the wage differential case for protection. This view no longer receives much emphasis among economists. However, more recent views suggest that protection will lead to more real-terms migration, which increases the urban unemployment problem and may worsen the symptoms of inflation.

6. The view that economic development must take place via import substitution and the problems about economic development that spread as import-substituting industrialization succeeds to fail have been compounded by the rapid economic growth of a number of Asian economies. These high performance Asian economies (HPEs) have industrialized not via import substitution but via exports of manufactured goods. They are characterized both by very high rates of trade in national income and by extremely high growth rates. The success of the HPEs and their highly dispersed, small observable points are very attractive to those who do not practice free trade, who do have lower costs of protection than other developing countries. Others assign a key role to the institutional and political pressures of the HPEs. Recent research suggests, however, that the experiences of various may be largely in domestic causes, especially high savings rates and rapid improvements in education.

Key Terms

- Import-substituting industrialization
- Infant industry
- Economic distress
- Wage differential

Problems

1. "Japan's experience makes the infant industry case for protection better than any others." In the early 1950s, Japan was a poor nation that survived by exporting textiles and toys. The Japanese government protected what at first were inefficient, high-cost, and uncompetitive industries, and those industries dominated world markets. "Diseases quickly." A country currently imports textiles at $5000 each. Its government believes that domestic problems would make manufacturing of these goods cost $3000. The government decides that this would not cause a balance-of-payments problem and accepts the option. But if the original high-cost, inefficient textile industries fail, the country would have to import textiles at $3000 each. This would increase imports by $2000 per year, which would result in a balance-of-payments problem.

2. Suppose that each firm that tries to produce auto parts must go through the same shutdown period of high costs on its own. Under what circumstances would the existence of the initial high cost justify infant industry protection? In the long run, the company that can impose the costs of training to produce auto parts at $6000 each, other firms can simulate and do the same. Explain how this can prevent development of a domestic industry, and how infant industry protection can help.

Footnotes

8 For a summary of this research and its implications, see P. A. Samuelson, "The High of Asia's Miracle," Foreign Affairs (November 1980).
In the food sector the marginal product of labor is independent of employment, and is $9. The world price of wheat is $10. so is the world price of a unit of food.

4. Suppose there were no taxation in the labor market; find the wage, the allocation of labor between manufactures and food, and the output of each good.

5. Suppose the firm can vary the minimum wages in the manufacturing sector to $10. Find the output of the economy in this case. How large is the cost of this distortion?

6. Finally, suppose that workers' wages are set by the country to the city and the wage of city workers multiplied by the probability of being employed equals the rural wage. Find the level of output not unemployed.

7. Suppose a country has the Harris-Todaro problem. This is, for some reason urban wages are much higher than rural, keeping to inefficiently low manufacturing production, but at the same time there is high urban unemployment because more workers migrate to the cities in search of high-wage jobs. What policy or combination of policies would you advance to solve this problem?

8. *Import quotas on capital-intensive industrial goods and subsidies for the import of capital equipment were meant to create manufacturing jobs in many developing countries. Unfortunately, they have probably helped create the same unemployment problem." Explains this remark.

Further Reading

Jagdish N. Bhagwati, *The Nine International Economic Orders* (Cambridge, MIT Press, 1957; and *The Three-Worlds* (1975), with worldwide research for a "new international economic order" that would redistribute income from rich to poor nations. This volume gives a good overview of the debate.)

### Table 10.1 Trade Policy in Developing Countries

<table>
<thead>
<tr>
<th>Number of markets</th>
<th>Marginal product of last worker</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20</td>
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<td>2</td>
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<td>7</td>
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</tbody>
</table>
CHAPTER II

Controversies in Trade Policy

As we have seen, the theory of international trade policy, like the theory of international trade itself, has a long and complex tradition. Experienced international economists tend to have a cynical attitude toward people who come along with "new" theories in trade—but the "gold standard" tends to be that most new concerns are simply old ideas in a new form.

Every once in a while, however, truly new issues do emerge. This chapter describes two controversies over international trade that arose in the 1980s and 1990s, each raising questions that professional economists had not been seriously concerned about.

First, in the 1980s a new set of sophisticated arguments for government intervention in trade emerged in advanced countries. These arguments focused on the "high-technology" industries that came to prominence as a result of the rapid growth of science. While some of the arguments were closely related to the market-failure analysis in Chapter 9, new theorems of strategic trade policy were based on different ideas, and created a considerable scandal.

Second, in the 1990s, a heated dispute arose over the effects of growing international trade on workers in developing countries—and whether trade agreements should include standards for wage levels and labor conditions. This dispute often widened into a broader debate about the effects of globalization; it was a debate played out not just in academic journals but also in government agencies.

Sophisticated Arguments for Activist Trade Policy

Nothing is the analytical framework developed in Chapters 8 and 9, but the possibility of government intervention in trade. Though the framework does not show that activist government policy needs to have a specific kind of justification, it certainly offers some promising domestic benefits. The problem with many arguments for activist trade policy is that they are not, in fact, the case for government intervention in any particular failure of the marketplace or as a response to factor-mobility rents. The problem with market failures arguments for intervention is how to know a market failure when you see one. Economists studying industrial countries have identified three kinds of market failure that seem to be present and relevant to the trade policies of advanced countries. One is the inability of firms in high-technology industries to capture the benefits of the part of their success to knowledge that spills over to other firms. The other is the presence of monopoly profits in highly concentrated domestic industries.

Technology and Externalities

The discussion of the infant industry argument in Chapter 9 noted that there is a potential market failure arising from difficulties of appropriating knowledge. If, in an industry general knowledge that other firms can also make without paying for it, the industry is in effect producing some extra output—the marginal social benefit of the knowledge—but is not reflected in the incomes of firms. Where such externalities benefit that, in addition to the firms that produce them, can be shown to be important, there is a good case for correcting the industry.

An obvious level of the argument is the case for the infant industries of low-developed countries as it is for the established industries of the advanced countries. In advanced countries, however, the arguments for a 1980s edge because with differences in that respect there are important high-technology sectors in which the possession of knowledge is in many ways the central aspect of the enterprise. In high-technology industries, firms devote a great deal of their resources to protecting their technology, either by explicit spending on research and development or by being willing to start out with new processes and procedures to gain experience. Such activities take place in nearly all industries, of course, so that there is no sharp line between high-tech and the rest of the economy. There are clear differences in degree, however, and it makes sense to talk of a high-technology sector in which the presence of knowledge is the key part of the business.

The point for the infant industry argument is that while firms can appropriate some of the benefits of their new processes or equipment, it is not clear that they can appropriate the knowledge (otherwise they would not be innovating), so they usually cannot appropriate them. Firms' benefits are not other firms that can replicate the ideas and techniques of the work on their own. In economics, for example, it is not uncommon for firms to "reverse engineer" a firm's product designs, taking their products apart to figure out how they work and how they were made. Because patents provide only weak protection for novelties, there is a reasonable presumption that other users themselves cannot legally stop the use, though they may take advantage of the new technology.

The Case for Government Support of High-Technology Industries

Should the U.S. government subsidize high-technology industries? While there is a certain advantage to the argument that we need to encourage some innovation, this question in particular arises first, the ability of government policy to argue the right thing; second, the quantitative importance of the argument.

Although high-technology industries probably produce extra social benefits because of the knowledge they generate, much of what goes on even in a high-technology industry has nothing to do with generating knowledge. There is no reason to subsidize the employment of technical workers in high-technology industries; on the other hand, innovation and technological change happens to some extent in industries that are mostly not at all high-tech. A general principle is that trade and industrial policy should be targeted specifically on the activities in which the market fails. Thus policy aimed to support
the generation of knowledge that firms cannot appropriate. A general subsidy for a set of industries in which the kind of knowledge generation is believed to go on in a pretty theft manner for the purpose.

Perhaps, instead, prices paid should subsidize research and development whenever it occurs. The problem here is a definition. How do we know when a firm is engaged in creating knowledge that has value beyond itself? Who is engaged in any whole paper clip system and computer chips are really supporting the development of knowledge or were placed as the research department's budget to infer the subsidy? A strict definition, on the other hand, would be much more common too. I'm discussing forms of research where the diffusion of knowledge can be somewhat documented over the smaller, organized institutions that are widely believed to be the key to the larger original thinking.

The United States does a relatively substantial amount of research and development (R&D), at least as compared with other kinds of investment. Research and development can be claimed by

firms as a current expense and thus as an immediate deduction against the corporate profit. By comparison, investment in plant and equipment cannot be claimed as an immediate expense and can be written off only through gradual depreciation. This effective favorable treatment for knowledge in an analysis of tax history rather than an explicit policy, but we should not be before concluding that the United States spends too little on R&D or that the high-technology sector needs further encouragement. To reach such a conclusion we would need to know how much subsidy is justified.

How important Are Extraterritorialities? The question of the appropriate level of subsidy for high-technology industries is one of the more difficult problems. How important, quantitatively, is the technological spillover for arguments targeting high-technology industries? The optimal subsidy at 130, 20, or 50 percent? The long-run answer is that one has a good idea. It is in the nature of extraterritorialities, benefits that do not carry a matrix price, that they are hard to measure.

Further, even if the magnitude generated by high-technology industries could be shown to be large, there may be only a limited incentive for any one country to support these industries. The reason is that the generation and diffusion of knowledge occurs in one country may in fact accrue to firms in other countries. Thus, if a Belgian firm develops a new technique for making steel, most of the firms that can utilize this technique will be other European countries, the United States, and Japan rather than Belgium. A world government might find it worthwhile to subsidize this innovation; the Belgian government might not. Such problems of appropriability as the level of the variable (as opposed to the firm) are not severe, but still important even for a nation as large as the United States.

Despite the criticisms, the technological spillover argument is probably the best case one can make intellectually for an active industrial policy. In contrast to many so-called criteria for choosing "desirable" industries, which can be strongly rejected, the case for or against targeting "knowledge-intensive" industries is a judgment call.

Imprecise Competition and Strategic Trade Policy

During the 1980s a new argument for industrial targeting received substantial theoretical attention. Originally proposed by the economist Barbara Spence and James Brander of the University of British Columbia, this argument locates the market failure that justifies government intervention in the lack of perfect competition. In some industries, they point out, there are only a few firms in effective competition. Because of the small number of firms, the assumptions of perfect competition simply apply. In particular, there will typically be excess capacity, that is, firms will produce above their relatively equally efficient equilibrium in the economy once even. There will be an international competition over who gets these profits.

Spencer and Brander noted that, in this case, it is possible in principle for a government to alter the rules of the game to shift these excess profits from foreign to domestic firms. In the simplest case, a subsidy in domestic firms, by entering investment and production by foreign competitors, can raise the profits of domestic firms by more than the amount of the subsidy. Setting aside the effects on consumers—the example, where the firms are selling only on foreign markets—this capture of profits from foreign competitors would mean the subsidy raises national income at other countries' expenses.

The Brander-Spencer analysis: An Example. The Brander-Spencer analysis can be illustrated with a simple example in which there are only two firms competing; one from a different country. Bearing in mind that any comparison to actual events may be misleading, let's call the firms Boeing and Airbus, and the countries the United States and Europe. Suppose there is a new production, 150-seat aircraft, that both firms are capable of making. For simplicity, assume each firm can make only one Or five destinations: either to produce 150-seat aircraft or not.

Table 11-1 shows how the profits earned by the two firms might depend on their decisions. (The setup is similar to the one we used to explain the interaction of different countries' trade policies in Chapter 9) Each row corresponds to a particular decision by Boeing, each column to a decision by Airbus. In each of the two entries, the entry on the lower left represents the profits of Boeing, while the one on the upper right represents the profits of Airbus.

As set up, the table reflects the following assumptions: Each firm could earn profits making 150-seat aircraft, but if both firms try to produce them, both will make losses. Which firm will actually get the profits? This depends on who gets there first. Suppose Boeing is able to get a small lead start and convinces itself to produce 150-seat aircraft before Airbus can get going. Another will find that it has an incentive to enter. The outcome will be in the upper right of the table, with Boeing earning profits.

Now consider the Brander-Spence point: The European government can raise this statistic. Suppose the European government commits itself to pay its firms a subsidy of $25 if it ever enters. The result will be a change in the table of payoffs to that represented in Table 11-2. It is now profitable for Airbus to produce 150-seat aircraft whenever Boeing does.
Let's work through the implications of this shift. Boeing now knows that whatever it does, it will have to compete with Airbus and will therefore have less ability to choose its policies. So now a is Boeing that will be driven from equlibria. In effect, the government subsidy has removed the advantage of a firm that we assumed was Boeing's and has confirmed it on Airbus instead.

The real result is that the equilibrium shifts from the upper right of Table 11-1 to the lower left of Table 11-2. A firm ends up with profits of 15% instead of 0, profits that are 10% less because of a government subsidy of only $25 per good. That is, the subsidy means profits by more than the amount of the subsidy itself, because of its deterrent effect on foreign competition. The subsidy has this effect because it removes an advantage for Airbus compared with the strategic advantage it would have had if, not Boeing, had had a head start in the industry.

Problems with the Branden-Spencer Analysis. This hypothetical example might seem to indicate that the strategic trade policy argument provides a compelling case for government assistance to industries. But the analysis is a bit more subtle. Airbus are three times more expensive than Boeing engines are at the expense of its foreign rivals. Leaving aside the interest of consumers, this seems clearly to raise European welfare (and reduce U.S. welfare). Shouldn't the U.S. government get involved in such a case?

In fact, the strategic justification for trade policy, while it has attracted much interest, has generated much criticism. Critics argue that to make rational use of the theory would require more information than is likely to be available, that such policies would risk foreign retaliation, and that in any case the domestic politics of trade and industrial policy would prevent use of such subtle analytical tools.

The problem of insufficient information has two aspects. The first is that even when looking as an industry in isolation, it may be difficult to fill in the details in a table like Table 11-1 with any confidence. Even if the government gets it wrong, a subsidy policy may turn out to be a costly error. To see this, instead of Table 11-1 the reality is represented by the seemingly similar payoffs in Table 11-3. The numbers are not much different, but the difference is crucial. In Table 11-3, Boeing is assumed to have some underlying advantage—a better technology—so that even if Airbus enters, Boeing will still find it profitable to produce. Airbus, however, cannot produce profitably if Boeing enters.

In the absence of a subsidy, the outcome in Table 11-3 will be in the upper right corner. Boeing produces and Airbus does not. Now suppose that, as in the previous case, the European government provides a subsidy of $25, which is sufficient to induce Airbus to produce. The new table of payoffs is illustrated in Table 11-4. The result is that both firms produce. The outcome is in the upper left. In this case Airbus, which receives a subsidy of 25, earns profits of only 5. That is, we have competitive outcomes of Table 11-3, which is, of course, consistent with the theory of strategic trade policy.

In fact, the two cases look very similar yet in one case a subsidy looks like a good idea, while in the other it looks like a terrible idea. It seems the usefulness of strategic trade policies depends on an exact matching of the situation. This lends some hesitation to ask whether we are ever likely to have enough information to use the theory effectively.

The information requirement is complicated by the fact that we cannot consider industries in isolation. If one industry is subsidized, it will draw resources from other industries and limit resources in their costs. Thus, even a policy that succeeds in giving U.S. firms a strategic advantage in one industry will need to cause strategic disadvantage elsewhere. To ask whether the policy is justified, the U.S. government needs to weigh these offsetting effects. Even if the government has a precise understanding of our industry, this is not enough; it needs an equally precise understanding of those industries with which that industry competes for resources.

If a proposed strategic trade policy can overcome these criticisms, it still faces the problem of foreign retaliation, essentially the same problem faced when considering the use of a tariff to improve the terms of trade (Chapter 9). Strategic policies are beggar-thy-neighbor policies that increase our welfare at other countries' expense. These policies therefore risk a trade war that leaves everyone worse off. Few economists would advocate such policies. Instead, the most that is usually
argue for it is that the United States itself be prepared to remediate when other countries appear to be using strategic policies aggressively.

Finally, can theories like this ever be used in a political context? We discussed this issue in Chapter 11, where the only way for skeptics to engage in the context of a political skepticism's case for free trade.

CASE STUDY

When the Chips Were Up

During the years when arguments about the effectiveness of strategic trade policy were at their height, advocates of a more interventionist trade policy on the part of the United States often claimed that Japan had prospered by deliberately promoting key industries. By the early 1980s, one example in particular—that of semiconductor chips—had become Exhibit A in the case that promoting key industries "works." Indeed, when author James Fallows published a series of articles in 1984 tracking trade policy strategy and altering the superiority of Japanese-style interventionism, he began with a piece titled "The Parish of the Chips." By the end of the 1980s, however, the dominance of semiconductors had come to seem an object lesson in the pitfalls of activist trade policy.

A semiconductor chip is a small piece of silicon on which complex circuits have been etched. The industry began in the mid-1950s, when U.S. firms introduced the first microprocessor, the brains of a computer on a chip. Since then the industry has experienced rapid yet predictably predictable technological change; roughly every 18 months the number of circuits that can be packed on a chip doubles, a result known as Moore's Law. This progress underlies much of the information technology revolution of the last three decades.

Japan became the semiconductor market in the late 1970s. The industry was definitely targeted by the Japanese government, which supported a research effort that helped build domestic technological capacity. The sums involved in this industry, however, were fairly small. The main component of Japan's activist trade policy, according to U.S. critics, was tacit protectionism. Although Japan had few formal tariffs or other barriers to imports, U.S. firms found that once Japan was able to manufacture a given type of semiconductor chip, few U.S. products were sold there. Critics alleged that there was a tacit understanding by Japanese firms in such industries as consumer electronics, in which Japan was already a leading producer, that they should buy domestic semiconductors, even if the price was higher or the quality lower than for competing U.S. products. Was this an accurate view? The facts of the case are in dispute to this day.

Observers also alleged that the protected Japanese market—of if that was what it was—indirectly promoted Japan's ability to export semiconductors. The argument went like this: Semiconductor production is characterized by a steep learning curve (recall the discussion of dynamic scale economies in Chapter 6). Guaranteed a large domestic market, Japanese semiconductor producers were certain that they would be able to work their way down the learning curve, which meant that they were willing to invest in new plants that could also produce for export. It remains unclear to what extent these policies led to Japan's success in taking a large share of the semiconductor market. Since features of the Japanese industrial system may have given

the country a "natural" comparative advantage in semiconductor production, where quality control is a crucial concern. During the 1970s and 1980 Japanese firms developed a new approach to manufacturing based on, among other things, setting acceptable levels of defects much lower than those that had been standard in the United States.

In any case, by the mid-1980s Japan had surpassed the United States in one of its type of semiconductor, which was widely regarded as crucial to industry success: random access memories, or RAMs. The argument that RAM production was the key to dominating the whole semiconductor industry hinged on the belief that it would yield both among technological externalities and excess returns. RAMs were the largest-volume form of semiconductors; industry experts asserted that the know-how acquired in RAM production was essential to a nation's ability to keep up with advancing technology in other semiconductors, such as microprocessors. So it was widely predicted that Japan's dominance in RAMs would soon transition into dominance in the production of semiconductors generally—and that this transition, in turn, would give Japan an advantage in the production of many other goods that used semiconductors.

It was also widely believed that although the manufacture of RAMs had not been a highly profitable business before 1980, it would eventually become an industry characterized by excess returns. The reason was that the number of firms producing RAMs had usually fallen; in each successive generation of chips, some producers had exited the market, with no new entrants. Eventually, many observers thought, there would be only two or three highly profitable producers left.

During the decade of the 1990s, however, both justification for targeting RAMs—technological externalities and excess returns—apparently failed to materialize. On one side, Japan's lead in RAMs ultimately did not translate into an advantage in other types of semiconductors; for example, American firms untied a secrecy code on microprocessors. On the other side, instead of continuing to shrink, the number of RAM producers began to rise again, with the same new newcomers from South Korea and another newly industrializing economy. By the end of the 1990s, RAM production was regarded as a "commodity" business many people could make RAMs, and there was nothing especially strategic about the sector.

The important lesson seemed to be that it is in such industries to promote the semiconductor industry appeared, in its face, to have all the attributes of a sector suitable for activist trade policy. But it is not yield neither strong revenues nor excess returns.

Globalization and Low-Wage Labor

It's a good bet that most of the clothing you are wearing as you read this came from a developing country for pennies than the United States. The rise of manufactured exports from developing countries is one of the major shifts in the world economy over the last generation; even a desperately poor nation like Bangladesh, with a per capita GDP less than 5 percent that of the United States, now relies more on exports of manufactured goods than on exports of traditional agricultural or mineral products. (A government official in a developing country remarked to one of the authors, "We are not a banana republic—we are a pineapple republic.")
It should come as no surprise that the workers who produce manufactured goods for export in developing countries are paid very little by advanced-country standards—often less than $1 per day, sometimes less than $0.50. After all, the workers have few good alternatives in most generally poor economies. We should be aware of just how similar the conditions of work are also very bad in many countries.

Simple wages and poor working conditions can be a cause for concern. Many people think so. In the 1990s the anti-globalization movement attracted many adherents in advanced countries, especially on college campuses. Concerns over wages and working conditions in developing country export industries was a large part of that movement's appeal, although other concerns (discussed below) were also part of the story.

It's fair to say that most economists have viewed the anti-globalization movement at best misguided. The skewed analysis of comparative advantages suggests that trade is mutually beneficial to the countries that engage in it. It suggests, furthermore, that most advanced countries export intermediate manufactured goods like clothing, not only should their national income rise but the distribution of income should shift in favor of labor. But is the anti-globalization movement entirely off base? The Anti-Globalization Movement

Before 1995, anti-globalists claimed that international trade by citizens of advanced countries targeted its effects on people who were also citizens of advanced countries. In the United States most critics of free trade in the 1980s focused on the alleged threat of competition from Japan. In the early 1990s there was substantial concern in both the United States and Europe over the effects of imports from low-wage countries on the wages of low-skilled workers at home.

In the second half of the 1990s, however, a rapidly growing movement—drawing considerable support from college students—began addressing the alleged harm that free trade was doing to workers in the developing countries. Activists pointed to the low wages and working conditions in Third World factories producing for Western markets. A catalyzing event was the Savicola in 1996 that claimed sold at Wal-Mart, and endorsed by television personality Barrie Lee Griffin, were produced by very poorly paid workers in Honduras.

The anti-globalization movement grabbed world headlines in November 1999, when a major meeting of the World Trade Organization took place in Seattle. The purpose of the meeting was to start another trade round, following on the Uruguay Round described in Chapter 9. Thousands of activists converged on Seattle, motivated by the belief that the WTO was negotiating loopholes in national independence and imposing free-trade rules that hurt workers. Despite some warnings, the police were ill-prepared, and the demonstrations brought considerable disruption to the meetings. In any case, negotiations were not going well; neither nation had failed to agree on an agenda, in advance, and it soon became clear that there was not sufficient agreement on the direction of a new round to get it underway.

In the end the meeting was regarded as a failure. Most experts on trade policy believe that the meeting would have failed even in the absence of the demonstrations, but the anti-globalization movement achieved at least the appearance of disrupting an important international conference.

Over the last two years, large demonstrations also rocked meetings of the International Monetary Fund and World Bank in Washington, as well as a summit meeting of major economic powers in G8, as the latter event Italian police killed one activist.

### Table 11.5 Real Wages

<table>
<thead>
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<th>High-tech goods/hour</th>
<th>Low-tech goods/hour</th>
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<tr>
<td><strong>(A) Before trade</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Mexico</td>
<td>1/2</td>
<td>1/2</td>
</tr>
<tr>
<td><strong>(B) After trade</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Mexico</td>
<td>1/4</td>
<td>1/2</td>
</tr>
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</table>
Now suppose that trade is opened. In the equilibrium after trade, the relative wage rates of U.S. and Mexican workers would be such that the relative productivity of workers in the two nations—for example, U.S. wages might be 4 times Mexican wages. Then it would be cheaper to produce low-tech goods in Mexico and high-tech goods in the United States.

A virtue of globalisation might lie in this trading equilibrium and conclude that trade works against the interests of workers. First of all, low-tech labor is highly paid in the United States are employed in lower-paid jobs in Mexico. Moreover, you might conclude that the Mexican workers are exploited, although they are half as productive as in the United States. Thus, the workers in the United States, they might conclude, are half as productive as in the United States.

But as shown in the lower half of Table 1.6, in this equation the purchasing power of wages has actually increased in both countries. U.S. workers, all of whom are now employed in high-wage jobs, are earning more low-tech goods than before, two years ago, so hours of work versus one. Mexican workers, all of whom are now employed in low-tech, find that they can purchase more high-tech goods with an hour's labor than before. It is easier, of course. Overall, the price of each country's import good in terms of that country's wage rate has fallen.

The key point of this example is not to reproduce the real situation in any exact way; it is to show that the evidence strongly indicate that globalization hurts workers in developing countries is exactly what you would expect. This is not even if the world were very well described by a model that says that trade actually hurts workers in both advanced and developing countries.

One might argue that even if the model is misleading because it assumes that labor is the only factor of production. It is true that if one takes the Ricardo model to the factor proportions would. However, as discussed in Chapter 4, it becomes possible that trade hurts workers in the labor-surplus, high-wage country—that is, the United States in this example. But this does not mean that the claim that trade hurts workers is developing countries. On the contrary, the case for believing that trade is beneficial to workers in the low-wage country actually becomes stronger: Standard economic analysis says that while workers in a capital-abundant nation like the United States might be hurt by trade with a labor-abundant country like Mexico, the workers in the labor-abundant country should benefit from the spillover in the distribution of income in their favor.

In the specific case of the maquiladoras, economists argue that white wages in the maquiladoras are very low compared with wages in the United States, that is because of the lack of other opportunities in Mexico, which has few other options. And it appears that white wages and working conditions in the maquiladoras may improve slowly, as they represent improvement over the alternative available in Mexico. Instead, the rapid rise of unemployment in those factories indicated that workers preferred the jobs they could find to the alternatives. Many of the new workers in the maquiladoras are in fact pushing from more and desperate poor areas of Mexico. One could say that they have moved from extreme but invisible poverty to less severe but comparable misery, simultaneously achieving an improvement in their lives and becoming a source of guilt for U.S. residents unaware of their former plight.

The standard compensation to workers employed in developing countries, those workers are better off than they would have if globalization had not taken place. Some activists do not accept this argument—they maintain that increased wage makes workers in both advanced and developing countries worse off. It is hard, however, to find a clear statement of the research through which this is supposed to happen. Perhaps the most popular argument is that capital is a mobile internationally, while labor is not, and that this mobility gives capital a bargaining advantage. We saw in Chapter 7, however, international factor mobility is similar in its effects to international trade.

Labor Standards and Trade Negotiations
Free-trade proponents and anti-globalization activists may debate the benefits such as, is globalization good for workers or not? First some policy issues are made, followed by whether and to what extent international trade agreements should also contain provisions aimed at improving wages and working conditions in poor countries. The most recent proposals have come from economists who argue for a system that maximizes wages and working conditions and makes the results of monitoring available to everyone. Their argument is similar to the market failure analysis in Chapter 7. Suppose, they suggest, that countries in advanced countries feel better about buying mass-produced goods that they know were produced of low-paid workers. This system allows these consumers to know, without expecting large efforts or information gathering, whether the workers were indeed paid a fair wage in an office for winter break. (Kendyke, Arne, cited in the Part 1, Reading list at the end of the chapter, p. 20, 21) retroging: "Look, I don't have time to be some kind of major activist every time I go out to shop. And I don't let gifts into boxes of shoes or to say, 'What?" Because consumers can choose to buy only "certified" goods, they are better off because they feel better about their purchases. Meanwhile, agents in the certified factories gain a better standard of living than they would have had before.

Propositions of such a system admit that it would not have a large impact on the standard of living in developing countries. The main reason is that it would affect only the wages of workers in export factories, who are a small minority of the workforce even in highly export-oriented economies. But they argue that it would do some good and little harm. A stronger step would be including formal labor standards—that is, conditions that export industries are supposed to meet—as part of trade agreements. Such standards have considerable political support in advanced countries, indeed, Plsak-Bill Clinton spoke in favor of such standards in the Durban meeting described above.

The economic argument in favor of labor standards in trade agreements is similar to markets in a situation of a minimum wage law as part of trade agreements. Such standards have considerable political support in advanced countries, indeed, President William Clinton spoke in favor of such standards in the Durban meeting described above. The economic argument in favor of labor standards in trade agreements is similar to the argument in favor of a minimum wage law as part of trade agreements. Such standards have considerable political support in advanced countries, indeed, President William Clinton spoke in favor of such standards in the Durban meeting described above.

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Environmental and Cultural Issues

Conspicuous against globalization go beyond labor issues. Many critics argue that globalization is bad for the environment. It is usually countered that environmental standards are much lower in developing countries, so there is little loss for the environment. It is also argued that in many cases, substantial environmental damages have been and are being done in order to provide goods to advanced-country markets. A visible example is the heavy listing of Southeast Asian forests in search of finished products for sale to Japanese and Western markets.

On the other hand, there is at least as many cases of environmental damage that has occurred in the name of "toward-thinking" policies by countries interested in integrating with the global economy. A notable example is the destruction of many square miles of rain forest in Brazil, the consequence partly of a domestic policy that subsidizes development in the interior. This policy has nothing to do with exports, and in fact began during the years when Brazil was struggling to pursue inward-looking development.

As in the case of labor standards, there is debate over whether trade agreements should include environmental standards. On one side, proponents argue that such agreements will lead to more robust environmental standards in developing countries will in effect drive potential export industries to poor economies, which cannot afford to maintain anything like Western standards. (The case of the Indians shipbuilding industry, described in the Case Study on p. 289, illustrates both sides of the debate.)

An even broader impact involves the global local and national cultures. It is undeniable that the growing cosmopolitanism of cultures around the world. People around the world increasingly tend to wear the same clothing, eat the same food, listen to the same music, and watch the same films and TV shows.

This is a hard-to-describe something that is part of this cultural homogenization. One could therefore make a market failure argument on behalf of policies that tend to preserve cultural differences, for example by limiting the number of American films that can be shown in theaters, for example. Or the diffusion of TV shows that can be taken up with programming from overseas.

As soon as one advances this argument, however, it becomes clear that there is another principle at work, the right of individuals to free societies to entertain themselves as they like. How would you feel if someone denied you the right to listen to the Rolling Stones or watch Jackie Chan movies, on the grounds that American cultural imperialism must be safeguarded?

The WTO and National Independence

One recurrent theme in the anti-globalization movement is that the drive for free trade and free flow of capital has undermined national sovereignty. In the extreme versions of this complaint, the World Trade Organization is characterized as a supranational power, able to coerce national governments from pressuring policies in their own interests. How much substance is there to this charge?
PART 1
International Trade Policy

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Old ships are bought to that breath and rear a grungy. They are equipped with large sets of wasteful, warship-like weapons over the ships, cut them into pieces, and count the pieces out. Although the small companies that do the work try to remove as much of the ships as they can, inevitably a considerable amount of waste arsenics pollutes the beach and its surroundings.

And although the foremen are experienced and knowledgeable, many accidents occur; there are enough willing workers who do not pay to take excessive precautions.

As a result, the shipbreaking industry of Aalst became a target of activist groups around the world, with the environmental organization Greenpeace taking the leading role in the protests. Greenpeace focused mainly on the pollution involved; other groups targeted the hazardous working conditions. A common theme of the protests was that advanced economies should clean up their own messes, not send them to poorer countries.

But others pointed out that the shipbreaking industry of Aalst was in many ways exactly what a country like India needed. Local entrepreneurs had found a low-cost way to do something that was capital-intensive in advanced countries, thereby making it the best use of their nation's most abundant resource. So in doing they had created a new industry, one that directly or indirectly supported perhaps a million people and provided India with overseas earnings it desperately needed. The workers of Aalst earned very low wages and endured terrible working conditions by Western standards, but by Indian standards they were relatively well paid. And beyond economics, there were something heroic about the industry: the shipbreakers were proud of what they did, of their skill and enterprise.

So was the shipbreaking industry of Aalst something to be condemned or praised? Is there evidence to show that it was, or were they deprived of important opportunity in order to satisfy their own fetishes?

Summary
1. Some new arguments for government intervention in trade exist in Europe. In 1980 and 1990, the argument for government intervention in trade is still strong. The countries with promising policies in this area are the United States, Germany, and Japan.

2. The Free Trade Agreement (FTA) is a new approach to globalization. It aims at the elimination of trade barriers in the developing countries.

3. Activist policy arguments rest on two ideas. One is the argument that government intervention in trade is necessary. The other, which represents a greater departure from standard market failure arguments, in the Broader-Spencer analysis, which suggests that strategic interaction can enable nations to capture export returns. These arguments are theoretically persuasive; however, many economists worry that they are too abstract and require too much information to be useful in practice.

4. The rise of multinational firms from developing countries, a new movement opposed to globalization has emerged. The central concern of this movement is with the low wages paid to export workers, although there are other themes as well. The response of most economists is that developing-country workers may earn low

CHAPTER 2
Conservatism in Trade Policy

wages by Western standards, but that trade allows them to earn more than they otherwise would.

4. An illustration of some arguments suggests how difficult the question of globalization really is, especially when one tries to view it as a moral issue. It is all too easy for people to do harm when they are trying to do good. The costs must be measured by the activity, the labor standards, the freedom of laborers, the freedom of the countries, which believe they will be used as proto-industrial devices.

5. Even more difficult problems arise over such issues as cultural homogenization and environmental standards.

Key Terms
border Hamilton, p. 281
Brown-Spencer, p. 279
compromise, p. 277
examen, p. 279
national trade policy, p. 276

Problems
1. Suppose the U.S. government were able to determine which industries would grow most rapidly over the next 20 years. Why doesn't this automatically mean that the nation should have a policy of supporting those industries?

2. The U.S.-Canada Free Trade Agreement has expanded the market for high-technology industries. It is argued that, because of the large number of new products, the potential for rapid future growth, and the ability to export to other countries, it is a major benefit to the United States. Describe one problem that the authors identify with this argument.

3. If the United States had its way, it would demand that Japan spend more money on basic research in science and less on applied research into industrial applications. Explain why in terms of the analysis of appropriability.

4. Tables 11-1 and 11-2 point out the role of foreign direct investment in the European governments. This is a time of growth of international relations. What is the role of the United States in this situation? What is the role of the European Union in this situation?

5. The "new strategic trade policy argument" demonstrates the wisdom of policies like that of South Korea, which subsidizes its exports across the board. The subsidy gives each country the strategic advantage it needs to reach the goal of world competition.

6. Does the U.S. military budget help or hurt the strategic position of U.S. high-technology industries? Make the case for either point of view.

7. Suppose that the European Commission asked you to develop a brief on behalf of subsidizing European software development—bearing in mind that the software industry is currently dominated by U.S. firms, notably Microsoft. What arguments would you use? What are the weaknesses of these arguments?

8. Prince, in addition to its occasional role as a strategic trade policy, pursues an active nationalistic cultural policy, promoting French art, music, fashion, cuisine, and so on.
CHAPTER 12
National Income Accounting and the Balance of Payments

Over the decade from 1991 to 2000, Japan's national product grew at an annual average rate of only 1.5 percent, while that of the United States grew by nearly 3.5 percent per year. At the same time, Japan's unemployment rate rose, reaching nearly 6 percent and overtaking that of the United States for the first time in fifty years. In 2001, however, the U.S. economy entered a recession and the entire world economy slowed. Can economic analysis help us understand both the interdependencies among national economies as well as the reasons why our fortunes often differ?

Previous chapters have been concerned primarily with the problem of making the best use of the world's scarce productive resources at a single point in time. The branch of economics known as microeconomics studies this problem from the perspective of individual firms and consumers. Microeconomics works "from the bottom up" to show how individual economic actors, by pursuing their own interests, collectively determine how resources are used. In our study of international microeconomics, we have learned how individual production and consumption decisions produce patterns of international trade and specialization. We have seen that while free trade usually encourages efficient resource allocation, government intervention or market failures can cause costs, even when all factors of production are fully employed.

With this chapter, we shift our focus and look at how the economic policy ensures that factors of production are fully employed! And while determining how an economy's capacity to produce goods and services changes over time. To answer these questions, we must understand macroeconomics, the branch of economics that studies how economies' overall levels of employment, production, and growth are determined. Like microeconomics, macroeconomics is concerned with the effective use of scarce resources. But while microeconomics focuses on the economic decisions of individuals, macroeconomics focuses on the behavior of the economy as a whole. In our study of international macroeconomics, we will learn how the interactions of national economies influence the worldwide pattern of macroeconomic activity. Macroeconomic analysis emphasizes the effects of economic life that we have usually kept in the background until now to simplify our discussion of international economics.

Some of the reasons we may be unemployed and inflation may be high. Macroeconomics studies the factors that cause unemployment and inflation. And the steps governments can take to prevent it. A main concern of international macroeconomics is the problem of ensuring full employment in economies open to international trade.

2. In earlier chapters, we usually assumed that every country consumes an amount exactly equal to its income—no more and no less. In making, households can put aside part of their income to provide for the future, or so they can borrow temporarily to spend more than they earn. A country's saving or borrowing behavior affects domestic employment and future levels of national wealth, from the standpoint of the international economy as a whole, the world saving rate determines how quickly the world stock of productive capital can grow.

3. Trade imbalances. As we saw in earlier chapters, the value of a country's imports equals the value of its exports when spending equals income. This state of balance is seldom achieved by actual economies, however. Trade imbalances play a large role in the following chapters because they redistribute wealth among countries and are a main channel through which one country's macroeconomic policies affect its trading partners. It should be no surprise, therefore, that trade imbalances, particularly when they are large and persistent, quickly become a source of international discord.

4. Money and the price level. The trade theory you have studied so far is a rather simple theory, one in which goods are exchanged directly for other goods on the basis of their relative prices. In practice, it is more convenient to use money, a widely accepted medium of exchange, in transactions, and to quote prices in terms of money. Because money changes hands in virtually every transaction that takes place in a modern economy, fluctuations in the supply of money or the demand for it can affect both output and employment. International macroeconomics takes into account that every country uses a currency and that a monetary change in one country (for example, a change in money supply) can have effects that spill across borders to other countries. Stability in money price levels is an important goal of international monetary policy.

This chapter takes the first step in our study of international macroeconomics by explaining the accounting concepts we'll need to describe a country's level of production and its international transactions. To get a complete picture of the macroeconomic linkages among economies that engage in international trade, we have to examine two related and essential tools. The first of these tools, national income accounting, reports all the expenditures that contribute to a country's income and output. The second tool, the balance of payments accounting, helps us keep track of both changes in a country's linkages to foreigners and the fortunes of its export- and import-competing industries. The balance of payments account also shows the connection between foreign transactions and national money supply.

The National Income Accounts

Of central concern to macroeconomic analysis is a country's gross national product (GNP), the value of all final goods and services produced by its factors of production and sold on the market in a given time period. GNP is the basic measure of a country's output studied by macroeconomists, is calculated by adding up the market values of all expenditures on final output. GNP therefore includes the value of goods like bread sold in...
CHAPTER 11 National Income Accounting and the Balance of Payments


<table>
<thead>
<tr>
<th>Component</th>
<th>Value (billion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumption</td>
<td>7000</td>
</tr>
<tr>
<td>Investment</td>
<td>5000</td>
</tr>
<tr>
<td>Government purchases</td>
<td>2000</td>
</tr>
<tr>
<td>&amp; exports</td>
<td>8000</td>
</tr>
<tr>
<td>+ current account</td>
<td>5000</td>
</tr>
<tr>
<td>Total GNP</td>
<td>29700</td>
</tr>
</tbody>
</table>

National Product and National Income

Our first task in understanding how economists analyze GNP is to explain in greater detail why the GNP of a country generated over some time period must equal its national income, the income earned at that period by its factors of production.

The reason for this equality is that every dollar used to purchase goods or services automatically ends up somewhere in the pocket of a person. A visit to the doctor provides a simple example of how income in national output raises national income by the same amount. The $75 you pay the doctor represents the implicit value of the services he or she provides for you, so your visit raises GNP by $75. But the $75 you pay the doctor also raises his or her income.

National income therefore = GNP.

The principle that output and income are the same also applies to goods, even goods that are produced with the help of many factors of production. Consider the example of an economist's haircut. When you purchase a new book from the publisher, the value of your purchase raises GNP. But your payment also raises the income of the productive inputs, data that we have estimated in producing the book, because the publisher must pay all his servants with the proceeds of sales. First, there are the author, editor, and typesetter who provide

the labor inputs necessary for the book's production. Second, there are the publishing company's shareholders, who receive dividends for having financed acquisition of the capital used in production. Finally, they sell the supplies of paper and ink, who provide the intermediate materials used in producing the book.

The paper and ink purchased by the publishing house to produce the book are not counted separately in GNP because their contribution is the value of national output and is already included in the book's price. The same is true for all the supplies that we allow only the sale of final goods and services we count into the definition of GNP. Suits of intermediate goods, such as paper and ink pulped by a publisher, are not counted. Notice how the value of a product does not enter GNP. Our definition excludes only final goods and services that are produced and a used textbook does not qualify. It was counted in GNP at the time it was first sold. Equivalently, the sale of a used textbook does not generate income for any factor of production.

Capital Depreciation, International Transfers, and Indirect Business Taxes

Because we have defined GNP and national income so that they are necessarily equal, their equality is really an identity. Some adjustments to the definition of GNP must be made, however, before the identification of GNP and national income is entirely correct in practice.

1Our definition of the current account is strictly accurate when a country is a net debtor or exporter of foreign aid. But, with large, some errors, also corrects our identification of GNP with national income. We discuss this in more detail about the identification of national income in the current account must be changed in such cases.
1. GNP does not take into account the economic loss due to the tendency of machinery and equipment to wear out as they are used. This loss, called depreciation, reduces the income of capital owners. To calculate national income over a given period, we must therefore subtract from GNP the depreciation of capital over the period. GNP less depreciation is called net national product (NNP).

2. A country's income may include gifts from residents of foreign countries, called unilateral transfers. Examples of unilateral transfers of wealth are pension payments to retired citizens living abroad, remittances of income, and foreign aid as well as relief funds donated to relief organizations. If the United States in 2006, the balance of such unilateral transfers from foreigners to the U.S. was $35.2 billion, representing a 0.53 percent of GNP as transferred to foreigners. Net unilateral transfers are called a country's income but are not part of its product, and they must be added to NNP in calculating private income.

3. National income depends on the prices producers receive for their goods. GNP is the prices producers pay. These two sets of prices need not, however, be identical. For example, sales taxes make buyers pay more than sellers receive, leading GNP to overestimate national income. The amount of this tax wedge, called induced business taxes, must therefore be subtracted from GNP in calculating true national income.

National income equals GNP less depreciation, plus unilateral transfers, less indirect business taxes. The difference between GNP and national income is by no means an insignificant amount, but macroeconomics has little to say about it, and it is of little importance for macroeconomic analysis. Therefore, for the purposes of this text we usually use the terms GNP and national income interchangeably, emphasizing the distinction between the two only when it is essential.

Gross Domestic Product

Most countries other than the United States have long recognized gross domestic product (GDP) rather than GNP as their primary measure of national economic activity. In 1991, the United States began to follow this practice as well. GDP is supposed to measure the volume of production within a country's borders. GDP equals the sum of net output, or the receipts of factor income from the rest of the world. These receipts are primarily the income derived from rents on property owned by residents of other countries. In the United States, this product has been defined as the national income of the United States, net of current transfers to foreign countries. However, a country's national income is not the same as its GDP, because the latter includes the income received from abroad and the income paid to foreigners.

GDP does not measure, as GNP does, the income of residents born or raised outside the United States. However, a country's national income is not the same as its GDP, because the latter includes the income received from abroad and the income paid to foreigners.

In conclusion, national income is a better measure of the standard of living and economic well-being of a country's residents than GDP, because national income includes the income of its citizens, both at home and abroad, whereas GDP excludes income from abroad, including income received by foreigners.

Consumption

The portion of GNP purchased by the private sector to fulfill economic wants is called consumption. Purchases of consumer goods, food, dental work, and washing machines all fall into this category. Consumption expenditure is the largest component of GDP in most economies. In the United States, for example, the fraction of GNP devoted to consumption has fluctuated in a range of about 60 to 69 percent since World War II.

Investment

The part of output used by private firms to produce future output is called investment. Investment spending may be viewed as the portion of GNP used to increase the nation's stock of capital.Steel and bricks need to be laid as a factory or part of investment spending, as do services provided by a technician who helps build business computers. Firms' purchases of investments are also counted in investment spending because carrying investments is just another way for firms to transfer output from current use to future use.Investment is usually measured as a percentage of GDP. In most economies, it is roughly the same as the rate of capital formation. Investment is usually measured as a percentage of GDP. In most economies, it is roughly the same as the rate of capital formation. Investment is usually measured as a percentage of GDP. In most economies, it is roughly the same as the rate of capital formation.

Government Purchases

Any goods and services purchased by federal, state, or local governments are classified as government purchases in the national income accounts. Included in government purchases are federal military spending, government support of cancer research, and government spending on highway repair and education. Government transfer payments like social security...
and unemployment benefits do not require the recipient to give the government any goods or services in return. Thus, transfer payments are not included in government purchases.

Government purchases currently total up about 18 percent of U.S. GDP, and this share has not changed much since the late 1950s. (The corresponding figure for 1959, for example, was around 20 percent.) To 1929, however, government purchases accounted for only 8.5 percent of U.S. GDP.

The National Income Identity for an Open Economy

A useful identity is that the total output of goods and services that is not purchased by households or the government must be sold by firms to produce new plant, equipment, and inventories. If consumption goods are not sold immediately to consumers or the government, firms (perhaps reluctantly) sell them in existing inventories, thus increasing inventories.

This information leads to a fundamental identity for closed economies. Let Y stand for GDP, C for consumption, I for investment, and G for government purchases. Since all of a country's output must be consumed, invested, or bought by the government, we can write

\[ Y = C + I + G. \]

We derived the national income identity for a closed economy by assuming that all output was consumed or invested by the country's citizens or purchased by the government. When foreign trade is possible, however, some output is purchased by foreigners while some domestic spending goes to produce goods and services produced abroad. The GDP identity for open economies shows how the national income of a country comes by selling its goods and services is divided between sales to domestic residents and sales to foreign residents.

Since residents of an open economy may spend some of their income on imports, that is, goods and services purchased abroad, and the portion of their spending that is not devoted to imports is part of domestic spending. The value of imports, defined by IMF, must be subtracted from total domestic spending, \( C + I + G \), so that the portion of domestic spending that generates domestic national income, imports from abroad added to foreign countries' GDPs, but not sold directly to domestic GDP.

Similarly, the goods and services sold to foreigners make up a country's exports. Exports, defined by IMF, are the amount foreigners' residents' purchases added to the national income of the domestic economy.

The national income of an open economy is therefore the sum of domestic and foreign expenditures on the goods and services produced by domestic factors of production. Thus, the national income identity for an open economy is

\[ Y = C + I + G + EX - IM. \]

### Table 12.1: National Income Accounts for Agraria, an Open Economy (bachelors of wheat)

<table>
<thead>
<tr>
<th></th>
<th>GDP (total output)</th>
<th>Consumption</th>
<th>Investment</th>
<th>Government purchases</th>
<th>Exports</th>
<th>Imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>$100$</td>
<td>$12$</td>
<td>$25$</td>
<td>$10$</td>
<td>$10$</td>
<td>$20$</td>
<td></td>
</tr>
</tbody>
</table>

*(1) In terms of value, U.S. balance per gallon = $0.10/gallon of milk.
(2) A household's income = $0.10/gallon of milk.

An Imaginary Open Economy

To make identity (12.1) concrete, let's consider an imaginary closed economy, Agraria, where only wheat is output. Each citizen of Agraria is a consumer of wheat, but each is also a farmer and therefore can be viewed as a firm. Profits earned by planting seeds is a portion of each year's crop as a result of the following year's planting. There is also a government that appropriates part of the crop to fund the Agrarian army. Agraria's total annual crop is 100 bushels of wheat. Agraria can convert 10 bushels of wheat into 50 bushels of milk. We can draw up Agraria's national income accounts without knowing the price of milk in terms of wheat because all the components in the GDP identity (12.1) must be measured in the same units. If we assume the price of milk is 0.5 U.S. dollar per gallon of milk, and that you give Agraria want in exchange for 40 gallon of milk, then Agraria's imports are equal to value in 20 bushels of wheat.

In Table 12.1 we see that Agraria's total output is 100 bushels of wheat. Consumption is divided between wheat and milk, with 55 bushels of wheat and 45 gallons of milk equal in value to 20 bushels of wheat converted over the year. The value of consumption in terms of wheat is \( W = (55 	imes 0.5) = 27.5 \) bushels of wheat. Exported wheat purchased by Agraria equals 25 bushels of wheat purchased by foreign residents, 15 bushels purchased by the government, and 10 are exported abroad. National income \( Y = (100) \) equals domestic spending \( C + I + G = (100) \) plus exports \( EX = (10) \) less imports \( IM = (20) \).

The Current Account and Foreign Indebtedness

In reality a country's foreign trade is usually balanced only partly. The difference between exports of goods and imports and services and exports of services is known as the current account balance (or current account). If we define the current account by CA, we can express this definition symbolically as

\[ CA = EX - IM. \]

When a country's imports exceed its exports, we say the country has a current account deficit. A country has a current account surplus when its exports exceed its imports.
The GNP identity equation (12-1) shows one reason why the current account is important in international macroeconomics. Since the right-hand side of (12-1) is net expenditure on domestic output, changes in the current account can be associated with changes in exports, imports, net foreign debt, and employment.

The current account is also important because it measures one side and direction of international borrowing. When a country imports more than it exports, it is buying more foreign merchandise than it sells to others and must somehow finance the current account deficit. How does it pay for additional imports since it has spent its export earnings? Since the country is at a whole more important than it exports only if it can borrow the difference from foreigners. A country with a current account deficit must be increasing its net foreign debt by the amount of the deficit.

Standard, a country with a current account surplus is earning more from its exports than it spends or imports. This country finances the current account deficit of its trading partners by lending to them. The foreign wealth of a surplus country rises because foreigner pay any imports not covered by their exports by issuing IOUs that they will eventually have to return. The preceding reasoning shows that a country's current account balance equals the change in its net foreign wealth.

We have defined the current account as the difference between exports and imports. Equation (12-3) says that the current account is also equal to the difference between national income and domestic residents' spending. C + I + G = CA.

It is only by borrowing abroad that a country can have a current account deficit and use more output than it is currently producing. If it uses less than its output, it has a current account surplus and is lending the surplus to foreigners. International borrowing and lending were identified with international trade in Chapter 7. A country with a current account deficit is importing present consumption and expecting future consumption. A country with a current account surplus is exporting present consumption and importing future consumption.

As an example, consider again the imaginary economy of Agricola described in Table 12-1. The total value of its consumption, investment, and government purchases, at 110 bushels of wheat, is greater than its output of 100 bushels. This longevity would be impossible in a closed economy; it is possible in this open economy because Agricola now imports 60 gallons of milk, which 30 bushels of wheat, its exports only 10 bushels of wheat. The current account deficit of 10 bushels is the value of Agricola's importing from foreigners, which the country will have to repay in the future.

Figure 12-2 gives a vivid illustration of how a country's current account deficits can add up to a large foreign debt. The figure plots the U.S. current account balance since the late 1970s along with a measure of the nation's stock of net foreign wealth. As you can see, the United States had accumulated substantial foreign wealth by the early 1980s, when a sustained current account deficit of proportions unprecedented in the nineteenth century opened up. In 1987 the country became a net debtor to foreigners for the first time since World War I.

As the Case Study on p. 316 above, it is surprisingly hard to measure accurately a country's net foreign wealth. Some economic analysts therefore question the data in Figure 12-2 and disagree over where the United States became a debtor country and how large its foreign debt really is. But there is no question that a large decrease in U.S. foreign assets did occur over the 1980s.

Saving and the Current Account: Simple as it is, the GNP identity has many illuminating implications. To explore the most important of these implications, we derive an concept of national saving, that is, the portion of output, Y, that is not devoted to household consumption, C, or government purchases,
CHAPTER 12 National Income Accounting and the Balance of Payments

Private and Government Saving

So far our discussion of saving has not attuned the distinction between saving decisions made by the private sector and saving decisions made by the government. Unlike private saving decisions, however, government saving decisions are often made with an eye towards their effect on output and employment. The national income identity can help us to analyze these channels through which government saving decisions influence macroeconomic conditions. To use the national income identity in this way, we first have to divide national saving into its private and government components.

Private saving is defined as the part of disposable income that is saved rather than consumed. Disposable income is national income, I, less the net taxes collected from households and firms by the government, T. Private saving, desired S*, can therefore be expressed as:

\[ S^* = Y - T - C \]

Government saving is defined similarly to private saving. The government's "income" is its net tax revenue, T, while its "consumption" is government purchases, G. If we let S* stand for government saving, then

\[ S^* = T - G \]

The two types of saving we have defined, private and government, add up to national saving. To see why, recall the definition of national saving, S, as \( I + C \). Then

\[ S = Y - T - C - G = (I - T) + (C - G) = S^* + S^T \]

We can use the definitions of private and government saving to rewrite the national income identity in a form that is useful for analyzing the effects of government saving decisions on two economies. Because S = S^* + S^T = I + C,

\[ S^* + S^T = I + C = S^T + S^* \]

Equation (12-2) relates private saving to domestic investment, \( i \) and current account surplus, and government saving. To interpret equation (12-2), we define the government budget deficit at \( G - T \). That is, as government saving permitted by a minus sign. The government budget deficit measures the extent to which the government is borrowing to finance its expenditures. Equation (12-2) then states that a country's private saving can take three forms: investments in domestic capital (I), purchases of savings from foreigners (CA), and purchases of the domestic government's newly issued debt (G - T). The multiplicity of equation (12-2) is illustrated by the following case study.

---

Footnotes:
1. The U.S. national income accounts assume that government purchases are not used to reduce the nation's capital stock. We follow this convention even for subtracting all government purchases from output to calculate national saving.
2. Gross national saving is defined as national savings plus government investment. Gross national saving is not normally distinguished from government consumption and government investment, for example. National saving (by public sector enterprises) includes the latter in part of national saving. Otherwise, government investment figures include purchases of machinery equipment.
3. Net taxes are net taxes minus imports of payments. The net government revenues in the federal, state, and local government accounts are treated as a single unit.
CASE STUDY

Government Deficit Reduction May Not Increase the Current Account Surplus

The linkage among the current account balance, investment, and private and government saving given by equation (12.3) is very useful for thinking about the results of economic policies and events. Our predictions about such outcomes cannot possibly be correct unless the current account, investment, and saving rates adjust in a way that is consistent with (12.3), because that equation is an identity. However, and in line with any theory of economic behavior, we cannot forecast the results of policies without some model of the economic reality. Equation (12.3) is, therefore, necessarily only as flexible as any valid economic model, but there are many more models consistent with (12.3).

A good example of how hard it can be to forecast policies' effects comes from thinking about the effects of governmental deficits on the current account. During the administration of President Ronald Reagan in the early 1980s, the United States substantially increased its budgetary expenditures, generating both a big government deficit and a sharply increased current account deficit. These events gave rise to the argument that the government and current account deficits were "twins" (both generated primarily by the bigger policies). If you rewrite identity (12.3) in the form

\[ CA = S^* - I = (G - T), \]

you can see how the outcome could have occurred. If the government deficit rises (G - T goes up) and private saving and investment don't change much, the current account surplus must fall by roughly the same amount as the increase in the fiscal deficit. In the United States between 1981 and 1985, the government deficit increased by a little over 2 percent of GDP, while \( S^* - I \) fell by about a half a percent of GDP, so the current account fell from approximate balance to about 3 percent of GDP. (The variables in (12-2) are percentages of GDP for easy comparison.) Thus, the twin deficits prediction is not too far off the mark.

The twin deficits theory story can lead to seriously naive, however, when changes in government deficits lead to bigger changes in private saving and investment behavior. A good example of these effects comes from European countries' efforts to cut their government budget deficits prior to the launch of their new common currency, the euro, in January 1999. As we will discuss in Chapter 30, the European Union (EU) had agreed that no member country with a large government deficit would be allowed to adopt the new currency along with the initial wave of euro zone members. As 1999 approached, therefore, EU governments made frantic efforts to cut government spending and raise taxes.

Under the "twins deficit" theory, we would have expected the EU's current account surplus to increase sharply as a result of the fiscal change. As the table below shows, however, nothing of the sort actually happened. Five EU as a whole, government deficits fell by about 4.5 percent of output, yet the current account surplus shrank about the same.

The table reveals the main reason the current account didn't change much: a sharp fall in the private saving rate, which declined by about 4 percent of output, almost as much as the increase

\[ \text{in government saving. (Recall row slightly at the same time.) In this case, the stresses of} \]

\[ \text{private saving seem to have neutralized governments' efforts to raise national saving!} \]

\[ \text{It is difficult to know how this effort occurred, but there are answers of possible explanations. One is based on an economic theory known as the " Ricardoian equivalence" of taxes and government deficits. (The theory is named after the same David Ricardo who discovered the theory of comparative advantage)—see Chapter 2 although he himself did not believe in Ricardoian equivalence.) Ricardoian equivalence argues that when the government raises taxes and cuts in deficit, consumers anticipate that they will face higher taxes later to pay for the resulting government debt. In anticipation, they raise their own (private) saving to offset the fall in government saving. Conversely, governments that lower their deficits (thereby increasing government saving) will reduce the private sector to lower its own saving. Qualitatively, this is the kind of behavior we see in Europe in the late 1990s.

\[ \text{Ricardian's} \ interruptus \ \text{suggests, however, that the Ricardoian equivalence doesn't hold exactly in practice. Most economists would attribute more than half the decline in European private saving to Ricardoian effects. Who explores the rest of the decline? The value of European financial assets generally rising in the late 1990s, a development fueled in part by optimism over the beneficial economic effects of the planned common currency. It is likely that increased household wealth was a second factor lowering the private saving rate in Europe.} \]

\[ \text{Because private saving, investment, the current account, and the government deficits are jointly determined variables, we can never fully determine the cause of a current account change using identity (12-3) alone. Nonetheless, the identity provides an essential framework for thinking about the current account and can furnish useful clues.} \]

The Balance of Payments Accounts

In the previous section, we examined the components of the national income accounts: consumption, investment, government purchases, and the current account (the measure of a country's net foreign investment or, equivalently, the difference between its exports and imports). In addition to national income accounts, government economists and statisticians also keep track of payments accounts, a detailed record of the composition of the current account balance out of the many transactions that finance it. Balance of payments figures

\[ \text{Year} \quad \text{CA} \quad \text{S}^* \quad I \quad G - T \]

\[ 1993 \quad 0.6 \quad 25.9 \quad 19.9 \quad -5.4 \]

\[ 1994 \quad 1.0 \quad 24.6 \quad 19.3 \quad -4.3 \]

\[ 1995 \quad 1.5 \quad 23.4 \quad 19.4 \quad -5.2 \]

\[ 1996 \quad 1.0 \quad 22.6 \quad 20.0 \quad -1.6 \]

\[ 1997 \quad 0.2 \quad 24.6 \quad 20.8 \quad -3.9 \]

\[ \text{Source:} \text{OECD Economic Outlook, December 2000, Table 13.3.} \]

\[ \text{Note:} \text{The figures in Table 13.3 are in billion EUROS, at current prices.} \]
CHAPTER 12  National Income Accounting and the Balance of Payments

You will find the composition of the balance of payments account has confusing if you keep in mind the following simple rule of double-entry bookkeeping: Every international transaction automatically balances the balance of payments entries once as a credit and once as a debit. This principle of balance of payments accounting holds true because every transaction has two sides. If you buy something from a foreigner you must pay him in some way, and the foreigner must then receive that payment.

Examples of Paired Transactions

Some examples will show how the principle of double-entry bookkeeping operates in practice.

Imagine you buy a typewriter from the Italian company Olivetti and pay for your purchase with a $100 check. Your payment is a good (the typewriter) from a foreigner to your U.S. account where you have a negative sign. But there is the offsetting balance of payments credit? Olivetti’s U.S. subsidiary must do something with your check—let’s say they deposit it in Olivetti’s account at Citibank in New York. In this case, Olivetti has purchased, and Citibank has sold, a U.S. asset—a bank deposit worth $100—and the transaction shows up as a $100 credit in the U.S. financial account. The transaction creates the following two offsetting bookkeeping entries in the U.S. balance of payments:

<table>
<thead>
<tr>
<th>Credit</th>
<th>Debit</th>
</tr>
</thead>
<tbody>
<tr>
<td>+$100</td>
<td>-$100</td>
</tr>
</tbody>
</table>

As another example, suppose that during your travels in France you pay $200 for a fine dinner at the Ritz in Paris. You charge the charge on your Visa credit card. Your payment, which is a service expenditure, would be counted as a service import for the United States, and therefore a current account debit. Where is the offsetting debit? Your signature on the Visa slip entitles the merchant to the $200 (actually, to the local currency equivalent) from First Card, the company that issued your Visa card. It is therefore an asset, a claim on future payment from First Card. So when you pay your meal and credit your Visa card, you are selling an asset to France and generating a $200 credit in the U.S. financial account. The process of offsetting debits and credits in this case is similar.

<table>
<thead>
<tr>
<th>Credit</th>
<th>Debit</th>
</tr>
</thead>
<tbody>
<tr>
<td>+$200</td>
<td>-$200</td>
</tr>
</tbody>
</table>

Imagine now that your Uncle Sid from Los Angeles buys a nicely issued share of stock in the United Kingdom oil giant British Petroleum (BP). This places his order with his stockbroker, Co-for-Broke, Inc., paying $95 with a check drawn on his Co-for-Broke money market account. BP, in turn, deposits the $95 dollars Sid has paid in his own U.S. bank account at Second Bank of Chicago, Uncle Sid’s purchase of the stock creates a $95 debit in the U.S. balance account (he has purchased as asset from a foreign resident, BP), while BP’s $95 deposit at its Chicago bank is the offsetting financial account credit (BP has...
The balance of payments accounts divide exports and imports into three main categories. The first is merchandise trade, that is, exports or imports of goods. The second category, services, includes items such as payments for legal assistance, tourists' expenditures, and shipping fees. The final category, invisibles, is made up mostly of international interest and dividend payments and the earnings of domestically owned firms operating abroad. If you have

<table>
<thead>
<tr>
<th>Table 12.2</th>
<th>U.S. Balance of Payments Accounts for 2000 (billions of dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Account</td>
<td>Credit</td>
</tr>
<tr>
<td>(1) Exports</td>
<td>+1,414.9</td>
</tr>
<tr>
<td>Of which:</td>
<td></td>
</tr>
<tr>
<td>Merchandise</td>
<td>+733.3</td>
</tr>
<tr>
<td>Services</td>
<td>+345.4</td>
</tr>
<tr>
<td>(2) Imports</td>
<td></td>
</tr>
<tr>
<td>Of which:</td>
<td></td>
</tr>
<tr>
<td>Merchandise</td>
<td>-1,222.8</td>
</tr>
<tr>
<td>Services</td>
<td>-353.7</td>
</tr>
<tr>
<td>Income payments</td>
<td>-303.6</td>
</tr>
<tr>
<td>Net unrecorded transfers</td>
<td>-136.6</td>
</tr>
<tr>
<td>(3) Balance of current account</td>
<td></td>
</tr>
<tr>
<td>(1) + (2) + (3)</td>
<td>-53.2</td>
</tr>
<tr>
<td>Capital Account</td>
<td></td>
</tr>
<tr>
<td>(4)</td>
<td>+53.3</td>
</tr>
<tr>
<td>Financial Account</td>
<td></td>
</tr>
<tr>
<td>(5) U.S. assets held abroad (increase = (+))</td>
<td>+952.4</td>
</tr>
<tr>
<td>Of which:</td>
<td></td>
</tr>
<tr>
<td>Official reserve assets</td>
<td>+35.9</td>
</tr>
<tr>
<td>Other assets</td>
<td>+191.5</td>
</tr>
<tr>
<td>(6) Foreign assets held in U.S. (decrease = (-))</td>
<td>-399.1</td>
</tr>
<tr>
<td>Of which:</td>
<td></td>
</tr>
<tr>
<td>Official reserve assets</td>
<td>-35.2</td>
</tr>
<tr>
<td>Other assets</td>
<td>-310.0</td>
</tr>
<tr>
<td>Statistical discrepancy</td>
<td>+191.5</td>
</tr>
</tbody>
</table>

Sources: U.S. Department of Commerce, Survey of Current Business, April 2001. Values may differ from those based on the balance of payments system described earlier for various reasons.
CHAPTER 13  National Income Accounting and the Balance of Payments

transaction involves the purchase of an asset from foreigners is called a financial out-
flow (or, alternatively, a capital outflow). To correct its 2000 current plus capital account deficits of $33.7 billion, the United States received a net inflow of $347.4 billion. In other words, net purchasing or sales of assets in foreigners should have amounted to $347.4 billion. We can look again in Table 12-2 to see exactly how does net financial inflow came about.

The table records separately increases in U.S. holdings of foreign assets (which are financial inflows and are given a positive sign) and decreases in foreign holdings of U.S. assets (which are financial outflows and are given a negative sign). According to Table 12-2, U.S. owned assets held abroad increased by $33.7 billion in 2000, corning a = $33.7 billion net outflow to foreigners. This does not specify assets held in the United States rose by $592.4 billion in the year, and these purchases are shown with a positive sign. We calculate the balance on financial account as $333.3 billion ($592.4 billion - $33.7 billion = $558.7 billion).

The Statistical Discrepancy

We come out with a financial account surplus of $399.1 billion rather than the larger $437.4 billion financial account surplus we expected. If every balance of payments credit automatically generates an equal counterpart debit, and vice versa, how is this difference possible?

The reason is that information about the offsetting debit and credit items associated with a given transaction may be collected from different sources. For example, the import debit that a shipment of VCRs from Japan generates may come from a U.S. customs inspector's report and the corresponding financial account entry from a report by the U.S. bank in which the check paying for the VCRs is deposited. Because data from different sources may either diverge, converge, or offset, the traillaces of payments accountseldon balance is nonexistent as it may exist in theory. Account keepers focus on the two-balances in balance by adding to the accounts a statistical discrepancy. For 2000 unrecorded (or misrecorded) international transactions generated a balancing credit of $38.4 billion.

We have no way of knowing exactly how to allocate this discrepancy among the current, capital, and financial accounts. (If we did, it wouldn't be a discrepancy.)

The financial account is for one reason only—the size is not really difficult to keep track of the complicated financial transfers—"mergers of different countries. But we cannot conclude that net financial inflows were $347.4 billion. Because overall U.S. foreign accounts is also highly suspect. Balance of payments accounts consider merchantiable trade data relatively reliable, but data on services are not. In particular, transactions such as sales of financial advice and computer programming services are very sensitive. Accurate measurement of international services and dividend receipts is particularly difficult. (See the box on page 314.)

Official Reserve Transactions

Although there are many types of capital account transactions, one type is important enough to merit separate discussion. This type of transaction involves the purchase or sale of official reserve assets by central banks.

An economy's central bank is the institution responsible for managing the supply of money. In the United States, the central bank is the Federal Reserve System. Official international reserves are foreign assets held by central banks as a cushion against

The Capital Account

The capital account shows in Table 12-2 the increases (or decreases) in the United States' assets or liabilities that are not accounted for in the current account. The current account shows the transactions of the nation with foreigners. Any transaction that is not an import or export is considered a transfer. The capital account shows purchases of assets or liabilities by foreigners or citizens, respectively. The capital account shows increases (or decreases) in the United States' assets or liabilities that are not accounted for in the current account. For example, a sale of a New York bank to a Japanese firm is a capital transaction and not a transaction in the current account. In general, any transaction that does not appear in the current account is considered a transaction in the capital account.

The Financial Account

Just as the current account is the difference between sales of goods and services to for-
egnigners and purchases of goods and services from foreigners, the financial account measures the difference between sales of assets to foreigners and purchases of assets from foreigners. When the United States borrows $1 from foreigners, it is selling them a security—a promise that they will pay $1, with interest, in the future. Such a transaction records a financial account with a positive sign because it is a claim to a payment that is being made. When the United States lends $1 abroad, however, a payment must be made in the future and the capital account is debited.
part of the current account deficit. This phenomenon occurs because the risk of currency misalignment is absorbed by the market, which is continuously adjusting exchange rates to maintain balance in the current account. The misalignment occurs because the expectations of future events, such as political or economic changes, can cause deviations from the actual exchange rate, leading to a disequilibrium in the current account.

The international financial system is characterized by a complex web of interconnected economies. The role of the central banks in managing the exchange rate and the current account is crucial in maintaining economic stability. The current account deficit can be financed through foreign direct investment, portfolio investment, or official reserves. However, the sustainability of such deficits depends on the ability of the economy to absorb the additional supply of foreign goods and services and to adjust its production and consumption patterns accordingly. The misalignment in the current account can lead to a revaluation of the currency, which can cause a reduction in the competitiveness of exports and an increase in the cost of imports, potentially leading to a recession.

When a central bank purchases or sells a foreign asset, the transaction takes place in its own currency, which affects the balance of payments and the national economy. The central bank's intervention in the foreign exchange market can have implications for the country's financial stability and can lead to misalignments in the current account. The role of the central bank in managing the exchange rate and the current account is critical in ensuring the stability of the financial system and the overall economic health of the country.

In conclusion, the misalignment in the current account can have significant implications for the economy. The misalignment can lead to a revaluation of the currency, which can cause a reduction in the competitiveness of exports and an increase in the cost of imports, potentially leading to a recession. The central bank's role in managing the exchange rate and the current account is crucial in maintaining economic stability and ensuring the sustainability of the current account deficit.

*To ensure understanding, a thesis on the same theme of action can be $10,000 improvement in the current account without achieving $10,000 winning at financial activity.
Foreign central banks purchased $53.9 billion to add to their reserves. The net increase in foreign official reserve assets on the United States side was 10.1 billion in U.S. official reserves in the balance of official reserve transactions, which stood at $55.9 billion, or $5.3 billion = $55.6 billion in 2000.

You can think of the $55.6 billion balance as measuring the degree to which monetary authorities in the United States and abroad jointed with other lenders to cover the U.S. current account deficit. In the example above, the Bundesbank, by acquiring $13.0 billion in U.S. bank deposits, indirectly financed an import of $15.0 billion German car. The bookkeeping offset to the balance of official reserve transactions is called the official settlements balance or (in less formal usage) the balance of payments. This balance is the sum of the current account balance, the capital account balance, the reserve position of the financial account balance, and the statistical discrepancy, and it indicates the payments gaps that official reserve transactions need to cover. Thus the U.S. balance of payments in 2000 was $55.6 billion, 10.1 billion of balance of official reserve transactions with its sign reversed.

Table 12-3 recapitulates the major categories in Table 12-2 to explain the role of official reserve transactions in bridging the gap between the current (plus capital) account deficit and the reserve position of the financial account surplus. The balance of payments played an important transitory role as a reservoir of disapposition in international payments, and for many countries it still plays this role. A negative balance of payments (a deficit) may signal a crisis, for it means that a country is running down its international reserve assets or incurring debts to foreign monetary authorities. A country faces the risk of being suddenly cut off from foreign loans, it will want to maintain a "war chest" of international reserves as a precaution.

Like any summary measure, however, the balance of payments must be interpreted with caution. To return to our earlier example, the German Bundesbank's decision to expand its U.S. bank deposit holdings by $15.0 billion (as measured U.S. balance of payments deficit) by the same amount. Suppose the Bundesbank instead placed its $15.0 million with Barclays Bank in London, which in turn deposits the money with Bankers Trust in New York. Now suppose U.S. financial inflows rise by $15.0 billion, so that the U.S. balance of payments deficit does not rise. But the "improvement" in the balance of payments is of little economic importance. It makes no difference to the United States whether it borrows the Bundesbank's money directly or through a London bank.

**CASE STUDY**

**Is the United States the World's Biggest Debtor?**

The Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce oversees the vast data collection operation behind the U.S. national income and product accounts and balance of payments statistics. In addition, the BEA reports annual estimates of the "international investment position of the United States"—the country's net foreign wealth. Table 12-3 estimated that at the end of 1999 the United States had a negative net foreign wealth position far greater than that of any other single country.

![Table 12-3: Calculating the U.S. Official Settlements Balance for 2000](image)
We saw earlier that the current account balance measures the flow of net new claims on foreign wealth that a country earns by exporting more goods and services than it imports. This flow is not, however, the only factor that causes a country's net foreign wealth to change. In addition, changes in the market price of wealth previously acquired can alter a country's net foreign wealth. When Japan's stock market lost three-quarters of its value over the 1990s, for example, American and European owners of Japanese shares saw the value of their claims on Japan's equities and Japan's net foreign wealth rise in a rush. The BIA must adjust the value of existing claims for such capital gains and losses before arriving at its estimate of U.S. net foreign wealth.

The BIA now reports two estimates of U.S. net foreign wealth that differ in their treatment of foreign direct investments (see Chapter 7). Until 1991 foreign direct investments were valued at their historical, that is, original, purchase price. Now the BIA uses two different methods to place current values on foreign direct investments: the current cost method, which values direct investments at the cost of buying them today, and for market value method, which is known as reestimate the price at which the investments would be sold. These methods can lead to different valuations, because the cost of replacing a particular direct investment and the price it would command if sold on the market may be hard to measure. The net foreign wealth data graphed in Figure 12-2 use current cost estimates.

Table 12-4 reproduces the BIA's account of how it made its valuation adjustments to find the U.S. net foreign position at the end of 1999. Starting with its estimate of 1998 net foreign wealth ($51,118.8 billion at current cost or $54,407.7 billion at market values), the BIA (column a) subtracted the amount of the 1999 U.S. net financial inflow ($323.4 billion—the sum of lines 5 and 6 of the 1999 version of Table 12-2. (Do you remember why it's financial inflow as the United States results in a reduction of U.S. net foreign assets?) Then it held adjusted the values of previously held assets for various changes in their dollar prices (columns b and c). As a result of these valuation changes, U.S. net foreign wealth fell by an amount sufficient from the $323.4 billion to new net financial inflow from abroad. Based on the current cost method for valuing direct investments, the BIA's 1999 estimate of U.S. net foreign wealth was $51,482.5 billion. On a market value basis, the IHA places 1999 U.S. net foreign wealth lower, at $41,473.7 billion.

This debt is larger than the rest foreign debt owed by all the Western Hemisphere's developing countries, which was $646.5 billion in 1999. To put these figures in perspective, however, it is important to realize that the U.S. net foreign debt (as current cost) amounted to less than 12 percent of the GDP, while that of Argentina, Brazil, Mexico, Venezuela, and the other West- ern Hemisphere debtors was 47 percent of their collective GDP. Thus, the U.S. external debt represents a much lower income drain than that of its southern neighbors. The United States certainly is the world's biggest debtor. There is no reason to be alarmed, however, because the U.S. GDP is also the world's largest and the United States is not in danger of being unable to repay its foreign debts. Remember also that foreign borrowing may not always be a bad idea. A country that borrows abroad to invest in productive domestic investment can pay back its condition and still have money left over (Chapter 7). Unfortunately for the United States, most of its foreign borrowing over the 1980s financed government budget deficits rather than investments, as we saw in the last Case Study. Future generations of U.S. citizens therefore will face a real burden in repaying the resulting foreign debt.
Summary

1. International macroeconomics is concerned with the full employment of scarce economic resources and price level stability throughout the world economy. Because they reflect national expenditure patterns and their international representations, the national income accounts and the balance of payments accounts are essential tools for studying the macroeconomies of open, investment-oriented economies.

2. A country's gross national product (GNP) is equal to the income received by its factor of production. The national income accounts divide national income according to the type of spending that generated it: consumption, investment, government purchases, and the current account balance. Gross domestic product (GDP), equal to GNP less net exports of factor income from abroad, measures the output produced within a country's territorial borders.

3. In an economy closed to international trade, GNP must be consumed, invested, or purchased by the government. By using current output to build plant, equipment, and inventories, investment transforms present output into future output. For a closed economy, the problem is the only way to save in the aggregate, so the sum of the saving carried out by the private and public sectors, net of financial transactions, must equal investment.

4. In an open economy, GNP equals the sum of consumption, investment, government purchases, and net exports of goods and services. Trade does not have to be balanced if the economy can borrow from and lend to the rest of the world. The difference between the economy's exports and imports is called the current account balance, which equals the difference between the economy's exports and its net worth of goods and services.

5. The current account also equals the country's net lending to foreigners. Unlike a closed economy, an open economy can save by domestic and foreign investment. National saving therefore equals domestic investment plus the current account balance.

6. Balance of payments accounts provide a detailed picture of the composition and financing of the current account. All transactions between a country and the rest of the world are recorded in its balance of payments accounts. The accounts are based on the convention that any transaction resulting in a payment to foreigners is entered with a minus sign, while any transaction resulting in a receipt from foreigners is entered with a plus sign.

7. Transactions involving goods and services appear in the current account of the balance of payments, while international sales or purchases of assets appear in the financial account. The capital account records asset transfers and deals to be made for the United States. A current account deficit must be matched by an equal surplus in the other two accounts of the balance of payments, and any current account surplus is recorded by a deficit in one or both accounts. The balance of payments accounts reflects the fact that discrepancies between export earnings and import expenditures must be matched by a promise to repay the difference, usually with interest, in the future.

8. International asset transactions carried out by central banks are included in the financial account. Any central bank transaction in private markets for foreign currency assets is called official foreign exchange intervention. One reason intervention is important is that central banks use it as a way of altering the amount of money in circulation.

CHAPTER 12 National Income Accounting and the Balance of Payments

A country has a deficit in its balance of payments when it is running down its official international reserves or borrowing from foreign central banks; it has a surplus in the opposite case.

Key Terms

- current account balance, p. 350
- financial account balance, p. 350
- official foreign exchange intervention, p. 350
- official international reserves, p. 350

Problems

1. We stated in this chapter that GNP accounts avoid double counting by including only the value of final goods and services produced within the country. Should the measures of imports used in the GNP accounts therefore be defined to include only imports of final goods and services imported from abroad? What about exports?

2. By now (12.2) we know that to reduce a current account deficit, a country must increase its private saving, reduce domestic investment, or cut its government budget deficit. In the 1980s, many people recommended trade liberalization or imports from Japan and other countries to reduce the American current account deficit. How would higher U.S. tariffs on imports affect its private saving, domestic investment, and government deficit? Do you agree that import restrictions would effectively reduce a U.S. current account deficit?

3. Explain how each of the following transactions generates two entries—credits and debits—in the American balance of payments accounts, and describe how each entry would be classified:
   - An American buys a share of German stock, paying by writing a check on an account with a Swiss bank.
   - An American buys a share of German stock, paying the seller with a check on an American bank.
   - The French government carries out an official foreign exchange intervention in which it uses dollars held in an account to buy French currency from its citizens.
   - A tourist from Denmark buys a meal at an expensive restaurant in Lyon, France, paying with a traveler's check.
PART 3 Exchange Rates and Open-Economy Macroeconomics


7. A U.S.-owned factory in Britain is at the stage of final manufacturing. The New York company pays $600 to ship the finished product to its destination.

8. A New York producer buys New York wine in New York to buy a $600 uniform buying machinery. The New York company buys the machinery and deploys the $100 check to its account in the New York Bank. How would these transactions change the balance of payments accounts of New York and New York? What if the New York buyer pays by check for the machinery?

9. The balance of payments of Peru had a current account deficit of $1 billion and a nonpecuniary financial account surplus of $500 million in 2002.

10. What would happen to the country's net foreign assets?

11. Assume that foreign central banks are not the sellers of Peruvian assets. How did the Peruvian central bank's foreign reserves change in 2002? How would this official intervention show up in the balance of payments accounts of Peru?

12. How would your answer be affected if the foreign central banks had purchased $500 million of Peruvian assets in 2002? How would these official purchases erase foreign balance of payments accounts?

13. Draw up the Peruvian balance of payments accounts for 2002 under the assumption that the event described in (c) occurred in this year.

14. Is there a need to worry about a current account deficit or surplus? Why might a government be concerned about its official settlements balance that is, its balance of payments?

15. Do data on the U.S. official settlements balance give an accurate picture of the extent to which foreign central banks buy and sell dollars in currency markets?

16. Is it possible for a country to have a current account deficit at the same time it has a surplus in its balance of payments? Explain your answer, using hypothetical figures for the current and nonpecuniary financial accounts. Be sure to discuss the possible implications for official international reserve flows.

Further Reading
Chapter 13
Exchange Rates and the Foreign Exchange Market: An Asset Approach

In the year 2000 Americans flocked to Paris to enjoy French cuisine while shopping for designer clothing and other specialties. When measured in terms of dollars, prices in France had actually fallen enough that an American shopper's savings could offset the cost of the airline ride from home. What economic forces made French goods appear so cheap to residents of the United States? One major factor was a sharp fall in the dollar price of France's currency, a development that made French living, dining, and shopping cheaper for Americans.

The price of one currency in terms of another is called an exchange rate. At 4 AM New York time on October 24, 2001, you would have needed 1.9125 dollars to buy one euro of the European currency; the euro on the dollar's exchange rate against the euro was $0.8825 per euro. Because of their strong influence on the current account and other macroeconomic variables, exchange rates are among the most important prices in an open economy.

Because an exchange rate, as the price of one country's money in terms of another, is also an asset price, the principles governing the behavior of other asset prices also govern the behavior of exchange rates. As you will recall from Chapter 12, the defining characteristic of an asset is that it is a form of wealth, a way of transferring purchasing power from the present into the future. The price that an asset commands today is therefore directly related to the purchasing power over goods and services that buyers expect it to yield in the future. Similarly, today's dollar/euro exchange rate is closely tied to people's expectations about the future level of that rate, just as the price of Microsoft stock rises immediately upon favorable news about Microsoft's future prospects, so do exchange rates respond immediately to any news concerning future currency values.

Our general goals in this chapter are to understand the role of exchange rates in international trade and how exchange rates are determined. To begin, we first learn how exchange rates allow us to convert the prices of different country's goods and services. Next we describe the international asset market in which currencies are traded and show how equilibrium exchange rates are determined in that market. A final section underscores our asset market approach by showing how today's exchange rate responds to changes in the expected future values of exchange rates.
The change in the exchange rate from $1.50 per pound to $1.75 per pound—an appreciation of the pound against the dollar but a depreciation of the dollar against the pound—lowers the pound price of the jeans to

($545 x 1.75 S) = £25.75.

As you can see, descriptions of exchange rate changes as depreciations or appreciations can be misleading, because when one currency depreciates against another, the second currency must simultaneously appreciate against the first. To avoid confusion in discussing exchange rates, we must always keep track of which of the two currencies we are examining has depreciated or appreciated against the other.

If we remember that a depreciation of the dollar against the pound is at the same time an appreciation of the pound against the dollar, we reach the following conclusion: When a country's currency depreciates, foreigners find its exports cheaper and domestic residents find that imports from abroad are more expensive. An appreciation has opposite effects: Foreigners pay more for the country's products and domestics purchases pay less for foreign products.

Exchange Rates and Relative Prices

Imports and export demands, like the demands for all goods and services, are (influenced by relative prices, such as the prices of sweaters in terms of designer jeans. We have just seen how exchange rates allow individuals to compare domestic and foreign money prices by expressing them in a common currency. Carrying this analysis one step farther, we can use this exchange rate also allow individuals to compare the relative prices of goods and services whose money prices are quoted in different currencies.

As an American trying to decide how much to spend on American jeans and how much to spend on British trousers, use the exchange rate to convert the price of sweaters in terms of pounds to the price of jeans in terms of dollars. As we have seen, an exchange rate of $1.50 per pound means that an American pays $75 for a winter priced at £50 in Britain. Because the pound is worth $1.50 per dollar, the price of sweaters in terms of pounds is ($75/1.50) = 1.50 pounds per pair of jeans. Naturally, a British tourist faces the same relative prices ($250 per pair of jeans)/$177 per pair of jeans per sweater. Table 13.2 shows the relative prices implied by exchange rates of $1.25 per pound, $1.50 per pound, and $1.75 per pound, on the assumption that the dollar price of jeans and the pound price of sweaters are unaffected by the exchange rate changes. To test your understanding, try to calculate these relative prices for yourself and confirm that the outcome of the calculation is the same for a British and for an American.

The table shows that if the goods' money prices do not change, an appreciation of the dollar against the pound makes sweaters cheaper in terms of pounds (each pair of jeans buys more sweaters) while a depreciation of the dollar against the pound makes sweaters more expensive in terms of pounds (each pair of jeans buys fewer sweaters). The computations illustrate a general principle. All else equal, an appreciation of a country's currency raises the relative price of its exports and lowers the relative price of its imports. Conversely, a depreciation lowers the relative price of a country's exports and raises the relative price of its imports.
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Table 13-2

<table>
<thead>
<tr>
<th>Exchange Rate</th>
<th>Rate per Euro</th>
<th>Rate per British Pound</th>
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<td>1.50</td>
<td>1.75</td>
<td>1.95</td>
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The Foreign Exchange Market

Just as other prices in the economy are determined by the interaction of buyers and sellers, exchange rates are determined by the interaction of the households, firms, and financial institutions that will buy foreign currency to make international purchases. The market in which international currency transactions take place is called the foreign exchange market.

The Actors

The major participants in the foreign exchange market are commercial banks, corporations that engage in international trade, multinational financial institutions such as international banking and insurance companies, and central banks. Individuals may also participate in the foreign exchange market—for example, the traveler who buys foreign currency at a bank's counter desk—since each cash transaction is an infinitesimal fraction of total foreign exchange trading.

We now review the major actors in the market and their roles.

1. Commercial banks: Commercial banks are at the center of the foreign exchange market because almost every significant international transaction involves the buying and selling of accounts of commercial banks in various financial centers. Thus, the rates of exchange for foreign currencies are determined by the prices of foreign exchange transactions, and the prices of foreign exchange transactions involve the prices of dollar deposits denominated in different currencies.

Let's look at an example. Suppose Exxon Corporation wishes to pay $10,000 to a German supplier. Exxon gets an exchange rate quotation from its own commercial bank, the Third National Bank, in New York. The Third National offers to pay €10,000 (that is, 10,000 euros) for $10,000 in deutsche mark.

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As the example shows, banks usually engage in the foreign exchange market to cover the needs of their customers. In addition, banks also engage in foreign exchange trading because of their willingness to pay a lower rate to buy foreign currency from their customers and receive deposits in foreign currency. This need for foreign exchange trading accounts for most of the activity in the foreign exchange market. Indeed, the exchange rates listed in Table 13-2 are interbank rates, the rates banks charge to each other. No amount in this section is quoted at these rates. The rates available to cor-

porate customers, called "retail" rates, are usually less favorable than the "wholesale" interbank rates.

Because their international commitments are extensive, large multinational corporations are well-suited to buying foreign exchange. In particular, multinational corporations are well-suited to buying currencies for foreign operations, and multinational corporations are well-suited to buying currencies in which they have headquarters.

To pay workers as in Mexico, for example. IBM may need Mexican pesos. If IBM has only dollars earned by selling computers in the United States, it can acquire the pesos it needs by paying workers in dollars in the foreign exchange market.

A TALE OF TWO DOLLARS

Back in 1976, the United States dollar and the Canadian dollar traded roughly at par, that is, at a one-to-one exchange rate. In the following 15 years, however, Canada's dollar has virtually disappeared against its American counterpart. By early 2002, the Canadian dollar was worth only about 65 United States cents.*

The tendency of the Canadian currency to depreciate accelerated in the late 1990s as the world prices of many of Canada's natural resource exports slumped. Canadian manufacturing export prices, measured by their ability to sell goods from easily abroad, while import prices at the higher prices they had to pay. Nominal income was the effects more striking time of Nigeria's debt, when thou-

sands cross the U.S.-Canadian border, going in both directions, every day. Canadians accustomed to going to the U.S. side for a weekend dinner found it harder to afford the meat. At the same time, Americans could suddenly find bargains on the Canadian side.

Canadian one-dollar coins carry on their backs the picture of a lion, the web-footed, fish-eating


bird often seen and based on Canada's take. Canada's dollar significantly is widely known as the "looney." One group of Canadian bonds avoided the loonsie in the late 1990s was the Timex Blue Jays. Because the American League baseball fans plays most of its games north of the Canadian border and participates in a U.S. national market for players, 80 percent of its revenue (excluding players' salaries) are in U.S. dol-

lars. On the other hand, 95 percent of its revenue (excluding players' salaries) are in Canadian dollars. A sudden and sharp depreciation of the loonie would cause big losses for the team by raising its expenses relative to its revenues. To prevent itself from suffering the effects of the exchange rate, the team often feels to make its sales U.S. dol-

lars ahead of time so that it can sell bonds and increase its revenue. American investors are in advance to lock in the exchange rate. Errors in the currency market are more costly for the Blue Jays than for the team.
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3. Monetary institutions. Over the years, deregulation of financial markets in the United States, Japan, and other countries has encouraged national financial institutions to offer their customers a broader range of services, many of them internationally-based from those offered by banks. Among these have been services involving foreign exchange transactions. Institutional investors, such as pension funds, often trade foreign currencies.

4. Central banks. In the previous chapter we learned that central banks sometimes intervene in foreign exchange markets. While the volume of central bank transactions is typically not large, the impact of these transactions may be great. The reason for this impact is that participants in the foreign exchange market watch central bank actions closely for clues about future macroeconomic policies that may affect exchange rates. Government agencies other than central banks may also trade in the foreign exchange market, but central banks are the most regular official participants.

Characteristics of the Market

Foreign exchange trading takes place in many financial centers, with the largest volume of trade occurring in such major cities as London (the largest market), New York, Tokyo, Frankfurt, and Singapore. The worldwide volume of foreign exchange trading is enormous, and it has ballooned in recent years. In April 1999 the average daily value of global foreign exchange trading was close to $500 billion per day, of which $364 billion were traded daily in London, $115 billion in the United States, and $111 billion in Tokyo. Only twelve years later, in April 2011, the daily global value of foreign exchange trading was reported to be $5.1 trillion. This jump to $5.1 trillion was due mainly to the rapid rise in newly emerging economies as their currencies became more widely traded. The increase in trading activity in these new financial centers has necessitated the development of new venues for trading and clearing transactions.

The integration of financial centers implies that there can be no significant difference between the dollars traded in each of these centers. As a result, the dollar-to-euro exchange rate quoted in New York at 9:00 A.M. and the dollars-to-euro exchange rate quoted in London at the same time (which corresponds to 2:00 A.M. London time) should be very similar. If the rates were very different, say 1.0 in New York and 1.2 in London, profits could be made through arbitrage, the process of buying a currency cheap in one place and selling it dearer in another. Firms that trade currencies have developed a sophisticated system to allow them to make a profit out of such situations.

**Note:**

4. April 1999 figures from the Bank of International Settlements not included, thereby understating the total volume of foreign exchange trading. Also, the Bank of International Settlements releases data on a monthly basis, so the figures for April 1999 are the latest available data as of April 2011. The April 2011 figures are based on reports from the Bank of International Settlements, the Bank for International Settlements, and the Bank for International Settlements.

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400,000. If all traders used cash in an open opportunity, however, their demand for cash in New York would drive up the dollar price of euros there, and their supply of euros in London would drive down the dollar price of euros there. Very quickly, the difference between the New York and London exchange rates would disappear. Since foreign exchange traders constantly watch their computer screens for arbitrage opportunities, the few that are near equal would very short-lived.

While a foreign exchange transaction can involve any two currencies, most transactions between banks (around 90 percent in 2000) involve exchanges of foreign currencies for U.S. dollars. This is true even when a bank's goal is to sell one nondollar currency and buy another. A bank wishing to sell Swiss francs and buy dollar bonds, for example, will usually sell in francs for dollars and then use the dollars to buy bonds. While this procedure may appear redundant, it is actually cheaper for the bank than the alternative of trying to find a broker of such deals which will buy Swiss francs. The advantage of trading through the dollar is a result of the United States' importance in the world economy. Because the volume of international transactions involving dollars is so great, it is not hard to find parties willing to trade dollars against Swiss francs or deutschmarks. In contrast, relatively few individuals require direct exchanges of Swiss francs for deutschmarks.

Because of its pivotal role in many foreign exchange deals, the dollar is sometimes called a vehicle currency. A vehicle currency is one that is widely used to denominate international contracts made by parties who do not reside in the country that issues the currency. It has been suggested that the euro, which was introduced in the euro zone at the end of 1999, will evolve into a vehicle currency, on a par with the dollar. By April 2001, however, only about 38 percent of foreign exchange trades involved euros. This proportion, once second only to the dollar as an international currency, has declined in importance.

**Sport Rates and Forward Rates**

The foreign exchange transactions that we have bin discussing take place on the open market, where two parties agree to an exchange of bank deposits and conclude the deal immediately. Exchange rates governing such "on-the-spot" trades are called spot exchange rates, and the deal is called a spot transaction. The term spot is a bit misleading because even spot exchange transactions usually become effective only a day or two after a deal is struck. The delay occurs because in some cases it takes two days for payment instructions (such as checks) to be cleared through the banking system. Suppose Apple Computer has a balance in an account at the National Westminster Bank in

**The Swiss Franc/Indian Rupee exchange rate is contractual because the dollar is transferred first and the Indian rupee is transferred later.**

4. Swiss Franc—Indian Rupee exchange rate is contractual because the dollar is transferred first and the Indian rupee is transferred later.
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London has rented to the Bank of America in San Francisco, which has offered Apple a most favorable spot exchange rate for pounds on the basis where it has its dollar account, Wells Fargo. On Monday, June 27, Apple pays the pounds to Bank of America with a pound check drawn on National Westminster, while Bank of America, in turn, pays Apple, where Apple's account is at Wells Fargo. Normally, Apple cannot own the dollars it has bought, as the Bank of America would receive pounds until Wednesday, July 2, two business days later. In the region of the foreign exchange market, the value date for a spot transaction—the date on which the parties actually receive the funds they have transferred—occurs two business days after the deal is made.

Foreign exchange deals sometimes involve a value date farther away than two days—30 days, 90 days, 180 days, or even several years. The exchange rates quoted in such transactions are called forward exchange rates. In a 30-day forward transaction, for example, two parties may agree on April 1 to a spot exchange of $100,000 for £55,000 on May 1. The 30-day forward exchange rate is therefore $1.5255 per pound, and it is generally different from the spot rate and from the forward rates applied in different value dates. When you agree to sell pounds for dollars on a future date at a forward rate agreed on today, you have "sold pounds forward" and "bought dollars forward.

Table 13-1 reports forward exchange rates for the seven heavily traded foreign currencies. (The forward quotations, when available, are listed below the corresponding spot quotations.) Forward and spot exchange rates, while not necessarily equal, do move closely together, as illustrated for dollar-pound rates in Figure 13-1. The opposite to this chapter, which discusses how forward exchange rates are determined, explains the close relationship between movements in spot and forward rates.

An example shows why parties may wish to engage in forward exchange transactions. Suppose an American who imports goods from Japan knows that in 30 days he must pay yen to a Japanese supplier for a shipment arriving then. The importor can tell rate for $100 and must pay his supplier $100,000 per yen, so his profit depends on the dollar-yen exchange rate. At the current spot exchange rate of $0.007 per yen, the importer would pay $(840.00 per yen) × ($90,000 per yen) = $75,600. If and would therefore make $5,400. However, the importor will not have the tenth to pay the supplier until the rates arrive and are sold. If over the next 30 days the dollar appreciates, the importer will have to pay $(840.00 per yen) × ($90,000 per yen) = $75,600. If the importor can make a 30-day forward exchange deal with the bank. If the bank agrees to sell yen to the importer in 30 days at a rate of $0.007, the importer is assured of paying exactly $(840.00 per yen) × ($90,000 per yen) = $75,300 per yen to the supplier. By buying yen and selling dollars forward, the importor has guaranteed a profit of $3,700 per yen and is insured against the possibility that a sudden exchange rate change will turn a profitable importing deal into a loss.

From now on, when we mention an exchange rate without specifying whether it is a spot rate or a forward rate, we will always be referring to the spot rate.

Foreign Exchange Swaps

A foreign exchange swap is a spot sale of a currency combined with a forward purchase of the currency. For example, a multinational company has just received $1 million from sales and knows it will have to pay these dollars to a California supplier in three months.

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Exhibit 13-1 shows the 30-day and 90-day forward exchange rates for 1981-2000.

The company's asset management department would therefore have to invest $1 million in Swiss francs. For a three-month swap of dollars into Swiss francs may result in lower break-even fees than the two marginal transactions of selling dollars for spot Swiss francs and selling the Swiss francs for dollars on the forward market. Swaps make up a significant portion of all foreign exchange trading.

Futures and Options

Several other financial instruments used in the foreign exchange market, like forward contracts, involve future exchanges of currencies. The timing and terms of the exchanges can differ, however, from those specified in forward contracts, giving traders additional flexibility in avoiding foreign exchange risk. Only 20 years ago, some of these instruments were not traded on organized exchanges. When you buy a commodity, you buy a promise that a specified amount of foreign currency will be delivered on a specified date in the future. A forward contract between you and some other party is an alternative way to ensure that you receive the same amount of foreign currency on the date in question. But while you have no choice about fulfilling your end of a forward deal, you can sell your futures contract on an organized futures exchange, realizing a profit or loss right away. Such a trade might appeal to someone for, for example, if your views about the future spot exchange rate were to change.

A foreign exchange option gives its owner the right to buy or sell a specified amount of foreign currency at a specified price at any time up to a specified expiration date. The other party to the deal, the option's seller, is required to sell or buy the foreign currency in the discretion of the option's owner, who has no obligation to exercise his right.
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Imagine that you are uncertain about what will happen in the next few months. To solve this problem, you may wish to buy a put option giving you the right to sell the foreign currency at a known exchange rate at any time during the month. If interest rates you expect to make a profit or loss on the stock is 10 percent per year. We call this a "delta rate" of return because the two values we compare are expressed in terms of dollars. It is also possible, however, to compare different rates of return by expressing the two values in terms of a foreign currency or a commodity such as gold.

The Demand for Foreign Currency Assets

We have now seen how banks, corporations, and other institutions trade foreign currency and deposit in a worldwide foreign exchange market that operates 24 hours a day. As major users ask how the major users' demands for different types of foreign currency deposits are determined. The demand for a foreign currency deposit is influenced by the same considerations that influence the demand for any other asset. Chief among these considerations is our view of what the expected return will be in the future. A foreign currency deposit's future value depends in turn on two factors: the interest rate it offers and the expected change in the exchange rate against other currencies.

Assets and Asset Returns

As you will recall, people can hold wealth in many forms—stocks, bonds, cash, real estate, rare coins, diamonds, and so on. The object of acquiring wealth is to transfer purchasing power into the future. We may do this to provide for our retirement years, for our heirs, or simply because we earn more than we need to spend in a particular year and prefer to save the balance for a rainy day.

Defining Asset Returns.

Because the object of saving is to provide for future consumption, we judge the desirability of an asset largely on the basis of its rate of return. This, in turn, is the percentage increase in value it offers over some time period. For example, suppose that at the beginning of 2003 you pay $100 for a share of stock issued by Financial Stockholders, Inc. If the stock pays you a dividend of $1 at the beginning of 2004, and if the stock's price rises from $100 to $100 per share over the year, then you have earned a rate of return of 10 percent on your stock investment. If your initial $100 investment has grown in value to $110, the sum of the $1 dividend and the $100 you paid for by selling your share, then Financial Stockholders stock paid out $1 in dividends in addition to its price rise, in other words, you would be worth $90 by year's end, giving you a total return of $90.

You often cannot know in advance how much of your return to an asset will actually pay you after you buy it. Such a dividend paid by a share of stock and the share's resale price, for example, may be based on many factors. Your decision to invest should be based on your expected rate of return. To calculate an expected rate of return for some time period, you make your best forecast of the asset's net value at the period's end. The percentage difference between that expected future value and the price you pay for the asset today equals the asset's expected rate of return over the time period.
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Interest Rates

As in other money markets, participants in the foreign exchange market have their demands for deposits of different currencies on a comparison of the interest rates paid by different banks. To compare returns on a deposit of a particular currency, the comparison unit of analysis is an individual investment in a money market, as with Eurodollars. First, they need to know how the interest rates on deposits in different currencies are determined. The rate of interest paid to determine the size of returns on a deposit of a particular currency is the money market interest rate, the amount of that currency that an individual can earn by lending a sufficient amount for a year at a dollar interest rate of $10 (quoted as 10 percent per year). The interest on $100,000 deposited at the end of the year is $10; the interest on $100,000 is $10 at the end of the year, 31 of which is principal and 60 cents of which is interest. It is determined that the principal is the return the money market rate of interest that must be paid to borrow $10 for a year. When you buy a U.S. Treasury bill, you earn the interest rate on dollars because you are lending dollars to the U.S. government.

Interest rates play an important role in the foreign exchange market because the large deposits tied there pay interest, each in the U.S. dollars. A money market, as with Eurodollars. For example, the money market interest rate of 10 percent per year, $100,000 deposit is worth $100,000.00 after a year, when the money market rate of interest is 5 percent per year, a $100,000 deposit is worth $100,000.00 after a year. Depositors pay interest because they are lent back to the depositor or investor. Where a corporation is not a financial institution, it is lending that money to the bank rather than using it for some other purpose. In other words, the depositor is acquiring it at least in a money market.

The dollar interest rate is roughly the dollar rate of return on dollar deposits. You "buy" the deposit by lending a bank a dollar, and when you are paid back with 10 percent interest at the end of the year your annual interest rate is $10. This gives a rate of return of $10.00 - $10.00/100.000 = 0.10, or 10 percent per year. Similarly, a foreign currency's interest rate

\[ \text{Interest rate (percent per year)} = \frac{\text{Annual return}}{\text{Deposit amount}} \]

Since dollar and different currency deposits are not measured in comparable terms, they must be compared over time. This is done by using a comparable "basket" of dollars and foreign currency deposits. In this way, the foreign currency returns on a deposit of that currency are compared to the domestic currency return on the same currency deposit.

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dollars will I get back a year later? When you answer this question, you are calculating the dollar rate of return on a non-payment because you are comparing its dollar price today with its dollar value a year from today.

To see how to approach this type of calculation, let's look at the following situation: Suppose that today's exchange rate (stated in American terms) is $1.10 per euro, but that you expect the rate to be $1.165 per euro a year from now (perhaps because you expect a visible devaluation in the U.S. economy). Suppose also that the dollar interest rate is 10 percent per year while the euro interest rate is 5 percent per year. This means a deposit of $1.00 pays 1.10 after a year while a deposit of €1.00 pays €1.05 after a year. Which of these deposits offers the higher return?

The answer can be found in five steps.

**Step 1. Use the today's dollar-euro exchange rate to figure out the dollar price of a euro deposit of, say, €1. If the exchange rate today is $1.10 per euro, the dollar price of a €1 deposit is just $1.10.**

**Step 2. Use the euro interest rate to fact the amount of money you will have a year from now if you purchase a €1 deposit today. You know that the interest rate on euro deposits is 5 percent per year. So at the end of a year, your €1 deposit will be worth €1.05.**

**Step 3. Use the exchange rate you expect to prevail a year from today to calculate the expected dollar value of the euro amount determined in Step 2. Since you expect the dollar to depreciate against the euro over the coming year so that the exchange rate 12 months from today is $1.165 per euro, then you expect the dollar value of your euro deposit after a year to be $1.165 per euro, or $1.165 X 1.05 = $1.225.**

**Step 4. Now that you know the dollar price of a €1 deposit today (§1.10) and ten months from today (§1.225), you can calculate the expected dollar rate of return on a euro deposit at $1.225 − $1.10 = $0.12, or 11 percent per year.**

**Step 5. Since the dollar rate of return on a dollar deposit (the dollar interest rate) is only 10 percent per year, you expect to do better by holding your wealth in the form of euro deposits. Despite the fact that the dollar interest rate exceeds the euro interest rate by 5 percent per year, the euros' expected appreciation against the dollar gives non-banks a prospective capital gain that is large enough to make euro deposits the higher-yielding area.**

A Simple Rule

There is a simple rule that allows us to do this calculation. First, define the rate of depreciation of the dollar against the euro as the percentage increase in the dollar/euro exchange rate over a year. In the last example, the dollar's expected depreciation rate is 1.165 − 1.10/1.10 = 0.059, or roughly 6 percent per year. Once you have calculated the rate of depreciation of the dollar against the euro, our rule is this: The dollar rate of return on euro deposits is approximately the euro interest rate plus the rate of depreciation of the dollar against the euro. In other words, to transform the euro return on euro deposits into dollar terms, you need to add the rate at which the euro's dollar price raises your in the euro interest rate. In our example, the sum of the euro interest rate (6 percent) and the expected depreciation rate of the dollar (roughly 6 percent) is about 12 percent, which is what we found to be the expected dollar return on euro deposits in our first calculation.

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We summarize our discussion by introducing some notation:

\[ R_d = \text{today's interest rate on one-year euro deposits}, \]

\[ R_e = \text{today's dollar/euro exchange rate (number of dollars per euro)}, \]

\[ R_{de} = \text{dollars/euro exchange rate (number of dollars per euro) expected to prevail a year from today.} \]

(The superscript e attached to this last exchange rate indicates that it is a forecast of the future exchange rate based on what people know today.)

Using these symbols, we write the expected rate of return on a euro deposit, measured in terms of dollars, in the sum of (1) the euro interest rate and (2) the expected rate of dollar depreciation against the euro:

\[ R_d = \frac{1}{R_{de} - R_e} \]

This expected return is what must be compared with the interest on one-year dollar deposits, \( R_d \), in deciding whether dollar or euro deposits offer the higher expected rate of return. The expected rate of return difference between dollar and euro deposits is therefore equal to \( R_d \) less the above expression:

\[ R_d - R_e = \frac{1}{R_{de}} - R_e \]

This difference above is positive, dollar deposits yield the higher expected rate of return; where it is negative, euro deposits yield the higher expected interest return.

Table 13.3 contains a few illuminating comparisons. In case 1, the interest rate in favor of dollar deposits is 4 percent per year (\( R_d = 0.04 = 0.02 + 0.02 \)), and no change in the exchange rate is expected (\( R_{de} = R_e = 1.00 \)). This means that the expected annual real rate of return on dollar deposits is 4 percent higher than that on euros, so that, other things equal, you would prefer to hold your wealth as dollars rather than euros. In case 2, the interest difference is the same (4 percent), but it is just offset by an expected depreciation rate of the dollar of 4 percent. The two assets therefore have the same expected rate of return.

If you compare the expected dollar return on euro deposits using the exact, fire method used above, but with the following assumption:

introducing the exchange rate, you find that the actually yields:

\[ R_d = \frac{1}{R_{de}} - R_e \]

This expression can be summarized, however, as:

\[ R_d = \frac{1}{R_{de}} - R_e \]

The expression above is very close to the formula derived from the simple rate where, as is usually the case, the product \( R_d \cdot R_{de} = 1 \) is small relative.
Table 12.3 Exchange Rates and Open-Economy Macroeconomics

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<th>Case</th>
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<td>0.06</td>
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The difference between the expression above and RF is identical to equation (13.3). Thus, it makes no difference to our comparison whether we measure returns in terms of money or in terms of some third currency. Suppose, for example, we wanted to measure the return on dollar deposits in terms of euros. Following our simple rule, we would add to the dollar return RF the expected rate of depreciation of the euro against the dollar. But the expected rate of depreciation of the dollar against the dollar is approximately the expected rate of appreciation of the euro against the euro, that is, the expected rate of depreciation of the dollar against the euro is negative. This means that in terms of euros, the return on a dollar deposit is

\[ r_F = \frac{E_{RF} - E_{RF}}{E_{RF}} \]

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condition. It implies that present holders of foreign currency deposits view them as equally desirable assets.

Let’s see why the foreign exchange market is in equilibrium only when the interest parity condition holds. Assume the dollar interest rate is 10 percent and the euro interest rate is 0 percent, but the dollar is expected to depreciate against the euro at an 8 percent rate per year. (This is case 3 in Table 13.3.) In the circumstances described, the rate of return on euro deposits would be 8 percent per year higher than that on dollar deposits. We assumed at the end of the last section that individuals always prefer to hold deposits of currencies offering the higher expected rates of return, so we assumed that the expected return on euro deposits is 4 percent greater than that on dollar deposits, no one would be willing to continue holding dollar deposits, and holders of dollar deposits would be trying to sell them for more deposits. There will therefore be an excess supply of dollar deposits and an excess demand for euro deposits in this foreign exchange market.

As a contrasting example, suppose that dollar deposits again offer a 10 percent interest rate but euro deposits offer a 2 percent rate and the dollar is expected to appreciate against the euro by 3 percent per year. (This is case 4 in Table 13.3.) Now the ex ante rates on dollar deposits are 8 percent higher. In this case no one will demand more deposits, so there will be an excess supply of dollar deposits and an excess demand for euro deposits in this foreign exchange market.

When, however, the dollar interest rate is 10 percent, the euro interest rate is 6 percent, and the dollar’s expected appreciation rate against the euro is 3 percent, dollar and euro deposits offer the same rate of return and participants in the foreign exchange market are willing to hold either. (This is case 2 in Table 13.3.)

Only if all expected rates of return are equal—i.e., that is, when the interest parity condition holds—is there a natural balance of supply of one type of deposit and no excess demand for another. The foreign exchange market is in equilibrium when no type of deposit in one currency is in excess demand or excess supply. We can therefore say that the foreign exchange market is in equilibrium when the interest parity condition holds.

To approximate interest parity between dollar and euro deposits symmetrically, we use expression (13.1), which shows the difference between the two assets’ expected rates of return measured in dollars. The expressed rates of return are equal when

\[ R_e = R_d + \left( \frac{1}{1 + \text{Euro}} \right) \delta_{\text{Variable}} \]

(13.2)

You probably suspect that when dollar deposits offer a higher return than euro deposits, the dollar will appreciate against the euro as investors all try to shift their funds into dollars. Conversely, the dollar should depreciate against the euro when it is a euro deposit that initially offers the higher return. This intuition is exactly correct. To understod the mechanics at work, however, we must take a careful look at how exchange rate changes force investors to maintain equilibrium in the foreign exchange market.

How Changes in the Current Exchange Rate Affect Expected Returns

As a first step in understanding how the foreign exchange market finds its equilibrium, we examine how changes in the current exchange rate affect the expected return on a foreign currency deposit when interest rates and expectations about the future exchange rate do not change. Our analysis will show that, other things being equal, depreciation of a country’s currency today (away from the expected domestic currency rates on foreign currency deposits. Conversely, appreciation of the domestic currency today, all else equal, means the domestic currency returns expected of foreign currency deposits

It is easier to see why these relationships hold by looking at an example. How does a change in today’s dollar/euro exchange rate, all else held constant, change the expected return, measured in terms of dollars, on euro deposits? Suppose that today’s dollar/euro rate is $1.05 per euro and the exchange rate you expect for this day next year is $1.05 per euro. Then the expected rate of dollar depreciation against the euro is \( 1.05 - 1.05(1.03) = 0.03 \) percent per year. What has happened to the “bonus” you expect to get from the euro’s increase in value in terms of dollars? The expected rate of dollar depreciation is now only 0.03 percent per year, or 0.03 percent per year. Since \( R_d \) has not changed, the dollar return on euro deposits, which is the sum of \( R_e \) and the expected rate of dollar depreciation, has fallen by 0.03 percent per year, or 0.3 percent per year.

In Table 13.4 we work out the dollar return on euro deposits for various levels of today’s dollar/euro exchange rate \( R_e \) always assuming the expected future exchange rate remains fixed at $1.05 per euro and the euro interest rate is 3 percent per year. As you can see, the in today’s dollar/euro exchange rate (a depreciation of the dollar against the euro) always knows the expected dollar return on euro deposits (as in our example), which a fall in today’s dollar/euro exchange rate (an appreciation of the dollar against the euro) always makes them rise.

It may not counter to your intuition that a depreciation of the dollar against the euro makes euro deposits less attractive relative to dollar deposits (by lowering the expected dollar return on euro deposits) while an appreciation of the dollar makes euro deposits even more attractive. This result will seem less surprising if you remember we have assumed that the expected future dollar/euro rate and interest rates do not change. A dollar depreciation today, for example, means the dollar now needs to depreciate by a smaller amount to reach any given expected future level. If the expected future dollar/euro exchange rate does not
change when the dollar depreciates today, the dollar's expected future depreciation against the euro therefore falls, or, alternatively, the dollar's expected future appreciation rises. Since interest rates also are exchanged, today's dollar depreciation thus makes euro deposits less attractive compared with dollar deposits.

In simpler words, a decrease in the dollar deposit rate means that the expected future dollar deposit rate is lower than the current dollar deposit rate. This change naturally makes euro deposits less attractive compared with dollar deposits.

It may also help to think of today's exchange rate change while the exchange rate expected for the 1-year spot rate. We will instead consider the change in the spot rate when both of these rates are the same. We will then be looking at the impact of a temporary change in the spot rate on the expected exchange rate for the next year. The figures 13-2 shows the calculation in Table 13-4, which is a graphic from that will be helpful in our analysis of exchange rate movements. The vertical axis in the figure measures today's dollar-dollar exchange rate and the horizontal axis measures the expected dollar return on euro deposits. For fixed values of the exchange rate between the dollar-dollar exchange rate and the euro interest rate, the relation between today's dollar-dollar exchange rate and the expected dollar return on euro deposits defines a downward-sloping schedule.

The Equilibrium Exchange Rate

Note that we can understand the interest parity condition more clearly if the foreign exchange market is in equilibrium and how today's exchange rate affects the expected return on foreign currency deposits, one can see the equilibrium exchange rate we have derived. One main conclusion will be that exchange rates are always subject to market-based parity. We continue to assume that the interest rate on euro deposits, in equilibrium. The market model in the graph shows the expected equilibrium exchange rate for the future, and the expected future dollar-dollar exchange rate E_{\$/€} is the same.

Figure 13-4 illustrates how the equilibrium dollar-dollar exchange rate is determined under the assumption. The vertical schedule in the graph depicts the fixed level of \( E_{\$/€} \), the interest rate on dollar deposits measured in terms of dollars. The downward-sloping schedule shows how the expected return on euro deposits measured in terms of dollars depends on the current dollar-dollar exchange rate. This second schedule is derived in the same way as the two shown in Figure 13-2.

The equilibrium dollar-dollar rate is the one indicated by the intersection of the two schedules at point \( P_{\$/€} \). At this exchange rate, the returns on dollar and euro deposits are equal, so that the interest parity condition (13.2)

\[
R_d = R_e \iff E_{\$/€} = E_{\$/€}^{eq}
\]

is satisfied.

Let's see why the exchange rate will settle at point \( P \) in Figure 13-4 if it is initially at a point such as 2 or 3. Suppose first that we are at point 2, with the exchange rate equal to \( E_{\$/€} = E_{\$/€}^{eq} \). The downward-sloping schedule measures the expected dollar return on euro deposits.
PART 3 Exchange Rates and Open-Economy Macroeconomics

CHAPTER 13 Exchange Rates and the Foreign Exchange Market

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The exchange rate (which is the relative price of two assets) responds to factors that alter the expected rates of return on those two assets.

The Effect of Changing Interest Rates on the Current Exchange Rate

We often read in the newspaper that the dollar is strong because U.S. interest rates are high or that it is falling because U.S. interest rates are falling. Can these statements be explained using our analysis of the foreign exchange market?

To answer this question we again turn to a diagram. Figure 13.5 shows a rise in the interest rate on dollars, from $R_D$ to $R_S$, as a reference shift of the vertical dollar deposit schedule. At the initial exchange rate $E_{x0}$, the expected return on dollar deposits is now higher than that on euro deposits by an amount equal to the distance between points 1 and 2. As we have seen, this difference causes the dollar to appreciate to $E_{x1}$ (point 2). Because there has been no change in the euro interest rate of its the expected future exchange rate, the dollar's appreciation today raises the expected dollar return on euro deposits by increasing the rate at which the dollar is expected to depreciate in the future.

The change causes the overnight-arbitrage schedule (which measures the expected dollar return on euro deposits) to shift upward. (To see why, ask yourself how a rise in the euro interest rate affects the dollar return on euro deposits, given the current exchange rate and the expected future rate.)

At the initial exchange rate $E_{x0}$, the expected depreciation rate of the dollar in the future (before the rise in $R_D$) on euro deposits was lower than that on dollar deposits. The dollar/furo exchange rate rises (from $E_{x0}$ to $E_{x1}$) to eliminate the excess supply of dollar assets at point 1. As before, the dollar's depreciation against the euro exhibits the excess supply of dollar assets by lowering the expected dollar rate of return on euro deposits. A rise in European interest rates therefore leads to a depreciation of the dollar against the euro, which is expected to appreciate the euro against the dollar.

Our discussion shows that, all else equal, an increase in the interest paid on deposits of a currency causes that currency to depreciate against foreign currencies.

Before we conclude that the newspaper accounts of the effects of interest rates on exchange rates is correct, we must remember that our analysis of a consumer's expected future exchange rate was unrealistic. In many cases, a change in interest rates will be accompanied by a change in the expected future exchange rate. This change in the expected future exchange rate will depend, in turn, on the economic causes of the interest rate change.

We compare different possible relationships between interest rates and expected future exchange rates in Chapter 10. Keep in mind for now that in the real world, we cannot predict how a given interest rate change will alter exchange rates unless we know why the interest rate change is occurring.

The Effect of Changing Expectations on the Current Exchange Rate

Figure 13.6 may also be used to study the effect on today's exchange rate of a rise in the expected future dollar/furo exchange rate, $E_{x1}^e$.

Given today's exchange rate, a rise in the expected future price of euros in terms of dollars raises the dollar's expected depreciation rate. For example, if today's exchange rate is
The Perils of Forecasting Exchange Rates

If exchange rates are asset prices that respond immediately to changes in expectations and interest rates, they should have properties similar to those of other asset prices, for example, stock prices. Like stock prices, exchange rates should respond strongly to "news," that is, to unexpected economic and political events, and, like stock prices, they therefore should be very hard to forecast.

Despite the increased difficulty of forecasting stock prices, there is no shortage of newsletters and television programs devoted to stock-market prediction. Similarly, numerous firms will exchange-rate forecasts to individual investors, international corporations, and others with financial interests in the foreign-exchange market. In a well-known study, Richard M. Levich of New York University surveyed the track record of a dozen exchange-rate forecasting companies in making near-term forecasts as to future rates. The results were disappointing for would-be exchange-rate speculators because of the extent of the errors in the foreign-exchange markets.

This finding does not mean that forward rates are accurate predictors. On the contrary, the evidence suggests that forward rates usually contain little information useful in predicting future spot rates (as we shall see in Chapter 7). When Levich's results do show that interest-rate expectational "news" plays such a dominant role in determining exchange rates that exchange-rate movements, like movements in stock prices, are almost completely impossible to forecast even over horizons of a year or less.

The theory we developed in this chapter suggests that exchange rates should not be completely impossible to forecast. According to the interest parity condition, interest-rate differentials should give indication of how much currency depreciation is expected. In practice, however, measured or expected currency movements are much greater than interest-rate differentials and suggest the predictability of movements in exchange rates. Forcans based on economic models were the most successful when used for long-term predictions, that is, predictions of exchange-rate movements a year ahead. For example, a country with sustained increase in its price level is likely eventually to experience currency depreciation, although the precise timing of the depreciation may be impossible to predict. In the next few chapters we will develop an open-economy model that links exchange-rate movements to changes in countries' price levels and other macroeconomic variables.

---


This chapter's appendix suggests one way of forecasting exchange rates might be related to expected future spot rates.

$1.00 per euro and the rate expected to prevail in a year is $1.05 per euro, the expected depreciation rate of the dollar against the euro is $0.05 ($1.05 — $1.00) = 0.05. If the expected future exchange rate were stable at $1.05 per euro, the expected depreciation rate also would be $0.00 ($1.05 — $1.05) = 0.00. Therefore a rise in the expected depreciation rate of the dollar means the expected dollar return on the deposit, the downward-sloping schedule shifts to the right, as in Figure 13-6.
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PART 3 Exchange Rates and Other-Monetary Macroeconomics

As the initial exchange rate, there is now an excess supply of dollars deposits, or deposits offer a higher expected rate of return (measured in dollars terms) than in the latter deposits. The dollar therefore depreciates against the euro until expectations are reached to point 3.

We conclude that, if the equation, is the expected future exchange rate, or the expected future exchange rate causes a fall in the current exchange rate.

Summary

1. An exchange rate is the price of one country's currency in terms of another country's currency. Exchange rates play a critical role because they enable us to translate different countries' prices into comparable terms. All else equal, a depreciation of a country's currency against foreign currencies (a rise in the home currency price of foreign currencies) makes its exports cheaper and its imports more expensive. An appreciation of its currency (a fall in the home currency price of foreign currencies) makes its exports more expensive and its imports cheaper.

2. Exchange rates are determined in the foreign exchange market. The major participants in this market are commercial banks, investment banks, central banks, and non-resident investors. Commercial banks play a pivotal role in the market because they facilitate the exchanges of interest-bearing bank deposits that make up the bulk of foreign exchange trading. Even though foreign exchange trading takes place in many financial centers around the world, modern telecommunications technology linking these centers together sets a single market price to be 24 hours a day. An important feature of foreign exchange trading is its immediacy, in which parties agree to exchange currencies on some future date at a pre-agreed exchange rate. In contrast, the 'spot' rate (for practical purposes) settles immediately.

3. Because the exchange rate is the relative price of two assets, it is most appropriately thought of as being an asset price too. The basic principle at work here is that an asset's current value depends on its expected future cash-punching power. By evaluating an asset, savers look at the expected return and 0, that is, the return in which the value of an investment in the asset is expected to rise over time. It is possible to measure an asset's expected rate of return in many different ways, each depending on the units in which the return's value is measured. Savers care about an asset's expected average rate of return, the rate at which its value is expected to rise over a period of time, and an index of a suppressed output basket is expected to rise.

4. When relative assets are relevant, as in the foreign exchange market, it is appropriate to compare expected changes in users' returns, provided these values are expressed in the same currency. If risk and liquidity factors do not significantly influence the demand for foreign currency assets, participants in the foreign exchange market always prefer to hold those assets yielding the highest expected rate of return.

The returns on deposits traded in the foreign exchange market depend on interest rates and expected exchange rate changes. To compute the expected returns of return offered by dollar and euro deposits, for example, the return on euro deposits must be expressed in dollar terms by adding to the euro interest rate and expected future rate of depreciation of the dollar against the euro and expected appreciation of the euro against the dollar over the deposit's holding period.

6. Equilibria in the foreign exchange market requires interest parity: that is, deposits offer a higher expected rate of return when returns are measured in comparable terms.

7. The foreign interest rate and a given expectation of the future exchange rate, the interest parity condition tells us the current equilibrium interest rate. When the expected dollar return on euro deposits exceeds that on dollar deposits, for example, the dollar will moderately depreciate against the euro. Other things equal, a dollar depreciation today makes the expected dollar return on euro deposits by reducing the depreciation rate of the dollar in the future. Similarly, when the expected return on deposits is below that on dollar deposits, the dollar will moderately appreciate against the euro. Other things equal, a current appreciation of the dollar makes euro deposits more attractive by increasing the dollar's expected future depreciation against the European currency.

8. All else equal, a rise in dollar interest rates causes the dollar to appreciate (against the euro) while a rise in euro interest rates causes the dollar to depreciate against the euro.

Today's exchange rate is also altered by changes in its expected future level. If there is a rise in the expected future level of the dollar return, for example, then an unchanged interest rate today's dollar/euro exchange rate will also rise.

Key Terms

appraisal, p. 220
arbitrage, p. 220
appreciation, p. 230
depreciation, p. 230
exchange rate, p. 228
foreign-exchange market, p. 228
forward exchange rate, p. 222
interest parity, p. 228
interest rate, p. 228
interest rate parity, p. 228

Problems

1. In March a barometer costs $2.50, but a hot dog costs $1 at Bean's Bonanza Park. As an exchange rate of $1.50 per euro, what is the price of a hotdog in terms of hot dogs? All else equal, how does this relative price change if the dollar appreciates to $1.25 per euro? Compared with the initial situation, has hot dog become more or less expensive relative to its barcode?

2. A U.S. dollar costs 7.65 Swiss francs, but the same dollar can be purchased for 1.25 Swiss francs. What is the New York-to-Swiss franc exchange rate?

3. Calculate the dollar rate of return on the following, etc.

a. A painting whose price rises from $100 to $120 in 2 years.

PART 3 Exchange Rates and Open-Economy Macroeconomics

5. What would be the real rate of return on the asset in the preceding question if the price changes described were accompanied by a simultaneous 10 percent increase in all dollar prices?

6. Suppose the dollar interest rate is 5 percent, the interest rate on German marks is 3 percent, and the dollar exchange rate is $1.20 per mark. If the mark were to appreciate 5 percent, what would be the dollar interest rate?

7. Suppose the price of a good increases in the United States faster than in Canada. How would this affect the exchange rate? Explain your answer in terms of the purchasing power parity theory.

8. A $1,000,000 loan in London costs 8 percent a year when the interest rate on pounds is 10 percent and the $/£ exchange rate is 1.50. If the pound strengthens 10 percent, what effect would this have on the loan costs in dollars?

9. Suppose the current exchange rate is $1.20/£1 and the 6-month forward rate is $1.22/£1. If you were a British importer and needed to buy a large amount of dollars in 6 months, would you use a forward contract to hedge against the risk of the dollar falling against the mark?

10. Does the foreign exchange market exist to support the purchase of goods and services in foreign countries? Explain your answer in terms of the functions of the foreign exchange market.

Further Reading


APPENDIX G TO CHAPTER 13

Forward Exchange Rates and Covered Interest Parity

This appendix explains how forward exchange rates are determined. Under the assumption that the interest parity condition always holds, a forward exchange rate equals the spot exchange rate expected to prevail at the forward contract’s value date.

As the first step in the discussion, we point out the close connections among the forward exchange rate between two currencies, their spot exchange rate, and the interest rates on deposits denominated in those currencies. The connection is described by the covered interest parity condition, which is similar to the (uncovered) interest parity condition defining foreign exchange market equilibrium but involves the forward exchange rate rather than the expected future spot exchange rate.

To become certain, we again consider dollar and euro deposits. Suppose you want to buy a euro deposit with dollars but would like to be certain about the number of dollars it will be worth at the end of a year. You can avoid exchange rate risk by buying a euro deposit and, at the same time, shifting the proceeds of your investment forward. When you buy a euro deposit with dollars and at the same time sell the principal and interest forward for dollars, you say you have "covered yourself," that is, avoided the possibility of an unexpected depreciation of the euro.

The covered interest parity condition states that the rate of return on dollar deposits and "covered" foreign deposits must be the same. An example will clarify the meaning of the condition and illustrate why it must always hold. Let $F_{E}{}$ stand for the one-year forward price of euros in terms of dollars, and suppose $F_{E}{} = \$1.125$ per euro. Assume that at the same time, the spot exchange rate $S_{E}{} = \$1.05$ per euro, $R_{D} = 0.10$, and $R_{E} = 0.06$. The (dollar) rate of return on a dollar deposit is clearly 0.10 or 10 percent per year. What is the rate of return on a covered euro deposit?

We answer this question as in the chapter. A $1 deposit costs $1.05 today, and it is worth $1.05 after a year. If you sell $1.05 forward today at the forward exchange rate of $1.125$ per euro, the dollar value of your investment at the end of a year is $(1.05 \times 1.125) = (1.1875)$, which $1.1875 = 1.18$. The rate of return on a covered purchase of a euro deposit is therefore $(1.18 - 1.05)/1.05 = 0.083$. This 8.3 percent per year rate of return exceeds the 10 percent offered by dollar deposits, so covered interest parity does not hold. In this situation, no one would be willing to hold dollar deposits; everyone would prefer covered euro deposits.

More formally, we can express the covered interest rate on euro deposits at

\[
F_{E} = S_{E} + R_{E} = F_{E} \times S_{E} \frac{1 + R_{E}}{1 + R_{D}}
\]

which is approximately equal to

\[
R_{F} = R_{D} + \frac{R_{E}}{1 + R_{D}}
\]

which is a small number. The covered interest parity condition can therefore be written

\[
R_{F} = R_{D} + \frac{R_{E}}{1 + R_{D}} = \frac{R_{D}}{1 + R_{D}}
\]

The quantity

\[
F_{E} = S_{E} \times \frac{1 + R_{E}}{1 + R_{D}}
\]

is called the forward premium on euros against dollars. It is also called the forward discount on dollars against euros.) Using this terminology, we can state the covered interest parity condition as follows. The interest rate on dollar deposits equals the interest rate on euro deposits plus the forward premium on euros against dollars plus the forward discount on dollars against euros.

There is strong empirical evidence that the covered interest parity condition holds for different currency pairs. While there are forward exchange rates that vary by looking at current interest rates and spot exchange rates and using the covered interest parity formula. Deviations from covered interest parity can occur, however, if the deposits being compared are issued in different countries. These deviations occur when asset holders fear that governments may impose regulations which prevent the free movement of foreign funds across national borders. The derivation of the covered interest parity condition implicitly assumed there was no political risk of this kind.

By comparing the (uncovered) interest parity condition,

\[
R_{F} = R_{D} + \frac{R_{E}}{1 + R_{D}}
\]

with the covered interest parity condition, you will find that both conditions can be true at the same time only if the one-year forward EUR rate quoted today equals the spot exchange rate people expect to prevail in a year from today.

\[
F_{E} = S_{E}
\]

This motion insensitive. When two parties agree in trade foreign exchange on a date in the future, the exchange rate they agree to is the rate they expect to prevail on that date. The important difference between covered and uncovered transactions should be kept in mind.9

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The” exchange rate theorem: A reappraisal,” Journal of Political Economy 95 (February 1987), pp. 135-160. Of course, actual situations in cross border activity are more the result currency parity deviations.
CHAPTER 14
Money, Interest Rates, and Exchange Rates

Chapters 13 showed how the exchange rate between currencies depends on two factors: the interest rate that can be earned on deposits of those currencies and the expected future exchange rate. To understand fully the determination of exchange rates, however, we have to learn how interest rates themselves are determined and how expectations of future exchange rates are formed. In the next three chapters we examine these topics by building on economic models that link exchange rates, interest rates, and other important macroeconomic variables such as the inflation rate and output.

The first step in building the model is to explain the effects of a country’s money supply and of the demand for its money on its interest rate and exchange rate. Because exchange rates are the relative prices of national monies, factors that affect a country’s money supply or demand are among the most powerful determinants of its currency’s exchange rate against foreign currencies. It is therefore natural to begin a deeper study of exchange rate determination with a discussion of money supply and money demand.

Monetary developments influence the exchange rate both by changing interest rates and by changing people’s expectations about future exchange rates. Expectations about future exchange rates are closely connected with expectations about the future money prices of countries’ products—their price movements, in turn, depend on changes in money supply and demand. In examining how monetary factors influence the exchange rate, we therefore look at how monetary factors influence output and prices along with interest rates. Expectations of future exchange rates depend on many factors other than money, however, and these nonmonetary factors are taken up in the next chapter.

Once the theories and determinants of money supply and demand are laid out, we use them to examine how equilibrium interest rates are determined by the equality of money supply and money demand. Then we combine our model of interest rate determination with the interest parity condition to study the effects of monetary shocks on the exchange rate, given the prices of goods and services, the level of output, and markets expectations about the future. Finally, we take a first look at the long-term effects of monetary changes on output prices and expected future exchange rates.
PART 1 Exchange Rates and Open-Economy Macroeconomics

Money Defined: A Brief Review

We are so accustomed to using money that we seldom notice the role it plays in almost all of our everyday transactions. As with many other consumer conveniences, we take money for granted until something goes wrong with it. In fact, the easiest way to appreciate the importance of money is to imagine a society in which it could be transferred between economic agents at low cost. In this section we do just that. Our purpose in carrying out this "thought experiment" is to dispel the notion of money from our minds and to show the very importance of money to the real world.

Money as a Medium of Exchange

The most important function of money is to serve as a medium of exchange, a generally accepted means of payment. To see why a medium of exchange is so important, imagine how time-consuming it would be for people to purchase goods and services in a world where the only type of trade possible was barter trade—the scale of goods or services for other goods or services. Money eliminates the enormous waste costs associated with a barter system because it is universally acceptable. It eliminates these transaction costs by enabling an individual to sell the goods and services she produces to people other than the producers of the goods and services the worker wishes to consume. A complex economic society would cease functioning without some standardized and convenient medium of payment.

Money as an Unit of Account

Money's second important role is as an unit of account, that is, as a widely recognized measure of value. It is in this role that we encountered money in Chapter 1: Virtues and Defects. Prices of goods, services, and assets are typically expressed in terms of money. Exchange rates allow us to translate different countries' money prices into comparable terms.

The conventional quoting of prices in money terms simplifies economic calculations by making it easy to compare the prices of different commodities. The international price comparisons in Chapter 13, which used exchange rates to compare the prices of different countries' output, are similar to the calculations you would have to do to buy many items each day if different countries' prices were not expressed in terms of a standardized unit of account. If the calculations in Chapter 13 gave you a headache, imagine what it would be like to have to calculate the relative prices of each good and service you consume in terms of several other goods and services. This thought experiment should give you a better appreciation of using money as an unit of account.

Money as a Store of Value

Because money can be used to transfer purchasing power from the present into the future, it is also an asset, or a store of value. This attribute is essential for any medium of exchange because no one would be willing to accept it as payment at its value in terms of goods and services exchanged immediately.

Money's usefulness as a medium of exchange, however, automatically makes it the most liquid of all assets. As you will recall from the last chapter, an asset is said to be liquid when it can be transformed into goods and services rapidly and with little transaction costs, such as brokers' fees. Since money is readily acceptable as a means of payment, money sets the standard against which the liquidity of other assets is judged.

What is Money?

Currency and bank deposits on which checks may be written certainly qualify as money. These are widely accepted means of payment that can be transferred between economic agents at low cost. Household's and firms' holdings of currency and checking deposits are a convenient way of financing current transactions as they arise. Assets such as real estate do not qualify as money because, unlike currency and checking deposits, they lack the essential property of liquidity.

When we speak of the money supply in this book, we are referring to the monetary aggregate the Federal Reserve calls M1. That is, the total amount of currency and checking deposits held by households and firms. In the United States at the end of 2005, the total money supply was $1.13 trillion, equal to 12.2 percent of that year's GDP. The large deposits held by participants in the foreign exchange market are not considered part of the money supply. These deposits are less liquid than money and must be used to finance short-term transactions.

How is the Money Supply Determined?

An economy's money supply is controlled by its central bank. The central bank directly regulates the amount of currency in existence and also has indirect control over the amounts of checking deposits issued by private banks. The procedures through which the central bank controls the money supply are complex, and we refer you for now to the central bank simply sets the size of the money supply at the level it desires. We go into the money supply process in more detail, however, in Chapters 17 and 21.

The Demand for Money by Individuals

Having discussed the functions of money and the definition of the money supply, we now examine the factors that determine the amount of money an individual desires to hold. The determinants of an individual's money demand can be derived from the theory of asset demand discussed in the last chapter.

We saw in the last chapter that individuals base their demand for an asset on three characteristics:

1. The expected return on the asset. Assets generally offer a return to offset the risk. The returns are expressed as a rate of return as an individual's expected return.

2. The risk of the asset. A risk-averse investor will not invest in a risky asset. The risk of an asset is determined by the asset's volatility. The higher the volatility of an asset, the more risky it is.

The money stock is a complex phenomenon, but we can make some broad generalizations about it. Money is a medium of exchange, an unit of account, and a store of value. Monies usefulness as a medium of exchange, however, automatically makes it the most liquid of all assets. As you will recall from the last chapter, an asset is said to be liquid when it can be transformed into goods and services rapidly and without high transaction costs, such as brokers' fees. Since money is readily acceptable as a means of payment, money sets the standard against which the liquidity of other assets is judged.

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While liquidity plays an important role in determining the relative demands for money in the foreign exchange market, households and firms hold money only because of its liquidity. To understand how the economy's households and firms decide the amount of money they wish to hold, we must look more closely at how the three considerations listed above influence money demand.

**Expected Return**

Currency pays no interest. Checking deposits pay a low rate of interest in effect, but they offer a rate of return that usually fails to keep pace with the higher returns offered by less liquid assets such as stocks. When you hold money, you therefore sacrifice the higher interest rate you could earn by holding securities rather than liquid assets. This is the rate of interest we have in mind when we refer to the "interest rate." Since the interest paid on currency in zero while the rate on "acceptable" debt securities tends to be relatively constant, the difference in rates of return between money in process and less liquid alternative assets is reflected by the market (interest rate). The higher the interest rate, the more you sacrifice by holding liquid assets. If the interest rate is low, the sacrifice may be small, but if you choose instead to keep the $100,000 in cash in a safe-deposit box, you give up the $1000 interest you would have earned by buying Treasury bills. You thus sacrifice 10 percent of what you could have earned by holding your $100,000 as money.

The rate of interest demand developed in the last chapter shows how changes in the rate of interest affect the demand for money. The theory states that, other things being equal, people prefer assets offering higher expected returns. Because an increase in the interest rate raises the rate of return on less liquid assets relative to the rate of return on money, individuals will want to hold more of their wealth in less liquid assets that pay a market interest rate and less of their wealth in the form of money if the interest rate rises. We conclude that all else equal, a rise in the interest rate causes the demand for money to fall.

We can also describe the influence of the interest rate on money demand in terms of the economic concept of opportunity cost—the amount you sacrifice by taking one course of action rather than another. The interest rate measures the opportunity cost of holding money rather than interest-bearing bonds. A rise in the interest rate therefore raises the cost of holding money and causes money demand to fall.

**Rise**

Rise is not an important factor in money demand. It is risky to hold money because an unexpected increase in the prices of goods and services could reduce the value of your

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**CHAPTER 14 Money, Interest Rates, and Exchange Rates**

money in terms of the commodities you consume. Since interest-paying assets such as government bonds have face values fixed in terms of money, however, the same unexpected increase in prices would reduce the real value of these assets by the same percentage. Because any change in the real size of money causes a real change in the real size of bonds, changes in the rate of holding money need not cause individuals to reduce their demand for money and increase their demand for interest-paying assets.

**Liability**

The main benefit of holding money comes from its liquidity. Households and firms hold money because it is the easiest way of financing their everyday wealth in a government bond, a large fine deposit, or some large price changes can be financed through the sale of a substantial liquid asset. An art collection, for example, could sell one of the Picassos to buy a house. Since a continuous stream of smaller expenditures at various times and in various amounts, however, households and firms must hold some money.

An individual's need for liquidity rises when the average daily value of his transactions rises. A student who takes the bus every day, for example, does not need to hold as much cash as a business executive who takes taxis during rush hour. We conclude that a rise in the average value of transactions carried out by a household or firm causes its demand for money to rise.

**Aggregate Money Demand**

Our discussion of how individual households and firms determine their demands for money can now be applied to derive the determinants of aggregate money demand, the total demand for money by all households and firms in the economy. Aggregate money demand is just the sum of all the economy's individual money demands.

Three main factors determine aggregate money demand:

1. The interest rate. A rise in the interest rate causes each individual in the economy to reduce his demand for money. All else equal, aggregate money demand therefore falls when the interest rate rises.

2. The price level. The country's price level is the price of a broad index basket of goods and services in terms of currency. If the price level rises, individual households and firms must spend more money than before to purchase their usual weekly baskets of goods and services. To maintain the same level of liquidity as before the price level increase, they will therefore have to hold more money.

3. Real national income. When real national income (GNP) rises, more goods and services are being sold in the economy. This increase in the real value of transactions raises the demand for money, given the price level.

If $M$ is the price level, $R$ is the interest rate, and $F$ is real GNP, the aggregate demand for money, $M^d$, can be expressed as

$$M^d = P \times L(R, F).$$

(14-1)
where its value of \(L(R, T) \) falls when \( R \) rose, and rises when \( R \) falls. To see why we have specified that aggregate money demand is proportional to the price level, imagine that all prices double but the interest rate and everyone's real income remained unchanged. The money value of each individual's average daily money balances would then simply double, so would the amount of money each wished to hold.

We usually write the aggregate money demand relation (14-1) in the expression form

\[ M^D = L(R, T), \]

(14-2)

and call \( L(R, T) \) aggregate real money demand. This way of expressing money demand shows that the aggregate demand for liquidity, \( L(R, T) \), is a demand for a certain number of commodity units in exchange for a certain amount of purchasing power in liquid form. The rate \( M^D / M \) — that is, desired money holdings measured in terms of a typical reference basket of commodities —equals the amount of purchasing power people would like to hold in liquid form. For example, if people wished to hold $1000 in cash at a price level of $100 per commodity basket, their real money holdings would be equivalent to $100000/100

per basket. If the price level doubled (to $200 per basket), the purchasing power of their $1000 in cash would be halved, since it would now be worth only 5 baskets.

Figure 14-1 shows how aggregate real money demand is affected by the interest rate for a fixed level of real income, \( R \). The aggregate real money demand schedule \( L(R, T) \) shifts downward because a fall in the interest rate raises the desired real money holdings of each household and firm in the economy.

For a given level of real GDP, changes in interest rates cause movements along the \( L(R, T) \) schedule. Changes in real GDP, however, cause the schedule itself to shift. Figure 14-2 shows how this is the case. Real GDP from \( T \) to \( T' \) affects the position of the aggregate real money demand schedule. Because a rise in real GDP raises aggregate real money demand for a given interest rate, the schedule \( L(R, T) \) lies to the right of \( L(R, T') \) when \( T' \) is greater than \( T \).

The Equilibrium Interest Rate: The Interaction of Money Supply and Demand

As you might expect from other economic courses you've taken, the money market is in equilibrium when the money supply set by the central bank equals aggregate money demand. In this section we see how the interest rate is determined by money market equilibria, given the price level and output, both of which are not necessarily assumed to be unaffected by monetary changes.

Equilibrium in the Money Market

If \( M^* \) is the money supply, the condition for equilibrium in the money market is

\[ M^D = M^*, \]

(14-3)

Usually, \( L(R, T) \) rises when \( R \) falls, and falls when \( R \) rises.
After dividing both sides of this equality by the price level, we can express the money market equilibrium condition in terms of aggregate real money demand as

\[ M/P = L(Y, r). \]  

(14-4)

Given the price level, \( P \), and output, \( Y \), the equilibrium interest rate is the one at which aggregate real money demand equals the real money supply.

In Figure 14-3, the aggregate real money demand schedule indicates the real money supply schedule at point 1 to give an equilibrium interest rate of \( r^* \). The money supply schedule is vertical at \( M/P \) because \( M/P \) is set by the central bank while \( P \) is taken as given. Let's see why the interest rate needed to settle at an equilibrium level by considering what happens if the market is initially at point 2.

At point 2, the demand for real money holdings falls short of the supply by \( Q^2 - Q^1 \), so there is an excess supply of money. If individuals are holding more money than they desire, they will attempt to reduce that excess by either putting money into bonds or by reducing consumption. Similarly, those who no longer want to hold their excess money supply will try to sell it to the demanders.

In Figure 14-4, the interest rate has fallen sufficiently to indicate an increase in real money demand equal to the increase in the real money supply. By raising the above policy experiment in reverse, we can see how a reduction of the money supply forces interest rates upward. A full \( M/P \) causes an excess demand for money at the interest rate that previously balanced supply and demand. People attempt to sell interest-bearing assets—this is, in a way—to reduce their demand for real money holdings. Since they cannot all be successful when there is excess money demand, the interest rate is pushed upward until everyone is content to hold the smaller real money stock.

We can see that an increase in the money supply lowers the interest rate, whereas a fall in the money supply raises the interest rate, given the price level and output.
Output and the Interest Rate

Figure 14-3 shows the effect on the interest rate of a rise in the level of output from $P_1$ to $P_2$. Given the money supply and the price level, an increase in output causes the entire aggregate real money demand schedule to shift to the right, moving the equilibrium away from point 1. At the old equilibrium interest rate, $R_1$, there is an excess demand for money equal to $Q_1 - Q_1^*$ (point 1). Since the real money supply is given, the interest rate is bid up until it reaches the higher new equilibrium level $R_2$ (point 2). A fall in output has opposite effects, causing the aggregate real money demand schedule to shift to the left and therefore causing the equilibrium interest rate to fall.

We conclude that an increase in real output raises the interest rate, while a fall in real output lowers the interest rate, given the price level and the money supply.

The Money Supply and the Exchange Rate in the Short Run

In Chapter 13 we learned about the interest parity condition, which predicts how interest rate movements influence the exchange rate. Given expectations about the exchange rate's future level, we know how shifts in a country's money supply affect the interest rate on foreign currency denominated in its currency. We can see how monetary changes affect the exchange rate. We will discover that an increase in a country's money supply causes its currency to depreciate in the foreign exchange market, while a reduction in the money supply causes its currency to appreciate.
CHAPTER 14 Money, Interest Rates, and Exchange Rates

Expected future flow makes euro deposits more attractive to leading people to anticipate a sharper dollar depreciation in the future.

At the intersection of the two schedules (point 1), the expected rate of return on dollar and euro deposits are equal, and therefore interest parity holds. \( E^d_1 \) is the equilibrium exchange rate.

The second diagram we need to examine is the relationship between money and the exchange rate (Figure 14-2). This figure shows how a country's equilibrium interest rate is determined in its money market and is plotted as the bottom part of Figure 14-4. For convenience, however, the figure has been repeated clockwise by 90 degrees so that dollar interest rates are measured from the horizontal axis and the U.S. dollar interest is measured from 0 on the descending vertical axis. Money market equilibrium is shown at point 1, where the dollar interest rate \( R^d_1 \) attracts people in demand real balances equal to the U.S. real money supply, \( M_{DP}^d \).

Figure 14-4 emphasizes the link between the U.S. money market (bottom) and the foreign exchange market (top)—the U.S. money market determines the dollar interest rate, which in turn affects the exchange rate that maximizes interest parity. (Of course, there is a similar link between the European money market and the foreign exchange market that operates through changes in the real interest rate.) Figure 14-7 illustrates these linkages. The U.S. and European central banks, the Federal Reserve System and the European System of Central Banks (ESCB), determine the U.S. and European money supplies, \( M^d \) and \( M^d \). Given the price level and national incomes of the two countries, equilibrium in domestic money markets varies in the dollar and euro interest rates, \( R^d_1 \) and \( R^d_2 \). These interest rates feed into the foreign exchange market where, given expression about the future dollar/euro exchange rate, the current rate \( E^d_1 \) is determined by the interest parity condition.

U.S. Money Supply and the Dollar/Euro Exchange Rate

We now see one model of asset market linkages (the link between the money and foreign exchange markets) to show how the dollar/euro exchange rate changes when the Federal Reserve changes the U.S. money supply, \( M^d \). The effect of this change are summarized in Figure 14-4.

As the initial money supply \( M^d \) varies, the money market is in equilibrium at point 1 with an interest rate \( R^d_1 \). Given the current interest rate \( E^d_1 \), the expected future exchange rate, a dollar interest rate of \( R^d_1 \) implies that foreign exchange market \( E^d_1 \) occurs at point 1, with an exchange rate equal to \( E^d_1 \).

What happens when the Federal Reserve raises the U.S. money supply \( M^d \), so \( M^d \) increases and \( R^d_1 \) falls to \( R^d_2 \)? The money market reaches its new equilibrium position (point 2). The expected return on dollar deposits falls to \( E^d_2 \), and the foreign exchange rate adjusts. The new dollar interest rate, \( R^d_2 \), is determined by the current dollar/euro exchange rate, \( E^d_1 \), and the expected return on dollar deposits, \( E^d_2 \). Holders of dollar deposits therefore try to sell them for euro deposits, which are momentarily more attractive. The dollar depreciates to \( E^d_2 \), as holders of dollar deposits bid for euro deposits. The foreign exchange market is now in equilibrium at point 2 because the exchange rate's move to \( E^d_2 \) causes a fall in the dollar's expected future depreciation rate sufficient to offset the fall in the dollar interest rate.
Monetary policy affects the Fed's interest rate, changing the dollar/euro exchange rate that affects the foreign exchange market. The ECB can affect the exchange rate by changing the European money supply and interest rate.

We conclude that an increase in a country’s money supply causes its currency to depreciate in the foreign exchange market. By looking at Figure 14.6 on the next page, you can see that a reduction in the country’s money supply causes its currency to appreciate in the foreign exchange market.

Europe’s Money Supply and the Dollar/Euro Exchange Rate

The conclusions we have reached also apply when the ECB changes Europe’s money supply. An increase in $M_2$ causes a depreciation of the euro (that is, an appreciation of the dollar), or a fall in $E_{usd}$, while a reduction in $M_2$ causes an appreciation of the euro (that is, a depreciation of the dollar), or a rise in $E_{usd}$.

The mechanism at work, which runs from the European interest rate to the exchange rate, is the same as the one we just analyzed. It is good exercise to verify those assertions by drawing Figures similar to Figures 14-6 and 14-8 that illustrate the linkage between the European money market and the foreign exchange market.

Here we use a different approach to show how changes in Europe’s money supply affect the dollar/euro exchange rate. In Chapter 13 we learned that a fall in the euro interest rate, $R_e$, shifts the downward-sloping schedule in the upper part of Figure 14-6 to the left. The reason is that for any level of the exchange rate, a fall in $R_e$ means the expected rate of return on euro deposits. Since a rise in the European money supply $M_2$ lowers $R_e$, we can see the effect on the exchange rate by shifting the expected return schedule in the top part of Figure 14-6 to the left.

The result of an increase in the European money supply is shown in Figure 14-9. Initially the U.S. money market is in equilibrium at point 1 and the foreign exchange market is in equilibrium at point 1 with an exchange rate $E_{usd}$. An increase in Europe’s money supply
Money, the Price Level, and the Exchange Rate in the Long Run

Our departure analysis of the link between countries' money markets and the foreign exchange market rested on the simplifying assumption that price levels and exchange rates expectations were given. To extend our understanding of how money supply and money demand affect exchange rates, we now consider how monetary policy affects a country's price level in the long run.

An economy's long-run equilibrium is the position it would eventually reach if no new economic shocks occurred that affect the adjustment to full employment. The key idea of long-run equilibrium is the equilibrium that would be maintained after all wages and prices had had enough time to adjust to their market-clearing levels. An equivalent way of thinking of it is as the equilibrium that would occur if prices were perfectly flexible and always adjusted immediately to preserve full employment.

In studying how monetary changes work themselves out over the long run, we will examine how such changes might affect the economy's long-run equilibrium. Our main tool is once again the theory of aggregate money demand.

Money and Money Prices

If the price level and output are fixed in the short run, the condition (14-4) of money market equilibrium,

\[ M/P = L(R, Y) \]

defines the domestic interest rate, \( R \). The money market always moves to equilibrium. However, note in our "short run" assumption and think of periods over which \( P \) and \( Y \) as well as \( R \) can vary. The money equilibrium condition can therefore be rearranged to give

\[ P = M/P(L(R, Y)) \]

(14-5)

which shows how the price level depends on the interest rate, real output, and the domestic money supply.

The long-run equilibrium price level is the value of \( P \) that satisfies condition (14-5) when the interest rate and output are at their long-run levels, that is, in levels consistent with full employment. When the money market is in equilibrium and all factors of production are fully employed, the price level will remain steady if the money supply, the aggregate money demand function, and the long-run values of \( R \) and \( Y \) remain steady.

The U.S. money market equilibrium occurs at point 1 because the price adjustments that influence the European money market and the foreign exchange market alter the interaction in Europe's money supply. This change either the money supply or money demand in the United States. Given \( E_0 \) and \( P_0 \), the exchange rate would rise. The change in the European money supply then affects the U.S. money market equilibrium, which remains at point 1.
money supply. Similarly, the interest rate is independent of the money supply in the long run. If the money supply and all prices double permanently, there is no reason why people previously willing to exchange $1 today for $1.01 a year from now should not be willing afterward to exchange $2 today for $2.02 a year from now, so the interest rate will remain at 10 percent per annum. Relative prices also remain the same if all money prices double, since relative prices are just ratios of money prices. Thus, money supply changes do not change the long-run allocation of resources. Only the absolute level of money prices changes.

When studying the effect of an increase in the money supply over long time periods, we are therefore justified in assuming that the long-run values of P and r will not be changed by a change in the supply of money. Thus, we can be following conclusions from equation (14.5). A permanent increase in the money supply cannot cause a permanent increase in the price level in the long run. In particular, if the economy is initially at full employment, a permanent increase in the money supply eventually will be followed by a proportional increase in the price level.

Empirical Evidence on Money Supplies and Price Levels

In looking at actual data on money and prices, we should not expect to see as much proportional relationship over long periods, partly because output, the interest rate, and the aggregate real money demand function can shift for reasons that have nothing to do with the supply of money. Surplus changes as a result of capital transactions and technological advances, for example, and money demand behavior may change as a result of demographic trends or financial innovations such as electronic cash-transfer facilities. In addition, actual economies are rarely in positions of long-run equilibrium. Nevertheless, we should expect the data to show a close positive association between money supplies and price levels. If real-world data did not provide strong evidence that money supplies and price levels move together in the long run, the usefulness of the theory of money demand we have developed would be in serious doubt.

Evidence on the money supply-price level linkage for the world's seven largest industrial countries is shown in Figures 14.10. The horizontal axis measures percentage increases in money supplies between 1973 and 1991, the vertical axis percentage increases in price levels. As you can see, there is a strong positive relationship between money supply and price level for this group of countries. A country's price level to the 45-degree line would be in which money supplies and price levels (measured more or less in proportion over 1973-1997. In several cases, however, the observations stray away from the 45-degree line along which increases in money and prices are proportionate. Germany's price level, for example, rose by a much smaller percentage than its money supply, as indicated by that country's position below the 45-degree line.
As we observed above, we should expect these discrepancies because the theory of money demand predicts exactly proportional increases in money and price levels only when no other factors affecting the money market (such as real income per capita) change at the same time. These other factors, however, have not remained constant in the countries shown. Countries closer to the 45-degree line in Figure 14-10 are those in which the effects on money market equilibriums of factors other than money supply roughly offset each other. The main lesson to be drawn from Figure 14-10 is that the data confirm the strong long-run link between national money supplies and national price levels predicted by economic theory.

Money and the Exchange Rate in the Long Run

The domestic currency price of foreign currency is one of the many prices in the economy that rise in the long run after a permanent increase in the money supply. If you think again about the effects of a currency reform, you will see how the exchange rate moves in the long run. Suppose, for example, that the U.S. government replaced every pair of "old" dollars with one "new" dollar. Then if the dollar-dollar exchange rate had been $1.00 old dollars per euro before the reform, it would change to 0.50 new dollars per euro immediately after the reform. In much the same way, a halving of the U.S. money supply would eventually lead the dollar to appreciate from an exchange rate of 1.20 dollars to one of 0.60 dollars. Since the dollar prices of all U.S. goods and services would also decrease by half, the 50 percent appreciation of the dollar leaves the relative prices of all U.S. and foreign goods and services unchanged.

We conclude that, all else equal, a permanent increase in a country's money supply causes a proportional long-run depreciation of its currency against foreign currencies.
Similarly, a permanent decrease in a country's money supply causes a permanent long-run appreciation of its currency against foreign currencies.

Inflation and Exchange Rate Dynamics

In this section we tie together our short-run and long-run findings about the effects of monetary changes by examining the process through which the price level adjusts to its long-run position. An economy experiences inflation when its price level is rising and deflation when its price level is falling. Our examination of inflation will give us a deeper understanding of how the exchange rate adjusts to monetary disturbances in the economy.

Short-Run Price Rigidity versus Long-Run Price Flexibility

Our analysis of the short-run effects of monetary changes assumed that a country's price level, unlike in exchange rates, does not jump immediately. This assumption cannot be exactly correct, because many commodities, such as agricultural products, are traded in markets where prices adjust slowly every day in response to demand and supply shifts. In addition, exchange rate changes themselves affect the prices of some tradable goods and services that enter into the commodity baskets defining the price level.

Many prices in the economy, however, are written into long-term contracts and cannot be changed immediately when changes in the money supply occur. The most important prices of this type are "wage contracts," which are negotiated only periodically in many industries. Wages do not enter indices of the price level directly, but they make up a large fraction of the cost of producing goods and services. Since output prices depend heavily on production costs, the behavior of the overall price level is influenced by the stickiness of wage movements. The short-run "stickiness" of price levels is illustrated by Figure 14.11, which compares data on monthly and percentage changes in the dollar/dish/german mark (DM) exchange rate, and data on monthly and percentage changes in the ratio of money prices in the United States and Germany, M/P. Notice that Germany held its own currency, the DM, until 1999, and that the DM exhibited a "legacy currency" role against the euro, until 2002. As we can see, the exchange rate is much more variable than relative price levels, a fact consistent with the view that price levels are relatively rigid in the short run. The pattern shown in the figure applies to all of the main industrial countries in recent years. In light of this and other evidence, we will therefore continue to assume that the price level is given in the short run and that it does not take significant jumps in response to policy changes.

This assumption would not be reasonable, however, for all countries at all times. In extremely inflationary conditions, such as those seen in the 1960s in some Latin American countries, long-term contracts specifying domestic money payment may go out of use. Automatic rigidities in compensation may also be widespread under highly inflationary conditions. Such development eliminate the price level much less rigid than it would have under moderate inflation, and larger price level jumps become possible. (See the box on Latin American inflation, pages 277 and 278, and Bolivia, page 185.)

Inflation and Exchange Rate Dynamics, page 279, contains a lengthy discussion of the effects of inflation on exchange rates and money supply. Because the discussion is complex and technical, it is beyond the scope of this chapter. However, it is important to understand the basic principles underlying the analysis of inflation and exchange rates. These principles are illustrated in the following text.

The mechanism by which inflationary movements of the exchange rate suggest that price levels are relatively sticky in the short run.

Source: OECD, National Accounts Database.
MONEY SUPPLY GROWTH AND HYPERINFLATION IN BOLIVIA

In 1964 and 1965 the small Latin American country of Bolivia experienced hyperinflation—an explosive and seemingly uncontrollable inflation in which money loses value rapidly and may even go out of use. During hyperinflation, the magnitude of monetary changes is so enormous that the "long-run" effects of money on the price level can occur very quickly. These changes therefore provide laboratory conditions well-suited for testing long-run theories about the effects of money on prices.

On the next page we show data on Bolivia's money supply and price level during the hyperinflation. An official exchange rate between the Bolivian peso and the U.S. dollar was commonly used in Bolivia during this period, so we list instead values for an exchange rate that better reflects market forces, the price of dollars in terms of pesos on the La Paz black market.

The data show a clear tendency for the money supply, price level, and exchange rate to move in step, as theory in the text would predict. Moreover, the rate of price increase was also an order of magnitude. The prices level rose to 22.98 times between April 1964 and July 1968, and the price of money rose by 34.62 times over the same period. These percentage changes are about the same as the changes in the money supply over the same period.

Inflationary expectations. If everyone expects the price level to rise in the future, their expectations will increase the price of inflation today. Workers bargaining over wage contracts will insist on higher money wages to counteract the effect on their real wages of the anticipated general increase in prices. Producers, once again, will gain in these wage demands if they expect product prices to rise and cover the additional wage costs.

8. Raw material prices. Many raw materials used in the production of finished goods, for example, petroleum products and metals, are sold in markets where prices adjust sharply to the spot market. By raising the prices of such products, inflation raises production costs in material-consuming industries. Eventually, producers in those industries will raise product prices to cover their higher costs.

Permanently Money Supply Changes and the Exchange Rate

We apply our analysis of inflation to study the adjustment of the dollar/peso exchange rate following a permanent increase in the U.S. money supply. Figure 14-1 shows both the short-run (Figure 14-1a) and long-run (Figure 14-1b) effects of this disturbance. We assume the economy starts with all variables at their long-run levels and that output remains constant, the economy adjusts to the temporary supply change.

Figure 14-1a assumes the U.S. price level is initially given as P*.
An increase in the nominal money supply from M* to M is therefore reflected as a real money supply change from M* / P* to M / P as in the short run. Note that the increase (in the numerator) is also in the real money supply (in the denominator).

So far our analysis follows exactly as it did earlier in this chapter. The first change in our analysis comes when we ask how the American money supply change (shown in the bottom part of panel a) affects the foreign exchange market (shown in the top part of panel a).

Macroeconomic Data for Bolivia, April 1961-October 1965

<table>
<thead>
<tr>
<th>Month</th>
<th>Money Supply (Billions of Pesos)</th>
<th>Price Level</th>
<th>Exchange Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>April</td>
<td>270</td>
<td>21.1</td>
<td>3.576</td>
</tr>
<tr>
<td>May</td>
<td>330</td>
<td>31.1</td>
<td>3.512</td>
</tr>
<tr>
<td>June</td>
<td>440</td>
<td>32.3</td>
<td>3.342</td>
</tr>
<tr>
<td>July</td>
<td>599</td>
<td>34.8</td>
<td>3.270</td>
</tr>
<tr>
<td>August</td>
<td>714</td>
<td>79.1</td>
<td>7.058</td>
</tr>
<tr>
<td>September</td>
<td>889</td>
<td>53.7</td>
<td>13.685</td>
</tr>
<tr>
<td>October</td>
<td>1,194</td>
<td>85.5</td>
<td>15.353</td>
</tr>
<tr>
<td>November</td>
<td>1,491</td>
<td>117.9</td>
<td>18.469</td>
</tr>
<tr>
<td>December</td>
<td>3,796</td>
<td>244.5</td>
<td>24.515</td>
</tr>
</tbody>
</table>

Sources: Juan Antonio Morales, "Inflation and Inflation in Bolivia," in Michael Bruno et al., Inflation Substitution: The Experience of Brazil, Argentina, Brazil, Bolivia, and Mexico. Cambridge: MIT Press, 1986, Table 7.1; Money supply is IMF.
in the top part of panel (a). As before, the falls in the U.S. interest rate are shown as a downward shift in the vertical schedule giving the dollar return on dollar deposits. This is no longer the whole story, however, for the money supply increases now affect exchange rate expectations. Because the U.S. money supply change is permanent, people expect a long-run increase in all dollar prices, including the expected exchange rate, which is the dollar price of non.

As you will recall from Chapter 1, a rise in the expected future dollar-exchange rate (a future dollar depreciation) raises the expected dollar return on non deposits, thus shifting the downward-sloping schedule in the top part of Figure 14-12 to the right. The dollar depreciates against the euro, moving from an exchange rate of $EL_{EU}$ (point 1) to $EL_{EU}$ (point 2). Notice that the dollar depreciation is greater than it would be if the expected future dollar-exchange rate stayed fixed (as it might if the money supply increase were temporary rather than permanent). If the depreciation $EL_{EU}$ did not change, the new short-run equilibrium would be at point 3 rather than at point 2.

Figure 14-12 shows how the interest rate and exchange rate behave as the price level rises during the economy's adjustment to its long-run equilibrium. The price level begins to rise from the initially given level $P_{0}$, eventually reaching $P_{2}$. Because the long-run increase in the price level must be proportional to the increase in the money supply, the final real money supply, $M_{0}/P_{2}$, is shown equal to the initial real money supply, $M_{0}/P_{0}$. Since output is given and the real money supply has returned to its original level, the real interest rate must again equal $R_{d}$ in the long run (point 4). The interest rate therefore begins from $R_{d}$ (point 1) to $R_{d}$ (point 4) as the price level starts from $P_{0}$ to $P_{2}$.

The rising U.S. interest rate has exchange rate effects that can also be seen in Figure 14-12. The dollar appreciation against the euro is the process of adjustment. If exchange rate expectations do not change further during this adjustment process, the foreign exchange market moves in its long-run position along the downward-sloping schedule defining the dollar return on non deposits. The model's path is just the path traced out by the vertical dollar interest rate schedule as it moves rightward because the price level's gradual fall. As the long run (point 4) the equilibrium exchange, $EL_{EU}$, is higher than at the original equilibrium, point 2. Like the price level, the dollar-exchange rate has risen in proportion as the increase in the money supply.

Figure 14-13 shows time paths like the ones just described for the U.S. money supply, the dollar interest rate, the U.S. price level, and the dollar-exchange rate. The figure is drawn so that the long-run increases in the price level (Figure 14-12a) and exchange rate (Figure 14-12b) are proportional to the increase in the money supply (Figure 14-12c).

**Exchange Rate Overhanging**

In an initial depreciation after a money supply rise, the exchange rate initially falls from $EL_{EU}$ to $EL_{EU}$, a depreciation greater than its long-run depreciation from $EL_{EU}$ to $EL_{EU}$. The exchange rate is said to overhang when its immediate increase in a disturbance is greater than its long-run response. Exchange rate overhanging is an important phenomenon because it helps explain why exchange rates move so sharply from day to day.

The economic explanation of overhanging comes from the interest parity condition. The explanation is easiest to grasp if we assume that before the money supply increase first occurs, no change in the dollar-exchange rate is expected, so that $EL_{EU}$ equals $EL_{EU}$ for given interest rate on euro deposits. A permanent increase in the U.S. money supply doesn't affect $R_{d}$, so it comes to $EL_{EU}$ to fall below $EL_{EU}$ and remains below that interest rate (Figure 14-13a) until the U.S. price level has completed the long-run adjustment to $P_{2}$ shown in Figure 14-12b. For the foreign exchange market to be in equilibrium during this adjustment process, however, the interest differences in favor of deposits must be offset by an expected appreciation of the dollar against the euro. This is, as expected fall in $EL_{EU}$. Only if the dollar-exchange rate overhangs $EL_{EU}$ initially will market participants expect a subsequent appreciation of the dollar against the euro.

Overhanging is a direct consequence of the overshooting rigidity of the price level. In a hypothetical world in which the price level could adjust immediately to its new long-run level after a money supply increase, the dollar interest rate would not fall because prices would adjust immediately and prevent the real money supply from rising. Thus, there
PART 3 Exchange Rates and Open-Economy Macroeconomics

CHAPTER 14 Money, Interest Rates, and Exchange Rates

2. The money market is in equilibrium when the real money supply equals aggregate real money demand. With the price level set, real output given, and a rise in the interest rate expected, the money supply rises to match the money demand. A rise in real output raises the interest rate, given the price level. A rise in real output has the opposite effect.

3. By lowering the domestic interest rate, an increase in the money supply causes the domestic currency to depreciate in the foreign exchange market (even when expectations of future exchange rates do not change). Similarly, a fall in the domestic money supply causes the domestic currency to appreciate against foreign currencies.

4. The assumption that the price level is given in the short run is a good approximation in reality. Countries with a controlled inflation rate, but not a controlled inflation rate, are better approximations of the long run. Permanent changes in the money supply push the long-run equilibrium price level proportionally in the same direction but do not influence the long-run values of output, the inflation rate, or any relative prices. One important money price "owners" of long-run equilibrium level rates is in response to a permanent money supply increase is the exchange rate, the domestic currency price of foreign currency.

5. An increase in the money supply can cause the exchange rate to overshoot its long-run level in the short run. If output is given, a permanent money supply increase, for example, causes a more-than-proportional short-run depreciation of the currency, followed by an appreciation of the currency in its long-run exchange rate. Exchange rate overshooting, when combined with the volatility of exchange rates, is a direct result of sluggish short-run price level adjustment and the interest parity condition.

Key Terms
- aggregate money demand, p. 361
- demand, p. 310
- exchange rate, p. 365
- inflation, p. 378
- long run, p. 387
- long-run equilibrium, p. 373
- money supply, p. 309
- price level, p. 361
- short run, p. 367

Problems
1. Suppose there is a reduction in aggregate real money demand. Does this result in a negative shift in the aggregate real money demand function? Trace the short-run and long-run effects on the exchange rate, interest rate, and price level.
2. How would you expect a fall in a country's population to alter its aggregate money demand function? Would it matter if the fall in population were due to a fall in the number of households or to a fall in the average size of a household?
3. The velocity of money, \( V \), is defined as the ratio of real GDP to real money holdings, \( V = \text{GNP} \). In this chapter's notation, the relationship (14-4) becomes an expression for velocity: velocity varies with changes in \( V \) and \( I \), and in long-run exchange rate changes. The effect of output changes on \( V \) depends on the elasticity of aggregate money demand with respect to real output, which economists believe to be less than unity. What is the relationship between velocity and the exchange rate?
4. What is the short-run effect on the exchange rate of an increase in monetary policy?

Summary
1. Money is held because of its liquidity. When considered in real terms, aggregate money demand is not a demand for a certain amount of currency units but instead a demand for a certain amount of purchasing power. Aggregate real money demand depends negatively on the opportunity cost of holding money (measured by the domestic interest rate) and positively on the volume of transactions in the economy (measured by real GDP).
5. Does one discussion of money's usefulness as a medium of exchange and unit of account suggest reasons why some currencies become relative currences for foreign exchange transactions? (The concept of a vehicle currency was discussed in Chapter 13.)

6. If a currency reform has no effect on the economy's real variables, why do governments typically imitate currency reforms in conjunction with broader programs aimed at balancing money inflows? (These are money inflows other than the current ones mentioned in the case.) Recent examples include Brazil's switch from the pound to the dollar, Argentina's switch from the peso to the Australian dollar back to the peso, and Brazil's exchange from the cruzeiro to the emalda, from the cruzeiro to the cruzado, then to the cruzeiro to the cruzado, and then to the cruzeiro to the real. To current currency, which was introduced in 1994.

7. Imagine that the central bank of an economy with unemployment troubles money supply. In the long run, full employment is restored and output returns to its full employment level. On the (unfortunately unlikely) assumption that the interest rate before the money supply increase equals the long-run interest rate, is the long-run increase in the price level more than proportionate or less than proportionate to the money supply change? What if (as is more likely) the interest rate was initially below its long-run level?

8. Between 1964 and 1973, the money supply in the United States increased by $641.9 billion from $770.3 billion, while that of Brazil increased by 100.1 billion cruzeiros from 24.4 billion. Over the same period, the U.S. consumer price index rose to 100 from a level of 68.6, while the corresponding index for Brazil rose to 100 from a level of only 31. Can you see the 1964-1985 ratio of money supply growth and inflations for the United States and Brazil, respectively. Assuming that other factors affecting the money markets did not change too dramatically, how do these numbers match up with the predictions of this chapter's models? How would you explain the apparently different responses of U.S. and Brazil in the price?

9. Continuing with the preceding question, note that the monetary value of output in 1985 was $4081 billion in the United States and $48 billion in Brazil. If one looks back to question 3 and calculate velocity for the two countries in 1985. Why do you think velocity was so much higher in Brazil?

10. In our discussion of short-run exchange rate overshooting, we stated that the real output was given. Assume instead that an increase in the money supply raises real output in the short run (an assumption that will be justified in Chapter 16). How does this affect the extent to which the exchange rate overshoots when the money supply first increases? Is it likely that the exchange rate overshoots? (Hint: In Figure 14.2, the numerator real money demanded shifts to the right in response to the increase in supply.)

Further Reading

CHAPTER 15
Price Levels and the Exchange Rate in the Long Run

The Law of One Price

To understand the market forces that might give rise to the results predicted by the purchasing power parity theory, we discuss first a related but distinct proposition known as the law of one price. The law of one price states that in competitive markets free of importation costs and official barriers to trade (such as tariffs), identical goods sold in different countries must sell for the same price when their prices are expressed in terms of the same currency. For example, if the dollar/yen exchange rate is 151.50 per pound, a sweater that sells for $45 in New York must sell for £30 in London. The dollar price of the sweater when sold in London is then ($30 per £) x ($1.50 per pound) = $45 per sweater, the same as its price in New York.

Let's consider the six major factors that influence exchange rates in the long run. First, we must consider the relative purchasing power parity (PPP). This relationship explains that the exchange rate in terms of one currency is the ratio of the prices of a basket of goods in two countries. The PPP states that if the price of a good in one country is higher, the exchange rate will be lower to make the prices equal. The PPP theory is based on the idea that in the long run, the purchasing power parity (PPP) holds true, meaning that the price of a good in one country is equal to the price of the same good in another country when converted to a common currency.

Purchased Power Parity

The theory of purchasing power parity states that the exchange rate between two countries' currencies equals the ratio of the countries' price levels. Recall from Chapter 14 that the domestic purchasing power of a country's currency is reflected in the country's price level, the money price of a reference basket of goods and services. The PPP theory predicts that a fall in a country's domestic purchasing power (as indicated by an increase in

Price Levels and the Exchange Rate in the Long Run
the domestic price level will be associated with a proportional currency depreciation in the foreign exchange market. Symmetrically, PPP states that an increase in the currency's domestic purchasing power will be associated with a proportional currency appreciation.

The basic intuition behind PPP is that the deviations in the prices of commodities across countries reflect the differences in the price levels of the same goods. However, PPP does not state that prices change in unison; it only states that they tend to adjust over the long run.

To express the PPP theory in symbols, let $P_m$ be the dollar price of a reference commodity basket sold in the United States and $P_e$ the price of the same basket in Europe. (Assume here that a single basket accurately measures money's purchasing power in both countries.) Then PPP predicts a dollar-exchange rate as

$$E_{t} = \frac{P_{e}}{P_{m}}$$

(15-1)

if, for example, the reference commodity basket costs $200 in the United States and $160 in Europe, PPP predicts a dollar-exchange rate of $1.25 per euro ($= 200 per $160 per basket). If the U.S. price level were to triple (say $600 per basket), so would the dollar price of a euro, PPP would imply an exchange rate of $1.75 per euro ($= 600 per $360 per basket).

By rearranging equation (15-1) to read

$$P_{m} = (E_{t} \times P_{e})$$

we get an alternative interpretation of PPP. The left side of this equation is the dollar price of the reference commodity basket in the United States; the right side is the dollar price of the reference basket when purchased in Europe (that is, its euro price multiplied by the dollar price of a euro). These two prices are the same if PPP holds. PPP also states that all countries' price levels are equal when measured in terms of the same currency.

Equivalently, the right side of the last equation measures the purchasing power of a dollar when exchanged for euros and spent in Europe. PPP therefore holds when, at giving exchange rates, every country's domestic purchasing power is always the same as its foreign purchasing power.

The Relationship Between PPP and the Law of One Price

Suppose we are comparing two baskets of goods, one in the United States and one in Europe. If the two baskets are identical, then their prices should be the same in both countries. This is the law of one price, which states that the price of a homogeneous good should be the same in all countries. However, deviations from PPP indicate that the price of the good is not the same in both countries.

If the law of one price holds true for every commodity, of course, PPP must hold automatically as long as the reference baskets used to define different countries' price levels are the same. Proponents of the PPP theory argue, however, that its validity (in particular, its validity as a long-run theory) does not require the law of one price to hold exactly.
CHAPTER 13 Long-Run Levels and the Exchange Rate in the Long Run

In the previous chapter, equation (13-1) showed how we can explain domestic price levels in terms of domestic money demands and supplies. In the United States:

\[ P_t = A_0P_{t-1} \]  

while in Europe:

\[ P_t = A_0P_{t-1} - \alpha. \]

As before, we have used the symbol \( A_0 \) to stand for a country’s money supply and \( 0.07 \) to stand for the aggregate non-money demand, which decreases when the interest rate rises and increases when real output rises.

Equations (13-2) and (13-4) show how the monetary approach to the exchange rate comes by its name. According to the statement of PPP in equation (15-1), the dollar price of a car is simply the dollar price of U.S. output divided by the euro price of European output. These two price levels, in turn, are determined completely by the supply and demand for each currency area’s money. The United States’ price level is the U.S. money supply divided by the U.S. real money demand, as shown in (13-3), and Europe’s price level similarly is the European money supply divided by European real money demand, as shown in (13-4). The monetary approach therefore makes the general prediction that the exchange rate, which is the relative price of American and European money, is fully determined in the long run by the relative supplies of these monies and the relative real demands for them. Shocks in money, output, and output levels affect the exchange rate only through their influences on money demand.

In addition, the monetary approach makes a number of specific predictions about the long-run effects on the exchange rate of changes in money supplies, interest rates, and output levels:

1. **Money supplies.** Other things equal, a permanent rise in the U.S. money supply \( M_2 \) causes a proportional increase in the long-run U.S. price level \( P_t \), as in equation (13-3). Because under PPP, \( P_t = P_{t-1} \), however, \( P_t \) also rises in the long run in proportion to the increase in the U.S. money supply. (For example, if \( M_2 \) rises by 10 percent, \( P_t \) and \( P_{t-1} \) both eventually rise by 10 percent as well.) Thus, an increase in the U.S. money supply causes a proportional long-run appreciation of the dollar against the euro. Conversely, equation (13-4) shows that a proportional increase in the European money supply causes a proportional decrease in the long-run exchange rate.

2. **Interest rates.** A rise in the interest rate \( R_t \) on dollar-denominated assets lowers real U.S. money demand \( D_t = P_tR_t \). By (13-3), this long-run U.S. price level rises, and under PPP the dollar will depreciate against the euro in proportion to this U.S. price level increase. A rise in the interest rate \( R_t \) on euro-denominated assets has the reverse long-run exchange rate effect. Because real European money demand \( D_t = P_tR_t \) falls, Europe’s...
price level rises, by (1-δ). Under PPP, the dollar price appreciates against the euro in proportion to Europe's price rise.

2. Output levels in the U.S. and in the eurozone, U.S. output rises real U.S. money demand (LΔP, US), while the eurozone's output remains constant. According to PPP, there is no lasting by (1-δ) in the long run. U.S. output increases, so the appreciation of the dollar against the euro. Simultaneously, in European output remains constant (LΔP, EZ), so, by (1-δ), a fall in Europe's long-run price level, PPP predicts that this development will make the dollar appreciating against the euro.

To understand these predictions, remember that the monetary approach, like any long-run theory, essentially assumes that price level affects real exchange rates through its impact on real interest rates.

The monetary approach leads to a result familiar from Chapter 14, that the long-run foreign exchange value of a country's money supply is proportional to its money supply (prediction 1). The theory also raises what seems to be a paradox (prediction 2). In our previous examples, we always found that a monetary expansion when the interest rate is stable was always very large in foreign interest rate. Now it is that we have actually produced exactly the opposite conclusion—that a country's interest rate does not reflect the interest rate in any country.

At the end of Chapter 13 we warned that an accurate account of how a change in interest rates affects the exchange rate is complex until we specify exactly why interest rates have changed. This paper analyzes the apparent contradiction in our findings about interest rates and exchange rates. To make the point, however, we must first examine more closely how monetary policies and interest rates are connected in the long run.

Ongoing Inflation, Interest Parity, and PPP

In the last chapter we saw that a permanent increase in the level of a country's money supply ultimately results in a proportional rise in its price level but has no effect on the long-run values of the interest rate. Similarly, the expected expansion of a wage, suppose money supply change is useful for thinking about the long-run effects of money, but it is not too realistic as a description of actual monetary policy. More often, the monetary authorities choose a growth rate for the money supply. Aggregate, 5 or 10 or 50 percent per year, and then allow money to grow gradually, through small but frequent increments. What are the long-run effects of a policy that allows the money supply to grow smoothly forever at a positive rate?

The reasoning in Chapter 14 suggests that controlling money supply growth will require a continuing rise in the price level—a situation of ongoing inflation. As firms and workers earn and save, the price level is growing constantly, so the nominal stock-to-flow ratio of money supply will rise, pushing up the real interest rate. The long-run growth rate of nominal GDP is still constant, but the increase in the price level will offset this.

To be precise, we must distinguish between a stance of economic growth—other things equal, money supply growth at a constant rate eventually results in ongoing exchange rate appreciation even if the interest rate rises. The exact form of the relationship between the exchange rate and the interest rate is not necessarily one of simple proportionality. However, the general result is that the exchange rate appreciation will be equal to the interest rate rise.

CHAPTER 15 Price Levels and the Exchange Rate in the Long Run

price level inflation at the same rate, that changes in this long-run inflation rate do not affect the full-employment output level or the long-run relative prices of goods and services. The interest rate, however, definitely sets independence of the money supply growth rate in the long run. While the long-run interest rate does not depend on the absolute level of the money supply, conditions growth in the money supply eventually will affect the interest rate. The reason is that a permanent increase in inflation affects the long-run interest rate by changing PPP with the interest rate parity condition on which our previous analysis of exchange rate determination was built.

As in the preceding two chapters, the condition of interest parity between dollar and euro assets in

\[ R_d = R_e + (\Delta P_d - \Delta P_e)/\pi \]

(r recall equation (13.2), page 342). Now let's ask how this parity condition, which must hold in the long run, as well as in the short run, fits with the parity condition we are assuming in our long-run model, purchasing power parity. According to the relationship, the percentage change in the dollar/euro exchange rate over the next year, say, will equal the difference between the inflation rates of the United States and Europe over that year (see equation (15.2)). Since people understand this relationship, however, it must also be true that they expect the percentage change rate change equals the U.S.-Europe inflation difference. The interest rate condition written above now tells us the following: if people expect relative PPP to hold, the difference between the interest rate after dollar and over deposits will equal the difference between the inflation rates expected over the relevant horizon, in the United States and in Europe.

Some additional reservations are helpful in deriving this result more formally. If \( \pi \) is the price level expected in a country for a year from today, the expected inflation rate in that country, \( \pi' \), is the expected percentage increase in the price level over the coming year;

\[ \pi' = \pi \delta = \pi P \]

If relative PPP holds, however, market participants will also expect it to hold, which means that we can replace the actual depreciation and inflation rates in equation (15.2) with the values the market expects to maximize:

\[ \Delta P_d = \Delta P_e = \pi' - \pi \]

By combining this "invariance" of relative PPP with the interest parity condition

\[ R = R + (\Delta P - \Delta P) - \pi \]

and rearranging, we arrive at a formula that expresses the international interest rate difference as the difference between expected national inflation rates

\[ R_d - R_e = \pi'_d - \pi'_e \]

If, as PPP predicts, currency depreciation is expected to offset the international inflation difference (so that the expected dollar depreciation rate is \( \pi'_d - \pi'_e \)), the interest rate difference must equal the expected inflation difference.
The Fisher Effect

Equation (15.5) gives us the long-run relationship between ongoing inflation and interest rates. However, to determine how interest rates affect exchange rates, we need to use the monetary approach to predict how interest rates affect future inflation. The Fisher Effect can be considered an example of this relationship. The Fisher Effect is the idea that the long-run equilibrium interest rate in the U.S. is higher than the long-run equilibrium interest rate in Europe because the U.S. has a higher inflation rate. This relationship is consistent with the principle of purchasing power parity (PPP), which states that the exchange rate will adjust to equalize the purchasing power of the two currencies.

The Fisher Effect is based on the premise that the nominal interest rate is determined by the real interest rate and the expected inflation rate. In the long-run equilibrium, the real interest rate is determined by the real economic variables, such as the rate of economic growth, productivity, and the supply of labor. The expected inflation rate is determined by the expected rate of price changes, which is influenced by factors such as the expected rate of wage growth, the expected rate of productivity growth, and the expected rate of changes in the money supply.

The Fisher Effect implies that the nominal interest rate in the U.S. is higher than the nominal interest rate in Europe because the expected inflation rate in the U.S. is higher than the expected inflation rate in Europe.

The Fisher Effect can also be used to explain the relationship between the nominal exchange rate and the expected inflation rate. The nominal exchange rate is determined by the expected rate of change in the price level and the expected rate of change in the money supply. In the long-run equilibrium, the nominal exchange rate is determined by the expected rate of change in the price level and the expected rate of change in the money supply.

After the money supply growth rate increases, the real interest rate increases, and the exchange rate depreciates. This is because the increase in the money supply causes the price level to rise, which makes the domestic currency less valuable. Conversely, if the money supply growth rate decreases, the real interest rate decreases, and the exchange rate appreciates. This is because the decrease in the money supply causes the price level to fall, which makes the domestic currency more valuable.

The Fisher Effect is a useful tool for predicting the relationship between interest rates and exchange rates. However, it is important to note that the Fisher Effect is based on the assumption that the expected inflation rate is the same across countries. If the expected inflation rate differs across countries, then the nominal interest rate and the nominal exchange rate will not be determined by the Fisher Effect.

The Fisher Effect is also important for understanding the impact of monetary policy on the exchange rate. For example, if a country's central bank increases the money supply, the expected inflation rate will increase, and the nominal interest rate will decrease. This will lead to a depreciation of the currency and a decrease in the nominal exchange rate. Conversely, if a country's central bank decreases the money supply, the expected inflation rate will decrease, and the nominal interest rate will increase. This will lead to an appreciation of the currency and an increase in the nominal exchange rate.

In summary, the Fisher Effect is a useful tool for predicting the relationship between interest rates and exchange rates. However, it is important to note that the Fisher Effect is based on the assumption that the expected inflation rate is the same across countries. If the expected inflation rate differs across countries, then the nominal interest rate and the nominal exchange rate will not be determined by the Fisher Effect.

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Footnote:
PART 3 Exchange Rates and Open-Economy Macroeconomics

equation (13-3). Along with the upward jump in $P_{t+1}$ in Figure 13-1d shows the simultaneoune proportional upward jump in $P_{t+1}$ implied by PPP. How can we visualize the meaning of the foreign exchange market at time $t$? The dollar interest rate must be one example not because of a change in current levels of money supply or demand, but solely because people expect more rapid future money supply growth and dollar depreciation. An investor3 by waiting into foreign deposits, which necessarily offer higher expected returns, the dollar depreciation simply in the foreign exchange market, moving to a new trend line along which depreciation is more rapid than it was up to time $t$. Notice how different assumptions about the speed of price level adjustments lead to contrasting predictions about how exchange and interest rates interact. In the example of a fall in the money supply under sticky prices, an interest rate rise is needed to preserve money market equilibrium, given that the price level cannot do so by dropping immediately in response to the money supply reduction. In that sticky price case, an interest rate rise is associated with lower expected inflation and a long-run currency appreciation, so the currency appreciates immediately. In our imperfectly-competitive example of a rise in money supply growth, however, an interest rate increase is associated with higher expected inflation and a currency that will be weaker in all future dates. An immediate currency appreciation is the result. These contrasting results of interest rate changes underlie our earlier warning that an explanation of exchange rates based on interest rates must carefully account for factors that cause interest rates to move. These factors can simultaneously affect expected future exchange rates and can therefore have a decisive impact on the foreign exchange market's response to the interest rate change. The appendix to this chapter shows in detail how expectations change in the case we analyzed.

Figure 13-2 shows the main long-run predictions of the Fisher effect. The figure plots inflation rates and interest rates for three countries that have had somewhat different inflationary experiences since 1970. Switzerland, the United States, and Italy. In each country interest rates tend to rise after inflation rates rise as prices adjust and people learn to expect higher inflation in the future, misjudges in inflation eventually lower interest rates for the same reason. Moreover, the average level of interest rates is lowest in Switzerland, which has the lowest average inflation rate, and highest in Italy, which has the highest average inflation rate.

The Fisher effect can be broadly correct even when PPP is not, so we can take the evidence in Figure 13-2 as confirmation of the monetary approach. We now look at evidence bearing more directly on the validity of PPP itself.

To be general case in which Europe's inflation rate $i_t$ is weak, the dollar value then depending upon the rate at time $t+1$. An allowed, accurate calculation of $t$ is $P_t - P_{t+1}$ where $i_t$ and $i_{t+1}$ are the $t$ and $t+1$ dollar interest rates.

National money supply typically in real yuan per unit, as in (15-2). Each vector looks at corresponding periods to look beats. If we assumed prior trend breaks differently, PPP implies that a real exchange rate on a new line, which the exchange rate is expected to move in the real exchange rate in the same manner. When we want to consider changes in trends, however, it will tip or, by approximation.
Empirical Evidence on PPP and the Law of One Price

How well does the PPP theory explain actual data on exchange rates and national price levels? A brief answer is that all versions of the PPP theory do badly in explaining the facts. In particular, changes in national price levels often fail to follow or anything about exchange rate movements.

Do not conclude from this, however, that the answer you've been taught about PPP was wrong. As we'll see later in this chapter, PPP is a key building block of exchange rate models more realistic than the monetary approach. Indeed, the empirical evidence of PPP gives an important clue about how more realistic models should be set up.

To test whether PPP holds, econometricians compare the international prices of a broad basket of commodities, noting causal assumptions for intercountry price differences among supposedly identical goods. These comparisons typically conclude that deviations from PPP are not significant either in absolute or relative terms. However, there are many exceptions to these findings. For example, the exchange rate for the British pound relative to the US dollar is generally higher than the PPP exchange rate. This is because the British pound is generally stronger against the US dollar than the PPP exchange rate would suggest.


A dramatic variation of relative PPP occurs in the years after 1979. In those years the dollar/German mark exchange rate increased significantly while the relative price of German goods increased as well. This suggests that relative PPP does not hold in those years.

Studies of other currencies also include the results in Figure 15.3. However, PPP has not held up well since the early 1970s, but in the 1980s was a more reliable guide to the exchange rate and national price levels. As you will learn later in this chapter...


For example, the German mark was generally stronger against the US dollar than the PPP exchange rate would suggest. This is because the German mark is generally stronger against the US dollar than the PPP exchange rate would suggest. This suggests that relative PPP does not hold in those years.
SOME MEERRY EVIDENCE ON THE LAW OF ONE PRICE

In the summer of 1986 the Economic magazine conducted an extensive survey on the prices of Big Mac hamburgers at McDonald's locations throughout the world. This apparently


book, between the end of World War II in 1945 and the early 1970s exchange rates were fixed within narrow intentionally agreed ranges through the intervention of central banks in the foreign exchange market. During the first half of the 1950s, when many exchange rates were reckoned-denominated at in the 1970s and after. Important deviations from relative PPP also occurred.6

Explaining the Problems with PPP

What explains the negative empirical results described in the previous section? There are several explanations. One is our failure to take PPP into account as a reason for the lack of currency valuation adjustments, which was based on the law of one price.

1. Counter to the assumptions of the law of one price, transport costs and restrictions on trade certainly do exist. These trade barriers may be high enough to prevent some goods from being traded between countries.

2. Monopolistic or oligopolistic pricing in goods markets may interact with transport costs and trade barriers to weaken further the link between the prices of similar goods in different countries.

3. Because the inflation data reported in different countries are based on different commodity baskets, there is no reason for exchange rate changes to affect all products equally.

Trade Barriers and Nominalcurrencies

Theoretically, transport costs are an important reason why markets might not work as well as expected under PPP. Suppose, again, that the same sweater sells for $45 in New York and £20 in London, but that in reality $2 may be too low a difference because of the two countries. At an exchange rate of $1.45 per pound, the dollar price of a £-denominated sweater is ($1.45 per pound) x ($20) = $33.00, but an American importer would have to buy $35.50 = $2 + $6.50 to purchase the sweater in London and get it to New York. At an exchange rate of $1.45 per pound, it would therefore be too expensive to buy a similar sweater from London to $50, even though their dollar price would be higher in the latter location. Similarly, at an exchange rate of $1.55 per pound, an American exporter would lose money by shipping sweaters from New York to London even though the New York price of $45 would be below the dollar price of the sweater in London, $46.50.

The lesson of this example is that transport costs may prevent the cross link between exchange rates and goods prices implied by the law of one price. The greater the transport costs, the greater the range over which the exchange rates can vary, given goods prices in different countries. Official trade adjustments such as tariffs have a similar effect, become a fixed ratio in the current imbalances affects the imports of one's country relative to those of another country. For example, in the presence of trade imbalances, a dollar does not fall as far as in Tokyo in Chicago—and a tariff, so anyone who has been to Tokyo has lost one. The reason for all this, transport costs may be relatively small to the consumer effecting some goods and services that they may not be traded internationally at all. Goods and services are called nontradables. The less-known, classroom example of a nontradable is a barter. A Freudenreich creating an American haircut would have to transport his own service to the United States to transport an American haircut to Paris. In another case, the cost of transport is so large relative to the price of the service being provided that (items excepted) French haircuts are only sold by residents of Paris while American haircuts are only sold by residents of the United States.

The existence in all countries of nontradable goods and services when prices are not linked internally allows systematic deviations even from relative PPP. Because the price of a nontradable is determined entirely by its domestic supply and demand curves, shifts in those curves may cause the domestic price of a tradable commodity to change relative to the foreign price of the same basket. Other change equal, a rise in the price of a country's nontradables will raise its price level relative to foreign price levels (measuring all countries' price levels in terms of a single currency). Looked at another way, the purchasing power of any given currency will fall to countries where the prices of nontradables rise.

Each country's price level includes a wide variety of nontradables, including goods with labor-content, consumer durable merchandise, and housing, among others. Broader speaking, we can identify distinct goods with manufactured products, raw materials, and agricultural products. Nontradables are primarily services and the output of the construction industry. There are notably exceptions in this rule. For example, financial services provided by banks and brokerage houses often can be traded internationally. In addition, trade restrictions, if sufficiently severe, can cause goods and services to be viewed as nontradables. Thus, in most countries nonmanufactures are nontradables.

We can get a rough idea of the importance of nontradables in the economy by looking at the composition of the service and construction industries in the United States. In 1990, the output of these industries accounted for about 30 percent of U.S. GNP. Numbers like these are likely to understate the importance of nontradables in determining national price levels. The prices of tradable products usually include costs of nontradables and including services that are given goods from producers to consumers. (See "Mean Everyone Else on the One Price", page 405-452.) Nontradables help explain the wide difference in relative PPP illustrated by Figure 15.13.

Departures from Free Competition

When trade barriers and imperfectly competitive market structures exist together, linkages between national price levels are weakened further. An extreme case occurs when a single firm sets a commodity for different prices in different markets. (Recall the analysis of dumping in Chapter 6.)

HONG KONG’S SURPRISINGLY HIGH INFLATION

If purchasing power parity holds true, currencies whose price indices are linked by an unchanged exchange rate should experience equal rates of price level inflation. Hong Kong’s experience since the early 1980s provides a glaring counter example. Despite an exchange rate that has been held to HK$7.8 at U.S. dollar since October 1983, Hong Kong’s inflation rate has far exceeded those of the United States. The figure on the next page shows how the two economies’ price levels have moved since 1983.

This high inflation is surprising because Hong Kong has eroded essentially no barrier to international trade, and thus is one of the world’s most open economies. If the terms of international trade were to remain strong everywhere to keep international price levels in line, it would be in Hong Kong.

Until the early 1970s Hong Kong’s currency was pegged to the pound sterling, and for the period, PPP was better. Over the period 1965–1972, for example, Hong Kong’s average inflation rate was 3.5 percent per year while Britain’s was 5.9 percent. Hong Kong had been pegging ever since the early 1980s.

The one-word answer is China. In 1978 China began a drive to liberalize, to quantify from the worst distortions of central planning while maintaining the Communist party’s political monopoly.

"No Gosia Perlberg, "Hong Kong’s Economy (Hong Kong: Oxford University Press, 1988)."

When a few sells the same product for different prices in different markets, we say that it is pricing to market. Pricing to market may reflect different demand conditions in different countries. For example, countries where demand is more price-sensitive will tend to be charged higher markups over a monopolistic seller’s production cost. Empirical studies of firm-level export data have yielded strong evidence of price-setting to market in manufacturing trade.1

1For a detailed review of the evidence, see the papers by Goldberg and Krueger in this chapter’s Fostering Theoretical comparison and pricing in markets for Hudson’s Bank (Cambridge, MA: MIT Press, 1997)." Why Buy a Car in Tokyo? Speed, Space, and Quality: A Case for High Prices in Japan."

their momentous in property prices (as well as in general inflation). Through the late 1980s, Hong Kong’s rents rose to be among the highest anywhere in the world, a development that raised the real cost to the consumer of purchasing a property. As a result of these forces, property prices in Hong Kong rose sharply. ..." Prices, as a result, rose by 8.2 and 3.5 million dollars, respectively, in 1983–2000."


Hong Kong’s price level has risen much more rapidly than that of the United States, despite a fixed exchange rate and no trade barriers.

Source: U.S. Department of Commerce, and Government Economic Hong Kong, Economic Project, various issues. Hong Kong today is completely open.

In the early 1980s, for example, a Nissan automobile built at the Japanese company’s Sheffield plant in northeast England could be bought from a dealer near the plant for £16,215. The same model sold in London for £14,375—despite the cost of Nissan of shipping the car 10,000 miles from Sheffield to London. This kind of discriminatory pricing to market would be difficult to imagine if at some sales for dollars. Hong Kong, same price in Japan and ship them to England. Similarly, if consumers overwhelmingly prefer foreign vehicles, competitive foreign producers would keep the U.K. price of Japanese cars from dropping wildly out of line with production costs. The combination of product differentiation and segmented markets, however, tends to limit the invasion of the low
CHAPTER 15

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larger and more frequent short-run deviations from relative PPP. The box on pp. 412-413 provides a special tip on visualizing how changes in relative PPP can generate violations of the law of one price as an empirical test for identifying goods.

Recent research suggests that short-run deviations from PPP as shown in the volatile exchange rates over time, with only 6% of the exchange rate changes remaining from the previous five years. This means that there are significant deviations from PPP remaining after five years. Even when these unexpected PPP deviations are removed from the data, it still appears that the cumulative effect of constant long-term trends causes predictable deviations from PPP in many countries. The case study entitled "Why Price Levels Are Lower in Poorer Countries" discusses one of the major mechanisms behind such trends.

CASE STUDY

Why Price Levels Are Lower in Poorer Countries

Research on international price differentials has uncovered a striking empirical regularity: When measured in terms of a single currency, countries' price levels are positively related to the level of real income per capita. In other words, a dollar, when converted in local currency at the market exchange rate, generally goes much farther in a poor country than in a rich one. Figure 15-4 illustrates the relative between price levels and income, with each dot representing a different country.

The previous section's discussion of the role of nominal goods in the determination of national price levels suggests that international variations in the price of commodities may contribute to price discrepancies between rich and poor nations. The available data indeed show that non-tradables tend to be more expensive (relative to tradables) in richer countries. One reason for the lower relative price of non-tradables in poorer countries was argued by Peter B. Bpun and Paul Samuelson. The Balassa-Samuelson theory assumes that the labor forces of poorer countries are less productive than those of rich countries in the tradables sector.

"Note: Not a standard Exchange Rate Regime, and the Behavior of Real Exchange Rates: Evidence and Implications," in Karl Brunner and Allan H. Meltzer (eds.), Monetary Policy, (Chicago: University of Chicago Press, 1973), which distinguishes a dollar in Canada from a dollar in the United States, showing how the price of a dollar varies across countries within and across different exchange rate regimes. The Balassa-Samuelson theory assumes that the labor forces of poorer countries are less productive than those of rich countries in the tradables sector. The Balassa-Samuelson theory is characterized by the theory of international trade. See "Theory of International Trade," by Krugman and Obstfeld, 1993, p. 152. The Balassa-Samuelson theory was formulated by Boister and Samuelson, 1964, p. 152-153."
But inter-country productivity differences in manufactures are negligible. If the prices of manufactured goods are roughly equal in all countries, however, lower labor productivity in the manufactures industries of poor countries implies lever wages than abroad, lower production costs in manufactures, and therefore a lower price of manufactures. Rich countries with higher labor productivity in the manufactures sector will tend to have higher manufacturable prices and higher price levels. Productivity analysis gives some empirical support to the Bolster-Samuelson differential productivity perspective. And it is plausible that international productivity differences are sharper in manufactured goods. Whether a country is rich or poor, a longer time has passed since many barriers are a week, but there may be significant wage for productivity differences across countries in the manufacturing of manufactured goods like personal computers.

An alternative story that attempts to explain the lower price levels of poor countries was put forth by Raj Chaudhury and Michael Krugman of the World Bank and the University of Pennsylvania and the Federal Reserve Bank of New York. The overall argument is that differences in emoluments of capital and labor rather than productivity differences, but it also predicts that the relative price of commodities increases as real per capita income increases. Rich countries have high capital-labor ratios, while poor countries have more labor relative to capital. Because rich countries have higher capital-labor ratios, the marginal productivity of labor is greater in rich countries than in poor countries, and the former will therefore have a higher wage level than the latter. This difference in the elasticity of labor demand in manufactures, which arises due to the fact that labor is a significant factor of production in manufactures, is also larger than in the rich, high-wage countries. Once again, the differential in the relative price of manufactures suggests that overall price levels, when measured in a single currency, should be higher in rich countries than in poor.
STICKY PRICES AND THE LAW OF ONE PRICE: EVIDENCE FROM SCANDINAVIAN DUTY-FREE SHOPS

Sticky nominal prices and wages are central in macroeconomic theory, but just why might it be difficult for money prices to change from day to day in markets characterized by "sticky prices"? One popular idea is that "sticky prices" are due to government intervention or "anti-inflationary policies" or "overcharge competitors' prices." When prices stick, even if costs change, some consumers will stop shopping elsewhere and find it more convenient to remain with a monopolist or oligopoly even if all sellers have raised their prices. Because of these various reasons, some states or localities will hold prices constant even after a change in market conditions since they are certain the change in price is permanent enough to make raising the costs of price change worthwhile. If there were only no barriers between two markets with goods priced in different currencies, sticky prices would be unable to survive in the face of an exchange rate change. All buyers would simply flock to the market where a good has become cheaper. But when taste and technology change, the demand for one price of one price do not induce unlimited arbitrage, so it is feasible for money prices to change from day to day in markets characterized by "sticky prices." In real world, trade barriers may be just as important to understand, widespread, and often subtle in nature.

Apparently, arbitrage between two markets may be limited even when the physical distance between them is not great, as a surveying study of price changes in Scandinavia's duty-free stores shows. Scandinavian consumers in Sweden and Finland studied pricing behavior in the Norwegian market in one, as a surveying study of price changes in Scandinavia's duty-free stores shows. Scandinavian consumers in Sweden and Finland studied pricing behavior in the Norwegian market and found the prices of various goods in several categories for the convenience of consumers from different countries. Only if it is easy to price the caviary, they are released only once a time to time with evident prices. In the interim, however, fluctuations in exchange rates can induce multiple, changing prices for the same good. For example, on the British Lira of foreign Swedish and Danish, prices, as we know, the fish offish can reflect the high variability or the fishing seasons.


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were listed in both Finnish marks and Swedish kroner between 1957 and 1958, implying that a relative depreciation of the mark would make it cheaper to buy caviary or walk by paying krona rather than marks.

Despite such price discrepancies, British line was always able to be in business in both currency—passengers did not need to buy at the lowest price. Swedish passengers, who held relatively large amounts of their own national currency, would not feel entitled to buy in the kroner markets, whereas Swedish tourists tended to buy marks or dollars. Often, British line would take advantage of such a situation by raising its prices of goods in foreign exchange, but this was not the case in Sweden. Since they are not used to price changes, they are released only once a time to time with evident prices. In the interim, however, fluctuations in exchange rates can induce multiple, changing prices for the same good. For example, on the British Lira of foreign Swedish and Danish, prices, as we know, the fish offish can reflect the high variability or the fishing seasons.

The idea that currency preferences, exchange rates, and price levels are determined by the international capital markets is not supported by the fact that currency preferences and currency market exchange rates are determined by the foreign exchange market exchange rates.

For a given percentage price discrepancy, the gurus are purchasing at the lowest price, which is the same price for all. The finding that DAX has more time for predicting the market to match with its bets is therefore consistent with the presence of financial barriers to arbitrage.

As we will see, real exchange rates are important not only for quantifying deviations from PPP but also for analyzing economic demand and supply conditions in open economies.

Real exchange rates are defined, however, in terms of nominal exchange rates and price levels. In other words, we can define the real exchange rate as the ratio of the two currencies, or we can say that it is the price level in one currency in terms of the other.

For example, if we define the nominal exchange rate as the ratio of the two currencies, or we can say that it is the price level in one currency in terms of the other.

We will now turn to the analysis of monetary factors, which we require instead that each country's price index gives a good representation of the purchases that increase its residents' demand for its monetary supply.

The reason the price level does not persist, but we must settle on some definition before the real exchange rate can be defined formally. To be meaningful, you can think of $P_{m}$ as the dollar price of an unit Foreign currency exchanging basket containing the typical weekly payments of U.S. households and foreign citizens. It is based on exchange rate reflecting the typical price of European households and foreign citizens. To be meaningful, you can think of $P_{m}$ as the dollar price of an unit Foreign currency exchanging basket containing the typical weekly payments of U.S. households and foreign citizens. It is based on exchange rate reflecting the typical price of European households and foreign citizens. To be meaningful, you can think of $P_{m}$ as the dollar price of an unit Foreign currency exchanging basket containing the typical weekly payments of U.S. households and foreign citizens. 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* The critical relationship was noted in our discussion of the price equation in Chapter 5. As we have emphasized in the chapter, commodity prices are one important factor behind the observed price for home products.

**PPP is a testable proposition as was noted in our discussion of the price equation in Chapter 5. As we have emphasized in the chapter, commodity prices are one important factor behind the observed price for home products.
Having described the foreign currency basket used to measure price levels, we can now formally define the real dollars/basket exchange rate, denoted $\text{RER}_{pb}$, as the dollar price of the European basket relative to that of the Americans. We can express the real exchange rate as the dollar value of Europe's price level divided by the U.S. price level or, in symbols, as:

$$\text{RER}_{pb} = \frac{\text{P}_{eb}}{\text{P}_{ub}}$$

(15.4)

A numerical example will clarify the concept of the real exchange rate. Imagine the European reference basket consists of $600 (with $300 = 100) per European basket), that the U.S. basket costs $240 (so that $300 = 100 per U.S. basket), and that the nominal exchange rate is $\text{ER}_{pb} = 1.30$ per euro. The real dollars/basket exchange rate would then be:

$$\text{RER}_{pb} = \frac{(1.30 \times 600) + (100 \times 240)}{(1.30 \times 300) + (100 \times 240)} = 1.20$$

(15.5)

A rise in the real dollars/basket exchange rate $\text{RER}_{pb}$ reflects a real depreciation of the dollar against the euro. We can also think in terms of a rise in the exchange rate of goods. For example, a 10 percent nominal depreciation of the dollar for a 10 percent increase in prices of European goods, or a 10 percent increase in the price level of European goods. In other words, a rise in $\text{RER}_{pb}$ reflects a rise in the price level of European goods.

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That $P_L$ has its properties in $M$, while (15-7) shows that the U.S. price level is the single variable changing throughout the long run along with the nominal exchange rate $E_{PP}$. Because the real exchange rate $E_{PP}$ does change, the nominal exchange rate change is consistent with relative PPP. The only long-run effect of the U.S. money supply increase is to raise all dollar prices, including the dollar price of the euro, in proportion to the increase in the money supply. It should be no surprise that this result is the same as the one we found using the monetary approach, since that approach also accounts for the long-run effects of monetary changes.

2. A shift in relative money supply growth rates. A persistent increase in the growth rate of the U.S. money supply raises the long-run U.S. inflation rate and, through the Fisher effect, raises the dollar interest rate relative to the euro interest rate. Because relative U.S. real money demand therefore declines, equation (15-3) implies that $E_{PP}$ will rise (as shown in Figure 15-1). Because this change brings the exchange rate closer to PPP, it is in our long-run world of differences, specifically, when we alter the long-run real dollar-dollars exchange rate. According to (15-7), then, $E_{PP}$ rises in proportion to the increase in $P_L$ in depreciation of the dollar against the euro. Once again, a purely monetary change brings about a long-run nominal exchange rate change in the real with relative PPP just in the monetary approach presented.

3. A change in relative output demand. This type of change is not covered by the monetary approach, so we now see the general perspective we've developed, in which the real exchange rate can change, is essential. Given a change in relative output demand does not affect long-run nominal price levels—and these depend solely on the factors appearing in equations (15-3) and (15-7)—the long-run nominal exchange rate will change only if an error in the real exchange rate change. Consider the case in which world real demand for goods rises. Earlier in this section we saw that a rise in demand for U.S. products causes a long-run real appreciation of the dollar against the euro if $E_{PP}$ in (15-7) is constant. This change is simply a rise in the relative price of U.S. output. Given that long-run real price levels are unchanged, however, (15-7) tells us that a long-run nominal appreciation of the dollar against the euro if $E_{PP}$ is constant. This prediction highlights the important fact that even though exchange rates are nominal prices, they respond to movements as well as to monetary equilibrium in the long run.

4. A change in relative supply shocks. As we saw earlier, this section, an increase in relative U.S. supply causes the dollar to appreciate in terms against the euro, lowering the relative price of U.S. output. This rise in $E_{PP}$ is, however, the only one change in equation (15-7) implied by relative exchange in U.S. output. In particular, the relative U.S. output increase raises the demand for real U.S. money balances, raising aggregate U.S. real money demand and, by (15-3), pushing the long-run U.S. price level down. Reflecting this decline in equation (15-7), we will see that real $E_{PP}$ falls, the output and money market effects of a change in output supply work in opposite directions, so that the net effect on $E_{PP}$ is indeterminate. Our analysis of an output-supply change demonstrates that even when a substantial origin in a single market (in this case, the output market), its influence on exchange rates may depend on a variety of factors that are characteristic of the economy's currency system, whether economic.
| Table 15.1 | Effect of Money Market and Output Market Changes on the Long-Horizon Nominal Dollar/Foreign Exchange Rate, $E\_\text{F}}$

<table>
<thead>
<tr>
<th>Change</th>
<th>Money market</th>
<th>Output market</th>
<th>Case Study: Why Has the Yen Kept Rising?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Increase in U.S. money supply level</td>
<td>Increase in the U.S. money supply level</td>
<td>Between 1950 and 1971 the Japanese yen was fixed to the U.S. dollar at a nominal exchange rate that could vary by no more than ±1.5% from 360 yen per dollar. Since the early 1970s, when the discretionary exchange rate was allowed to float or change in response to market forces, the cumulative appreciation of the yen against the dollar has been enormous. In the spring of 1999 the dollar's price hovered near the 120 yen mark. In about 25 years, the yen had lost two-thirds of its foreign exchange value again the yen.</td>
</tr>
<tr>
<td></td>
<td>Increase in European money supply level</td>
<td>Increase in European money supply level</td>
<td>This development cannot be explained by the simple PPP theory because there has been no corresponding rise in the U.S. commodity price level relative to Japan's. Can the extended theory of long-run nominal exchange rates have provided some light on the dollar's cumulative depreciation against the yen?</td>
</tr>
<tr>
<td></td>
<td>Increase in U.S. money supply growth rate</td>
<td>Increase in European money supply growth rate</td>
<td>A general failure to come to the behavior of the dollar's real exchange rate against the yen, $\epsilon$, between 1970 and 1995 shows that the price of Japanese goods in terms of U.S. goods has followed a steep upward trend since at least 1990. Let's take this trend of real yen appreciation as a given for the moment, and consider its implications for the nominal dollar/yen exchange rate, $E_\text{F}}$. We will then return to the factors causing the upward trend in $E_\text{F}}$.</td>
</tr>
<tr>
<td></td>
<td>Increase in demand for U.S. output</td>
<td>Increase in demand for European output</td>
<td>Even though $E_\text{F}}$ was fixed approximately at 100 (1960) = 102.5 yen per dollar, the real exchange rate $R_\text{F}}$ was able to move even over the 1920–1971 period because Japan's higher inflation than the United States did. Between 1950 and 1960 Japan's inflation averaged 5% per year while U.S. inflation averaged only 2.6%. Average U.S. inflation was higher than before during the 1960–1971 period, at 3.4% per year, but Japan's 5.5% average annual inflation rate for the same period still remained considerably above it. With $P_\text{F}}$ rising more rapidly than $P_\text{Y}$, the trend rate in $\epsilon_\text{F}} = \frac{P_\text{F}}{P_\text{Y}}$, shown in Figure 15.5 could stabilize even with $E_\text{F}}$ fixed.</td>
</tr>
<tr>
<td></td>
<td>Increase in demand for Japanese output</td>
<td>Increase in demand for Japanese output</td>
<td>Things changed with the coming of floating exchange rates in the early 1970s. After suffering through some very high inflation in 1973 and 1974, Johnson's efforts produced a steepening of the yen's appreciation in the 1980s. For example, the nominal exchange rate $E_\text{F}}$ rose from 250 yen per dollar in 1980 to over 120,000 yen per dollar in 1995.</td>
</tr>
<tr>
<td></td>
<td>Output supply increases in the United States</td>
<td>Output supply increases in Europe</td>
<td>We see that the only way for $E_\text{F}}$ to keep rising even more sharply than $P_\text{F}}/P_\text{Y}$ is for $\epsilon_\text{F}}$ to rise even more sharply. And a steep programming of the dollar's price of yen is exactly what we have observed.</td>
</tr>
<tr>
<td></td>
<td>Output supply increases in Japan</td>
<td>Output supply increases in Europe</td>
<td></td>
</tr>
</tbody>
</table>

The U.S. dollar has steadily devalued in real terms against Japan’s yen. This erosion has increased the average trade deficit in the U.S. and Japan.

The yen has appreciated against the dollar since the early 1980s. The appreciation of the yen has had significant implications for the U.S. economy. The appreciation of the yen has meant that Japanese goods become cheaper relative to U.S. goods, which has led to a decrease in U.S. exports and an increase in imports. This has had a significant impact on the U.S. trade deficit.

Inflation rates have been relatively low in Japan, which has contributed to the appreciation of the yen. The Bank of Japan has maintained low interest rates, which has made it attractive for foreign investors to invest in Japan. This has led to an inflow of capital into Japan, which has put upward pressure on the yen.

In conclusion, the appreciation of the yen has had a significant impact on the U.S. economy. The appreciation has contributed to the widening of the U.S. trade deficit, which has been a major concern for policymakers in the U.S. and Japan.
between countries depend not only on changes in expected inflation, as in the monetary approach models, but also on expected changes in the real exchange rate. We begin by recalling that the change in \( \Delta \pi \), the real difference exchange rate, is the deviation from relative PPP, that is, the change in \( \pi_{t+1} - \pi_t \). The difference change in the nominal difference exchange rate less the international difference in inflation rates between the United States and Europe. We thus arrive at the corresponding relationship between the expected change in the real exchange rate, the expected change in the nominal rate, and expected inflation:

\[
(\Delta \pi - \Delta \pi_{\text{nom}}) = (\pi_{t+1} - \pi_t) - \pi_{t+1} - \pi_t = \pi_{t+1} - \pi_t
\]

(15.8)

where \( \pi_{t+1} \) (as per usual notation) is the real exchange rate expected for year t+1 from today. Now return to the interest parity condition between dollar and euro-deposits.

\[
R_t - R_{t+1} = (\pi_{t+1} - \pi_t)_{\text{nom}}
\]

(15.9)

An easy rearrangement of (15.8) shows that the expected rate of change in the nominal dollar/euro exchange rate is just the expected rate of change in the real dollar/euro exchange rate plus the U.S., Europe expected inflation rates. Combining (15.8) with the above interest parity condition, we are led to the following breakdown of the international interest gap:

\[
R_t - R_{t+1} = (\pi_{t+1} - \pi_t)_{\text{nom}} + (\pi_{t+1} - \pi_t)
\]

(15.9)

Notice that when the market expects relative PPP to prevail, \( \pi_{t+1} - \pi_t = 0 \), and the first term on the right side of this equation drops out. In this special case (15.9) reduces to the simpler (15.5), which we derived by assuming relative PPP.

In general, however, the dollar/euro-interest rate difference in the case of non-zero components: (1) the expected rate of real dollar depreciation against the euro and (2) the expected inflation difference between the United States and Europe. For example, if U.S. inflation will be 3 percent per year forever and European inflation zero, the long-run interest difference between dollar and euro deposits need not be the 5 percent that PPP (all interest parity) would suggest. If, in addition, everyone knows that output demand and supply trends will make the dollar decline against the euro in real terms at a rate of 1 percent per year, the international interest spread will annually be 6 percent.

### Real Interest Parity

Economics makes an important distinction between nominal interest rates, which are rates of return measured in monetary terms, and real interest rates, which are rates of return measured in real terms, that is, in terms of a country’s currency. Because real rates of return often are unstable, we usually refer to expected real interest rates. The interest rates we discussed in connection with the interest parity condition and the determinants of money demand were nominal rates, the example, the dollar return on dollar deposits. But for many other purposes, economists need to analyze behavior in terms of real rates of return. No one who is thinking of investing money, for example, could make a decision knowing only that the nominal interest rate is 15 percent. The investment would be quite unstable at an inflation, but dramatically unattractive if inflation were running at 100 percent per year.28

We conclude this chapter by showing that when the nominal interest parity condition expects nominal interest rate differences between countries in expected changes in nominal exchange rates, a real interest parity condition equals expected real interest rate differences to expected changes in real exchange rates. Only when relative PPP is expected to hold (meaning no real exchange rate change is anticipated) are expected real interest rates in all countries identical.

The expected real interest rate, denoted \( \pi_t \), is defined as the nominal interest rate, but is the expected inflation rate, \( \pi_t \) in the equation:

\[
\pi_t = R_{t+1} - R_t
\]

In other words, the expected real interest rate in a country is just the real rate of return a domestic investor expects to earn on a loan or his currency. The definition of the expected real interest rate clarifies the generality of the theory behind the Fisher effect. Any increase

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28We could get away with computing nominal interest differences in the foreign exchange market between (15 Chapter 15) showed that some differences equal real rate differences for any given reason. In the context of the money market, the nominal interest rate is the real rate of return you see by holding international currency.
PART 3 Exchange Rates and Open-Economy Macroeconomics

In the expected inflation rate view, the domestic real interest rate must be referred, one for one, to the normal interest rate. A notable consequence of the preceding definition is a formula for the difference in expected real interest rates between two currency areas such as the United States and Europe:

\[ r_d^* - r_f^* = (r_d^* - r_f^*) - (R - R_d^*) \]

If we use marginal equation (13-19) and combine it with the equation above, we get the desired real interest rate for this condition:

\[ r_d^* = r_f^* + \frac{\sigma_d^*}{\sigma_f^*} \cdot R \]

Equation (13-10) looks much like the nominal interest parity condition from which it is derived, but it expresses differences in expected real interest rates between the United States and Europe by expected movements in the dollar's real exchange rate. Expected real interest rates are the same in different countries where relative PPP is expected to hold (which case equation (13-10) implies that \( r_d^* = r_f^* \)). More generally, however, expected real interest rates in different countries need not be equal, even in the long run. If controlling change in output markets is expected to rise during the next two decades while productivity growth remains steady in South Korea, then expected real interest rates must be expected to rise. Suppose, for example, that productivity growth is higher in South Korea than in the United States. If the Heckscher-Ohlin hypothesis is valid, people should be willing to buy more in South Korea at the same cost of the United States' non-durable goods. Equation (13-10) then implies that the expected real interest rate should be higher in the United States than in South Korea.

The real interest difference simply implies growth opportunities for international investors. Not necessarily. A cross-border real interest differential does imply that investors from one country perceive different real rates of return on assets elsewhere. Nominal interest parity fails us, however, that any investor expects the same real returns on domestic and foreign currency assets. Two parallel reasoning in different countries need not calculate this expected real rate in the same way if relative PPP does not lock the prices of their consumption baskets, but there is no way either can profit from their disagreement by shifting funds between countries.

**Summary**

1. The purchasing power parity theory, in its absolute form, asserts that the exchange rate between countries' currencies equals the ratio of their price levels, as measured

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*Note: The analysis provided is a theoretical framework for understanding the relationship between real interest rates in international markets.*
PART 3 Exchange Rates and Open Economy Macroeconomics

more equal the difference in expected inflation plus the expected percentage change in the real exchange rate.

Key Terms
- Purchasing power parity (PPP), p. 389
- Real appreciation, p. 414
- Real depreciation, p. 414
- Real exchange rate, p. 413
- Real interest rate, p. 423
- Elasticity PPP, p. 391

Problems
1. Suppose Russia’s inflation rate is 100 percent over one year but the inflation rate in Switzerland is only 5 percent. According to real PPP, what should happen over the next 10 years? If the Swiss franc’s exchange rate against the Russian ruble?

2. Discuss why it is often asserted that exporters suffer when their home currencies appreciate in real terms against foreign currencies and prosper when their home currencies depreciate in real terms.

3. Other things equal, how would you expect the following things to affect a country’s real exchange rate relative to foreign countries?
   - The overall level of spending doesn’t change, but domestic consumers decide to spend more of their income on non-tradable products and less on tradables.
   - Foreign investors start to demand away from their own goods and toward the home country’s exports.

4. Large-scale trade typically bring a combination of international trade and financial activities. Explain how real trade under these conditions, that the real exchange rate as a function of the price of the home currency relative to the foreign currency.

5. In the late 1970s, Britain seemed to have struck it rich. Having developed its North Sea oil producing fields earlier than many others, Britain suddenly found its real income higher as a result of a dramatic increase in world oil prices in 1978-1980. In the early 1980s, however, oil prices plummeted as the world economy slid into a deep recession and world oil demand fell.

The following page, we show index numbers for the average real exchange rate of the pound against several foreign currencies. Each average index numbers are called real effective exchange rate. A rise in one of these numbers indicates a real appreciation of the pound, that is, an increase in Britain’s price level relative to the average price level paid abroad measured in pounds. A fall is a real depreciation.
14. Suppose the expected real interest rate in the United States is 9 percent per year while that in Europe is 3 percent per year. What do you expect to happen to the real effective exchange rate over the next year? 

15. In a short run of a model with sticky prices, real incomes in the money supply raise the nominal interest rate and appreciates the currency (see Chapter 10). What happens to the expected real interest rate? Explain why the sign of the real exchange rate change reflects the real interest parity condition.

16. Discuss the following statement: "When a change in a country's nominal interest rate is caused by a rise in the expected real exchange rate, the domestic currency appreciates. When the change is caused by a rise in expected inflation, the currency depreciates."

17. The difference between the nominal interest rate and the actual inflation rate is often called the real rate at account rate (as opposed to a real rate, or expected real interest rate. Figure 10-1 shows that between 1975 and 1980, the real interest rate in Switzerland was usually positive while those in the United States was usually negative. Assume that people were able to forecast inflation accurately in both countries during those years. Would you always use the difference between Swiss francs and the Swiss francs value of the French francs to exchange between 1975 and 1981? Why or why not?

18. If you think that the real effective exchange rate in 1981-1984?

Check your answers by looking up the history of the exchange rate. (See, for example, the International Monetary Fund's publications, International Financial Statistics.)

Further Reading

Robert G. Pasinio, The Monetary Approach to Exchange Rates, New York: Columbia University Press, 1938. This is a great introduction to the monetary approach theory of exchange rates in analyzing the major problems that affected World War II.


Chapter 15

Price Levels and the Exchange Rate in the Long Run


APPENDIX TO CHAPTER 15

The Fisher Effect, the Interest Rate, and the Exchange Rate under the Flexible-Price Monetary Approach

The monetary approach to exchange rates, which assumes that the prices of goods are perfectly flexible, implies that a country's currency depreciates when its nominal interest rate is higher than that of other countries. This approach supports a classical analysis of the trade balance.

Consider again the flexible exchange rate case, and imagine that the Federal Reserve raises the future rate of U.S. money-supply growth by the amount \( \Delta t \). Figure 15A-1 provides a diagram that will help us keep track of how various markets respond to this change.

The lower left quadrant in the figure is our usual depiction of equilibrium in the U.S. money market. It shows that before the increase in U.S. money-supply growth, the nominal interest rate on dollars equals \( R_d \) (point 1). The Fisher effect tells us that a rise \( \Delta t \) in the future rate of U.S. money-supply growth, all else equal, will raise the nominal interest rate on dollars to \( R_d^* = R_d + \Delta t \) (point 2).

As the diagram shows, the rise in the nominal dollar interest rate reduces money demand and therefore requires an equalizing fall in the real money supply. But the nominal money stock is unchanged in the short run because it is only the future rate of U.S. money-supply growth that has risen. What happens? Given the unchanged nominal money supply \( M_d^* \), an upward jump in the U.S. price level, from \( P_0^* \) to \( P_0^* \), leaves the real money stock unchanged in the short run. The associated flexibility of prices allows this jump to occur even in the short run.

To see the exchange rate response, we turn to the upper left quadrant. The monetary approach assumes purchasing-power parity, implying that if \( P_0^* \) rises (while the American price level remains constant), which we assume, the flexible-exchange rate equation \( E^* = E + \Delta \log P^* \) (where \( \Delta \) is a depreciation of the dollar). The lower left quadrant of Figure 15A-1 graphs the implied relationship between U.S. real money holdings, \( M_r/P_0^* \), and the exchange rate, \( E^* \). Given an unchanged nominal money supply in the United States and an unchanged European price level. Using FFP, we can write the equation graphed there (which is a downward-sloping hyperbola) as

\[
E^* = E \left( \frac{M_r/P_0^*}{M_d^*} \right) \left( \frac{P_0^*}{P_0^*} \right)
\]

This equation shows that the fall in the U.S. real money supply, from \( M_r/P_0^* \) to \( M_r/P_0^* \), it associated with a dollar depreciation in which the flexible-exchange rate equals the ratio of the U.S. to the European price levels.

The 45-degree line in the upper left quadrant of Figure 15A-1 allows you to visualize the exchange-rate change given the lower left quadrant to the vertical shift of the upper right.

When goods prices are perfectly flexible, the money market equilibrium diagram (bottom quadrant) shows two effects of an increase \( \Delta t \) in the future rate of U.S. money-supply growth. The change \( \Delta t \) raises the dollar interest rate from \( R_d^{*} = R_d + \Delta t \) to \( R_d^{*} \). In line with the Fisher effect, and \( \Delta t \) rises the real price level. The FFP relationship in the upper quadrant shows that the price level jump from \( P_0^{*} \) to \( P_0^{*} \) causes a depreciation of the dollar in terms of the euro (the dollar-dollar exchange rate rises from \( E_0 \) to \( E_0^* \) in the foreign exchange market diagram (bottom quadrant); this dollar depreciation is shown at the top of the lower part) even though there has been no change in the nominal money supply.
CHAPTER 16
Output and the Exchange Rate in the Short Run

In September 1992 Britain allowed the pound to deprecate in the foreign exchange market. The country's markets surged as a result, and Britain was hit out of recession without a rise in inflation. Ten years later, Argentina let its currency depreciate amidst economic chaos and continuing recession. What explains these sharply contrasting experiences? This chapter will help us to understand the complicated factors that cause output, exchange rates, and inflation to change by completing the macroeconomic model built in the last two chapters.

Chapters 14 and 15 presented the connections among exchange rates, interest rates, and price levels but always assumed that output levels were determined outside of the model. Those chapters gave us only a partial picture of how macroeconomic changes affect an open economy because events that change exchange rates, interest rates, and price levels may also affect output. How do we complete the picture by examining how output and the exchange rate are determined in the short run?

Our discussion combines what we have learned about asset markets and the long-run behavior of exchange rates with a new element: a theory of how the output market adjusts to demand changes when product prices in the economy are themselves slow to adjust. As we saw in Chapter 14, institutional features like long-term nominal contracts can give rise to "sticky" or slowly adjusting output market prices. By putting a short-run model of the output market together with our models of the foreign exchange and money markets (the asset markets), we build a model that explains the short-run behavior of all the important macroeconomic variables in an open economy. The long-run exchange rate model of the preceding chapter provides the framework that participants in the asset markets use to form expectations about future exchange rates.

Because output changes may push the economy away from full employment, the theory among output and other macroeconomic variables such as the merchandise trade balance and the current account are of great concern to economic policymakers. In the last part of the chapter we use our short-run model to examine how macroeconomic policy tools affect output and the current account, and how these tools can be used to maintain full employment.
PART 3 Exchange Rates and Open-Economy Macroeconomics

Determinants of Aggregate Demand in an Open Economy

To analyze how output is determined in the short run when produce prices are sticky, we introduce the concept of aggregate demand for a country’s output. Aggregate demand is the amount of a country’s goods and services demanded by households and firms throughout the world. Just as the output of an individual good or service depends in part on the demand for it, a country’s output also depends on the aggregate demand for its goods and services. The economy is in full employment in the long run (by definition) because wages and the price level eventually adjust to ensure full employment. In the long run, domestic output depends only on the available domestic supply of factors of production such as labor and capital. As we will see, however, these productive factors can be over- or underemployed in the short run as a result of skills in aggregate demand that have led to their full employment over the past.

In Chapter 12 we learned that an economy’s output is the sum of four types of expenditure: government purchases; consumption; investment; and the current account. Correspondingly, aggregate demand for an open economy’s output is the sum of consumption demand (C), investment demand (I), government demand (G), and export demand (X). Each of these components of aggregate demand depends on various factors. In this section we examine the factors that determine consumption demand and the current account. We discuss government demand later in this chapter when we examine the effects of fiscal policy. For now we assume that G is given. To avoid complicating the model, we also assume that investment demand is given. The determinants of investment demand are incorporated into the model in Appendix A to this chapter.

Determinants of Consumption Demand

In this chapter we view the amount a country’s residents wish to consume as depending on disposable income, D (that is, nominal income less taxes, Y – T). (C, Y, and T are all measured in terms of domestic output units.) With this assumption, a country’s desired consumption level can be written as a function of disposable income:

$$C = C(D)$$

Because each consumer generally demands more goods and services as his or her real income increases, we expect consumption to increase as disposable income increases at the aggregate level, too. Thus, consumption demand and disposable income are positively related. When disposable income decreases, however, consumption demand generally rises by less because part of the income increase is saved.

$$C = C(D)$$

As a matter of practicality, we assume the following factors, such as unemployment and the interest rate, to affect consumption: price level, real interest rate, and expected output. This is the consumer price index (CPI) of the country, which can be read as the level of the consumer price index in the appendix to Chapter 7.
Part 3 | Exchange Rates and Open-Economy Macroeconomics

How Real Exchange Rate Changes Affect the Current Account

You will see that a representative domestic expenditure basket includes some imported goods but places a relatively heavier weight on goods and services produced domestically. At the same time, the representative foreign basket is skewed toward goods and services produced in the foreign economy. Thus the rise in the price of the foreign basket in terms of domestic baskets, will be associated with a rise in the relative price of foreign output in general relative to domestic. 2

To determine how such a change in the relative price of national outputs affects the current account, let’s think about the value of imports from other countries as a function of exchange rate. Exports are measured in terms of foreign outputs, and the volume of foreign outputs is measured in terms of domestic currency. Then, the relative price of foreign goods is equal to the volume of imports measured in terms of domestic output, and the value of the foreign goods price is the volume of foreign goods in terms of domestic currency. 

Table (6.1) summarizes our discussion of how real exchange rate and disposable income changes influence the current account.

The Equation of Aggregate Demand

We now derive the four components of aggregate demand in order to express for total aggregate demand, denoted D: 

\[ D = C + I + G + (X - M) \]

where \( C \) is the consumption component, \( I \) is the investment component, \( G \) is the government purchases component, and \( X - M \) is the net exports. This equation shows that aggregate demand for output can be written in the form of the real exchange rate, disposable income, investment demand, and government spending:

\[ D = (X - M) - I - G \]

We now want to see how aggregate demand depends on the real exchange rate and domestic GDP. We examine the relationship between the real exchange rate and disposable income.

The Real Exchange Rate and Aggregate Demand

A rise in the real exchange rate makes domestic goods and services more competitive relative to foreign goods and services and shifts both domestic and foreign trade toward foreign goods in domestic goods. As a result, CA rises (as assumed in the previous section) and aggregate demand shifts up. A real appreciation of the home currency raises aggregate demand for home output, other things equal, and a real depreciation lowers aggregate demand for home output.

Table 6.1 | Factors Determining the Current Account

<table>
<thead>
<tr>
<th>Change</th>
<th>Effect on current accounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real exchange rate, ( E/P )</td>
<td>CA</td>
</tr>
<tr>
<td>Real exchange rate, ( E/P )</td>
<td>CA</td>
</tr>
<tr>
<td>Disposable income, ( Y )</td>
<td>CA</td>
</tr>
<tr>
<td>Disposable income, ( Y )</td>
<td>CA</td>
</tr>
</tbody>
</table>

2 The real exchange rate is being used here essentially as a government monetary instrument because the relative price of domestic goods relative to foreign goods, a key concept in the macroeconomic analysis, would affect the current account with aggregate demand and supply factors for the country’s international competitiveness and inflation, which would be in turn, to some extent, through this mechanism.

This assumption requires real import and export demands for a relatively elastic with respect to the real exchange rate. Appendix C in this chapter describes the sectoral conditions, which the Marshall-Lerner conditions, under which the country is in the same basket and can be linked. An appendix also examines the empirical evidence of the theory that the real exchange rate and international competitiveness.

United States. The production shift represents an hour-to-hour world demand for U.S. labor and output.
Chapter 16: Output and the Exchange Rate in the Short Run

Aggregate demand is a function of the real net worth ratio \( (DP / P)^{\text{nominal income}} \), investment demand \((I - T)\) and government spending \((G)\). If all other factors remain unchanged, a rise in real income \((Y)\), a decrease in aggregate demand. Because the increase in aggregate demand is more than the increase in output, the slope of the aggregate demand function is less than \(1\) (as indicated by its position within the 45-degree angle).

\[ Y = (DP/P)^{\text{nominal income}} + I - T + G \]

The equality of aggregate supply and demand therefore determines the short-run equilibrium output level. The analysis of short-run output determination applies to the short run because we assume that the money prices of goods and services are exogenously fixed. As we will see later in the chapter, the short-run output changes that occur when prices are temporarily fixed eventually causes price level changes that move the economy into its long-run equilibrium. 

\[ Y = (DP/P)^{\text{nominal income}} + I - T + G \]
in this short-run equilibrium, consumers, firms, the government, and foreign buyers of domestic products are all able to realize their desired expenditures with no output left over.

Output Market Equilibrium in the Short Run: The DD Schedule

Now that we understand how output is determined for a given real exchange rate SPFR, let's look at how the exchange rate and output are simultaneously determined in the short run. To understand this process, we need two elements. The first element, developed in this section, is the relationship between output and the exchange rate; the DD schedule must hold when the output market is in equilibrium. The second element, developed in the next section, is the relationship between output and the exchange rate that must hold when the foreign money market and the foreign exchange market (the asset markets) are in equilibrium.

Output, the Exchange Rate, and Output Market Equilibrium

Figure 16.3 illustrates the relationship between the exchange rate and output implied by the output market equilibrium. Specifically, the figure illustrates the effect of a depreciation of the domestic currency against foreign currency (time is a real fall in e) or for fixed values of the domestic price level, P, and the foreign price level, P^*. With fixed price levels in home and abroad, the rise in the nominal exchange rate makes foreign goods and services more expensive relative to domestic goods and services. This relative price change shifts the aggregate demand schedule upward.

The DD in the relative price of domestic output shifts the aggregate demand schedule upward because at each level of domestic output, the demand for domestic products is now higher. Output expands from Y^ to Y^* in terms of domestic goods, but excess demand remains at initial production levels.

Although we have considered the effect of a change in P and P^* held fixed, it is straightforward to analyze the effects of changes in P or P^* on output. Any rise in the real exchange rate EPFR (whether due to a rise in E or a rise in P^*) will cause an upward shift in the aggregate demand function and an expansion of output, all else equal. (A rise in P, for example, has effects qualitatively identical to those of a rise in E.) Similarly, a fall in EPFR regardless of the cause (a fall in E or a fall in P^*) will cause output to contract, all else equal. (A rise in P, with E and P^* held fixed, for example, makes domestic products more expensive relative to foreign products, reduces aggregate demand for domestic output, and causes output to fall.)

Deriving the DD Schedule

If we assume P and P^* are fixed in the short run, a depreciation of the domestic currency (a real fall in e) is associated with a rise in domestic output, Y, while an appreciation (a fall in e) is associated with a fall in Y. This association provides us with one of the two key insights between e and Y needed to describe the short-run macroeconomic behavior of an open
The DD schedule (shown in the lower panel) slopes upward because it plots the exchange rate from $E^0$ to $E^1$. All else equal, cause output in the home economy to rise from $P^0$ to $P^1$.

Factors that Shift the DD Schedule

A number of factors affect the position of the DD schedule: the levels of government demand, taxes, and investments; the demand and investment levels; variations in domestic consumption behavior; and the foreign demand for home output. To understand the effects of shifts in each of these factors, we can trace how the DD schedule shifts when it changes. In the following discussion we assume that all other factors remain fixed.

1. A change in $G$, Figure 16-5 shows the effect on DD at a rise in government purchases from $G^0$ to $G^1$, given a fixed exchange rate of $E^0$. As shown in the upper part of the figure, the exchange rate $E^0$ leads to an equilibrium output level $P^0$ at the initial level of government demand; no point is one point on DD.

2. An increase in $G$ causes the aggregate demand schedule in the upper part of the figure to shift upward. Everything else remaining unchanged, output increases from $P^0$ to $P^1$. Point 2 is the bottom panel shows the higher level of output $P^1$ at which aggregate demand and supply are new equal, given an unchanged exchange rate of $E^0$. Point 1 is on a new DD curve, $DD^1$.

3. For any given exchange rate, the level of output (opposing aggregate demand and supply) is higher the increase in $G$. This implies that an increase in $G$ causes DD to shift to the right, as shown in Figure 16-5. Similarly, a decrease in $G$ causes DD to shift to the left. The method and reasoning we have just used in exactly how an increase in $G$ shifts the DD curve can be applied to all the cases that follow. Here we summarize the results. To see your understanding ones diagnostic similar to Figure 16-5 to illustrate how the economic factors listed before change the curve.

4. A change in $T$, Figure 16-6 shows the effect on aggregate demand by changing disposable income, and thus consumption, for any level of $P$. It follows that an increase in taxes causes the aggregate demand function of Figure 16-1 to shift downward given the exchange rate $E$.

5. Since this effect is the opposite of that of an increase in $G$, an increase in $T$ causes the DD schedule to shift upward. Similarly, a fall in $T$ causes a rightward shift of DD.

6. A change in $I$, an increase in investment demand has the same effect as an increase in $G$. The aggregate demand schedule shifts upward and DD shifts to the right. A fall in investment demand shifts DD to the left.

7. A change in $P$, Figure 16-7 shows the effect on DD in $P$ makes domestic goods more expensive relative to foreign output and lowers net export demand. The DD schedule shifts to the left. That is, aggregate demand declines, and causes a leftward shift of DD.

8. A change in the consumption function. Suppose members of the home economy suddenly decide they want to consume more and save less at each level of disposable income. If the increase in consumption spending is not demand entirely to imports from abroad, aggregate demand for domestic output rises and the aggregate demand schedule shifts upward for any given exchange rate $E$. This implies a shift to the right of the DD.
The aggregate demand schedule shifts upward and so does the IS curve. The
same reasoning holds that if the IS curve shifts upward, the IS curve shifts to the right.
You have been explaining that a single role allows you to predict the effect on the IS of any of
the disturbances we have discussed. Any disturbance that raises aggregate demand for
domestic output shifts the IS curve to the right, we disturbance that lowers aggregate
demand for domestic output shifts the IS curve to the left.

**Asset Market Equilibrium in
The Short Run: The AA Schedule**

We have now derived the first element of our accounted short-run exchange rate and income
determination, the relation between the exchange rate and output that is in equilibrium with
the equality of aggregate demand and supply. That relation is summarized by the IS schedule,
which shows all the exchange rate and output levels at which the output market is in short-run
equilibrium. As we noted in the beginning of the preceding section, however, equilibrium in
the system as a whole requires equilibrium in the asset markets as well as in the output
market, and there is no reason in general why points on the IS schedule should lead to asset
market equilibrium.

To complete the story of short-run equilibrium, we therefore introduce a second element
in this context that the exchange rate and output levels consistent with output market equilibrium
are also consistent with asset market equilibrium. The schedule of exchange rate and output
combinations that are consistent with equilibrium in the domestic money market and the
foreign exchange market is called the AA schedule.

### Output, the Exchange Rate, and Asset Market Equilibrium

In Chapter 13 we studied the interest parity condition, which states that the foreign
exchange market is in equilibrium only when the expected rate of return on domestic and
foreign currency deposits are equal. In Chapter 14 we learned how the interest rates that
enter the interest parity relationship are determined by the equality of real money supply
and real money demand in national money markets. Now we combine these asset market
equilibrium conditions to see how the exchange rate and output must be related when
all asset markets simultaneously clear. Because the focus here is on the domestic economy,
the foreign interest rate is taken as given.

For a given expected future exchange rate, $E_t$, the interest parity condition describing
foreign exchange market equilibrium is equation (12-2):

$$ R = R^* + (E^* - E_t) $$

where $R$ is the interest rate on domestic currency deposits and $R^*$ is the interest rate on for-
earn currency deposits. In Chapter 14 we saw that the domestic interest rate satisfying
the interest parity condition must also equal the real domestic money supply ($M_P$) to aggre-
gate real money demand (see equation (14-6)):

$$ M_P = L/R, Y $$
You will recall that aggregate real money demand (LM) rises when the interest rate falls because a fall in R makes interest-bearing money assets less attractive to hold. Conversely, a rise in the interest rate lowers real money demand. A rise in real output, Y, increases real money demand by raising the volume of monetary transactionspeople carry out (and so in real output reduces real money demand by reducing transactions scaled).

We now use the diagrammatic tools developed in Chapter 14 to study the changes in the exchange rate that accompany output changes on that asset market remains in equilibrium. Figure 15-1 shows the equilibrium domestic interest rate and exchange rate associated with the output level 3 for a given real money supply, M', a given domestic price level, P, a given foreign interest rate, R', and a given value of the expected future exchange rate, E. In the lower part of the figure, we see that with real output at 3 and the real money supply at M', the interest rate R' clears the home money market (point 1) while the exchange rate E' clears the foreign exchange market (point 7). The exchange rate E' clears the foreign exchange market because it implies the expected rate of return on foreign deposits, measured in terms of domestic currency, to R'.

A rise in output from 3 to 3 raises aggregate real money demand from LM(3) to LM(3'), shifting the real money demand schedule in the lower part of Figure 15-1. This shift, in turn, raises the equilibrium domestic interest rate to R' (point 2). With R' and 3' fixed, the domestic currency must appreciate from E' to E' to bring the foreign exchange market back into equilibrium in point 2. The domestic currency appreciates by just enough that the increase in the rate at which it is expected to depreciate in the future offsets the increased domestic rate advantage of home currency deposits. For asset markets to remain in equilibrium, a rise in domestic output must be accompanied by an appreciation of the domestic currency, all else equal, and a fall in domestic output must be accompanied by a depreciation.

Deriving the AA Schedule

While the DD schedule plots exchange rates and output levels at which the output market is in equilibrium, the AA schedule relates exchange rates and output levels that keep the money and foreign exchange markets in equilibrium. Figure 16-1 shows the AA schedule. From Figure 15-1 we see that for any output level, 3, there is a unique exchange rate, E, satisfying the parity condition (given the real money supply, the foreign interest rate, and the expected future exchange rate). Our previous reasoning tells us that other things equal, a rise in Y to Y' will produce an appreciation of the domestic currency, that is, a fall in the exchange rate from E to E'. The AA schedule therefore has a negative slope, as shown.

Factors that Shift the AA Schedule

Five factors cause the AA schedule to shift: changes in the domestic money supply, M', changes in the foreign interest rate, R', changes in the foreign exchange rate, E', changes in the foreign interest rate, R', and shifts in the aggregate real money demand schedule.

1. A change in M'. For a fixed level of output, an increase in M' causes the domestic currency to depreciate in the foreign exchange market, all else equal (that is, E' falls).

Since for each level of output, the exchange rate E is higher the the rise in M', the rise in M' causes AA to shift upward. Similarly, a fall in M' causes AA to shift downward.

2. A change in P. As increases in P reduces the real money supply and drives the interest rate upward. Other things (including Y) equal, this rise in the interest rate causes E to fall. The effect of a rise in P is therefore a downward shift of AA. A fall in P results in an upward shift of AA.

3. A change in E'. Suppose participants in the foreign exchange market suddenly revise their expectations about the exchange rate's future value so that E' rises. Such a
The short-run equilibrium of the economy occurs at point \( E \), where the output market (where equilibrium points are determined by the OX axis) and asset market (where equilibrium points are determined by the AA axis) simultaneously reach.

Short-Run Equilibrium for an Open Economy: Setting the DO and AA Schedules Together

By assuming that input prices are temporarily fixed, we have derived two separate schedules of exchange rate and output levels: the DO schedule, along which the output market is in equilibrium, and the AA schedule, along which the asset markets are in equilibrium. A short-run equilibrium for the economy as a whole must lie on both schedules because such a point must bring both equilibrium simultaneously in the output and asset markets. We can therefore find the economy's short-run equilibrium by finding the intersection of the DO and AA schedules. Once again, it is the assumption that output prices are temporarily fixed that makes this interaction a short-run equilibrium. The discussion in this section continues to assume that the foreign interest rate \( r^* \) and the expected future exchange rate \( E^* \) are also fixed.

Figure 16-8 combines the DO and AA schedules to locate short-run equilibrium. The intersection of DO and AA at point \( E \) is the only combination of exchange rate and output consistent with both the equality of aggregate demand and aggregate supply and asset market equilibrium. The short-run equilibrium levels of the exchange rate and output are therefore \( E \) and \( O \).

To convince yourself that the economy will indeed settle at point \( E \), imagine that the economy is instead in a position like point \( P \) in Figure 16-8 at point \( P \), which lies above AA and DO. Both the output and asset markets are out of equilibrium. Because \( k \) is so high relative to \( A \), the rate at which \( E \) is expected to fall in the future is also high relative to the rate that would maintain interest parity. The high expected future appreciation rate of the domestic currency implies that the expected domestic currency return on foreign deposits is below that on domestic deposits, so there is an excess demand for the domestic currency in the foreign exchange market. The high level of \( O \) at point \( P \) also makes domestic goods cheap for foreign buyers (given the goods/domestic-currency prices), causing an excess demand for output at that point.

The excess demand for domestic currency leads to an immediate fall in the exchange rate from \( E^* \) to \( E \). This appreciation equalizes the expected returns on domestic and foreign deposits and places the economy at point \( E \) on the asset-market-equilibrium curve AA. But
&lt;par&gt;Because asset markets react very quickly, the exchange rate jumps immediately from point 2 to point 3 on AA. The economy then moves to point 1 along AA as output rises to meet aggregate demand.

Since point 3 is above the IS-DLL schedule, there is still excess demand for domestic output. As firms raise production to avoid depleting their inventories, the economy travels along AA to point 1, where aggregate demand and supply are equal. Because output prices can jump immediately while changes in production plants take some time, the asset markets remain in continuos equilibrium even while output is changing.

The exchange rate falls as the economy approaches point 1 along AA because rising national output causes money demand to rise, pushing the interest rate steeply upward. The currency must appreciate steeply to lower the expected rate of future domestic currency appreciation and maintain interest parity. Once the economy has reached point 1 on D0, aggregate demand equals output and producers no longer face inventory investment deprecation. The economy therefore settles at point 1, the only point at which the output and asset markets clear.

Temporary Changes in Monetary and Fiscal Policy

Now that we have seen how the economy's short-run equilibrium is determined, we can study how shifts in government macroeconomic policies affect output and the exchange rate. Our interest in the effects of macroeconomic policies stems from the necessities in countering economic disturbances that cause fluctuations in output, unemployment, and inflation. In this section we learn how government policies can be used to maintain full employment in open economies.

We concentrate on two types of government policy, monetary policy, which works through changes in the money supply, and fiscal policy, which works through changes in government spending or taxes. To avoid the complications that would be introduced by ongoing inflation, however, we do not look at situations in which the money supply grows over time. Thus, the only type of monetary policies we will study explicitly are one-shot increases or decreases in money supplies.

In this section we examine temporary policy shifts, shifts that the public expects to be removed in the near future. The expected future exchange rate, E", is now assumed to equal the long-run exchange rate discussed in Chapter 15, that is, the exchange rate that prevails once full employment is reached and domestic prices have adjusted fully to price distortions in the output and asset markets. In line with this assumption, a temporary policy change does not affect the long-run expected exchange rate, E'.

We continue throughout this chapter in the economy we are studying do not influence the foreign interest rate, r', or price level, P", and that the domestic price level, P, is fixed in the short run.

Monetary Policy

The short-run effect of a temporary increase in the domestic money supply is shown in Figure 1. An increase in money supply shifts AA upward to AB but does not affect the position of DO. The upward shift of the asset market equilibrium schedule moves the economy from point 1, with exchange rate E' and output Y', to point 2, with exchange rate E" and output Y". An increase in the money supply causes a depreciation of the domestic currency, an expansion of output, and therefore an increase in employment.

We can understand the economic forces causing these results by recalling our earlier discussion of asset market equilibrium and output determination. At the initial output level Y' and given the fixed prices level, an increase in money supply shifts the asset market demand curve to the right, raising the exchange rate. Given the fixed exchange rate, a higher domestic price level will cause the demand for the domestic currency to rise, which will lead to a depreciation of the currency.

Fiscal Policy

As we saw earlier, expansionary fiscal policy can take the form of an increase in government spending, a cut in taxes, or some combination of the two that raises aggregate demand. A temporary fiscal expansion (which does not affect the expected future exchange rate) therefore shifts the IS-DLL schedule to the right but does not move AA.
Figure 16-11 shows how expansionary fiscal policy affects the economy in the short run. Initially, the economy is at point 1, with an exchange rate E1 and output Y1. Suppose the government decides to spend $10 billion to develop a new space shuttle. A one-time increase in government purchases moves the economy to point 2, causing the currency to appreciate to E2 and output to expand to Y2. The economy would respond in a similar way to a temporary cut in taxes.

What economic forces produce the movement from point 1 to point 2? The increase in expenditures caused by the increase in government spending raises the transactions demand for real money holdings. Given the fixed price level, this increase in money demand pushes the interest rate, r, upward. Because the expected future exchange rate, E*, and the foreign interest rate, r*, have not changed, the domestic currency must appreciate to offset the expectation of a subsequent depreciation just large enough to offset the higher international interest rate difference in favor of domestic currency deposits.

Policies to Maintain Full Employment
The analysis of this sector can be applied to the problem of maintaining full employment in open economies. Because temporary monetary expansion and temporary fiscal expansion both raise output and employment, they can be used to counteract the effects of temporary disequilibria that lead to recession. Similarly, disequilibria that lead to unemployment can be offset through contractionary macroeconomic policies.

Figure 16-12 illustrates this case of macroeconomic policy. Suppose the economy's initial equilibrium is at point 1, where output equals its full-employment level, denoted Y1. Suddenly there is a temporary shift in consumer tastes away from domestic products. At some earlier in this chapter, such a shift in demand gives rise to aggregate demand for domestic products.

A temporary fall in world demand shifts DD1 to DD2, reducing output from Y1 to Y2 and causing the currency to depreciate from E1 to E2 (point 2), which in turn expands aggregate demand for domestic products.

The appropriate policy is a temporary fiscal expansion, DD1 to DD2, which increases output to its long-run equilibrium level Y2, where the exchange rate is at its new equilibrium level E2. The monetary policy causes the currency to appreciate to E2.
goods, and it causes the curve DD to shift inward, to DD'. At point 2, the new short-run equilibrium, the currency has depreciated to E' and output, at Y', is below its full employment level and the economy is in a recession. Because the shift in preference is assumed to be temporary, it does not affect E'; so there is no change in the position of AA'.

To restore full employment, the government may use monetary or fiscal policy, or both. A temporary fiscal expansion shifts DD' back to its original position, restoring full employment and returning the exchange rate to E'. A temporary money supply increase shifts the asset market equilibrium curve to AA' and配上 the economy at point 3, a move that restores full employment but causes the home currency to depreciate even further.

Another possible cause of recession is a temporary increase in the demand for money, illustrated in Figure 16.13. An increase in the money demand pushes up the domestic interest rate and appreciates the currency, thereby making domestic goods more expensive and causing output to contract. Figure 16.13 shows this asset market disturbance as the downward shift of AA' to AA'', which moves the economy from its initial full-employment equilibrium at point 1 to point 2.

Expansionary macroeconomic policies can raise output full employment. A temporary money supply increase shifts the AA curve back to AA' and moves the economy back to its initial position at point 3. This temporary increase in money supply will eventually offset the increase in velocity demanded by the higher real income, raising real money demand to the level that held the monetary money they desire to hold. Temporary fiscal expansion shifts DD' to DD'' and restores full employment at point 3. But the move to point 3 involves an even greater appreciation of the currency.

**Inflation Bias and Other Problems of Policy Formulation**

The apparent case with which full employment’s marginalists in our model is misleading, and you should not be carried away from our discussion of policy with the idea that it is easy to keep the macroeconomy on a steady course. There are a few of the many problems that can arise:

1. Sticky nominal prices may not allow governments’ power to raise output when the economy is chronically low, but also may tempt them to create a politically useful economic boom. Just before the election, this kind of policy problems when unions and firms anticipate that in advance, they will raise wages demand and prices in the expectation of expansionary policies. The government will thus find itself in the position of having to use expansionary policy tools to prevent or reverse recession that higher domestic prices otherwise would cause. As a result, unconventional policy will display as inflation bias, leading to high inflation but low average growth. Inevitably inflation bias will lead to a search for alternatives, for example, control tools that operate independently of the government’s power that can maintain equilibrium steady. As government will not be used in the short-run way, at the expense of longer-term policy stability. Many central banks throughout the world now seek to track announced target levels of low inflation. Chapters 30 and 32 will discuss some of these effects.

2. In practice it is sometimes hard to see whether a disturbance to the exchange origin will cause the output or asset markets. A government concerned about the exchange rate effect of its policy response needs to know this before it can choose between monetary and fiscal policy.

3. Real-world policy choices are frequently determined by bureaucratic necessities rather than by detailed consideration of whether shocks to the economy are real (i.e., they originate in the output market) or monetary. Shifts in fiscal policy often can be made only after lengthy legalistic deliberation, while monetary policy, in contrast, is usually exercised by the central bank. To avoid procedural delays, governments are likely to respond to disturbances by changing monetary policy even when a shift in fiscal policy would be more appropriate.

4. Another problem with fiscal policy is its impact on the government budget. A tax cut or spending increase may lead to a government budget deficit that must sooner or later be closed by a fiscal revenue. Unfortunately, there is no guarantee that the government will have the political will to synchronize these actions with the pace of the business cycle. The state of the electoral cycle may be more important, as we have seen.

5. Policies that appear to act swiftly in our single model operate in reality with lags of varying length. At the same time, the difficulty of evaluating the size and direction 7
Permanent Shifts in Monetary and Fiscal Policy

A permanent policy shift affects only the current value of the government's policy instrument (the money supply, government spending, or taxes) but also the long-run exchange rate. This in turn affects expectations about future exchange rates. Because these changes in expectations have a major influence on the exchange rate prevailing in the short run, the effect of permanent policy shifts differs from that of temporary shifts. In this section we look at the effects of permanent changes in monetary and fiscal policy in both the short and long run. 59

To make it easier to grasp the long-run effects of policies, we assume that the economy is initially at a long-run equilibrium position and that the policy changes we examine are the only economic changes that occur (we "wash things equalized." These assumptions mean that the economy starts at full employment with the exchange rate at its long-run level and with no change in the exchange rate expected. In particular, we know that the domestic interest rate must initially equal the foreign rate, R 5.

A Permanent Increase in the Money Supply

Figure 16-14 shows the short-run effects of a permanent increase in the money supply on an economy initially at a full-employment output level (Y 5). As we saw earlier, even a temporary increase in M causes the same monetary equilibrium schedule to shift upward from AA 5 to AA 6. Because the long-run exchange rate (E) is fixed, the increased money supply also causes the exchange rate to fall. Chapter 14 showed that a permanent increase in the money supply allows the long-run exchange rate to fall. A permanent increase in M thus ultimately leads to a lower and a lower exchange rate. Therefore, the rise in AA 5 causes R 5 to fall, and the exchange rate to fall, to a new equilibrium, R 6, at which the exchange rate is expected to remain. Note that the increase in M causes R 5 and the expected future exchange rate, E 6, to rise proportionally.

Because a rise in R 5 accompanies a permanent increase in the money supply, the upward shift of AA 5 to AA 6 is greater than that caused by an equal, temporary, increase. At point 3, the economy is now at short-run equilibrium, Y 5 6 and R 5 6 are both higher than they would be were the change in the money supply temporary. (Point 3 shows the equilibrium that might result from a temporary increase in M.)

Adjustment to a Permanent Increase in the Money Supply

The increase in the money supply shown in Figure 16-14 is not revisited by the central bank, so it is natural to ask how the economy is affected over time. At the short-run equilibrium, shown in point 3 in Figure 16-14, output is above its full-employment level and labor and workers are working overtime. Upward pressure on the price level develops as workers

"This is not the working first in the economy. However, the shift in the short-run equilibrium, shown in point 3 in Figure 16-14, output is above its full-employment level and labor and workers are working overtime. Upward pressure on the price level develops as workers demand higher wages and producers raise prices to cover their increasing production costs. Chapter 14 showed that while an increase in the money supply must eventually raise all money prices to rise in proportion, it has no lasting effect on output, relative prices, or interest rates.
PART 3 Exchange Rates and Open-Economy Macroeconomics

After a permanent money supply increase, a steadily increasing price level shifts the DD and AA schedules to the left, until a new long-run equilibrium (point 3) is reached.

![Diagram](image)

Notice that along the adjustment path between the initial short-run equilibrium (point 2) and the long-run equilibrium (point 3), the domestic currency initially appreciates (from $E^2$ to $E^3$) following its initial sharp depreciation (from $E^1$ to $E^2$). This exchange rate behavior is an example of the overshooting phenomenon discussed in Chapter 14, in which the exchange rate's initial response to a change is greater than its long-run response. 11

We can draw on our conclusions to describe the proper policy response to a permanent monetary disturbance. A permanent increase in money demand, for example, can be offset with a permanent increase in the money supply of equal magnitude. Such a policy maintains full employment, but because the price level would fall in the absence of the policy, the policy will not have inflationary consequences. Instead, monetary expansion raises the exchange rate instead of its long-run, full-employment position. Keep in mind, however, that this is hard in practice to diagnose the origin or persistence of a particular shock to the economy.

A Permanent Fiscal Expansion

A permanent fiscal expansion not only has an immediate impact in the output market but also affects the asset markets through its impact on long-run exchange rate expectations. 11

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CHAPTER 16 Output and the Exchange Rate in the Short Run

Because a permanent fiscal expansion changes exchange rate expectations, a shift in $AA$ is equal to a shift in $DD$ to the right. The effect on output (point 2) is nil if the economy starts in long-run equilibrium. If comparative statics hold, the economy at point 2, which contrasts with the economy at point 1, would leave the economy at point 3.

![Diagram](image)

Figure 16-16 shows the short-run effects of a government decision to spend an extra $5 billion a year on its space travel program. As before, the short-run effects of this in $G$ on aggregate demand cause $DD$ to shift right to $DD^1$. But because the increase in government demand for domestic goods and services is permanent in the case, it creates a long-run appreciation of the currency, as we saw in Chapter 14. The resulting fall in $E^1$ pushes the asset market equilibrium schedule $AA^1$ downward to $AA^2$. Point 2, where the new schedules $DD^1$ and $AA^2$ intersect, is the economy's new long-run equilibrium, and at this point the currency has appreciated to $E^2$ from its initial level while output is unchanged at $Y^1$.

The important result illustrated in Figure 16-16 is that when a fiscal expansion is permanent, the additional currency appreciation caused by the shift in exchange rate expectations reduces the policy's expansionary effect on output. Without this additional appreciation effect due to the permanence of the fiscal change, equilibrium would initially be at point 3, with higher output and a smaller appreciation. The greater the downward shift of the asset market equilibrium schedule, the greater the appreciation of the currency. This appreciation "crowds out" aggregate demand for domestic products by making those more expensive relative to foreign products.

Figure 16-16 is drawn to show a case in which fiscal expansion, contrary to what you might have guessed, has no net effect on output. This case is not, however, a special one; in fact, it is inevitable under the assumptions we have made. The sequence of calculations this process requires five steps; by taking the time to understand it you will solidify your understanding of the whole we have covered so far.


1. As a first step, consider yourself (perhaps by reviewing Chapter 14) that because the fiscal expansion does not affect the money supply, M, or the long-run values of the domestic interest rate (which equals the foreign interest rate) and output (Y), it can have no impact on the long-run price level.

2. Next, recall our assumption that the economy starts out in long-run equilibrium with the domestic interest rate, r, equal to the foreign rate, r*, and output equal to Y.

3. Now imagine, contrary to our view in Figure 16-16 above, that output did fall from Y to Y*.

4. Notice that there is something wrong with this conclusion. We already know (from step 1) that the long-run price level is not affected by the fiscal expansion, to people can expect a normal domestic currency depreciation just after the policy change only if the currency appreciates in real terms as the currency system tends to long-run equilibriums. Such a real depreciation, by making domestic products relatively cheap, would only weaken the initial situation of overemployment that we have imagined to exist, and thus would prevent output from actually returning to Y*.

5. Finally, conclude that the simple interaction is resolved only if output does rise all after the fiscal policy move. The only logical possibility is that the currency appreciates slightly away from its long-run value. This appreciation decreases the excess supply and allows output to return to its full employment level despite the higher level of C.

Notice that this exchange rate change, which allows the output market to clear at full employment, leaves the asset market in equilibrium as well. Since the exchange rate has jumped to its new long-run value, P remains at A*. With output also at Y*, however, the long-run money-exchange equation conditions MP = LV(r, Y) will hold, as it did before the fiscal story. So our story hangs together: The currency appreciation that is permanent fiscal expansion provides immediately the asset market as well as the output market in positions of long-run equilibrium.

We conclude that if the economy starts out in long-run equilibrium, a permanent change in fiscal policy has no effect on output. Instead, it causes an immediate and permanent exchange rate jump that offsets exactly the fiscal policy's direct effect on aggregate demand.

The box on p. 462 gives a numerical example of how exchange rates and output responses drive by fiscal policy can affect the economy.

Macroeconomic Policies and the Current Account

Policymakers are often concerned about the level of the current account. As we will discuss more fully in Chapter 18, an excessive imbalance in the current account—either a surplus or a deficit—may have undesirable long-run effects on welfare. Large surplus imbalances may also generate political pressures for government restrictions on trade. It is therefore important to know how monetary and fiscal policies aimed to domestic objectives affect the current account.

Figure 16-17 shows how the D-U equation can be illustrated to explain the effects of macroeconomic policies on the current account. In addition to the D-U and AA curves, the figure contains a new curve, labeled XX, which shows combinations of the exchange rate and output at which the current account balance would be equal to some desired level, say CA/MP = p. The curve shifts upward because, other things being equal, a rise in output increases spending on imports and thus weakens the current account if it is not accompanied by a currency appreciation. Since the initial level of C-4 does not fall from X, the economy's short-sale equilibriums do not have to be on the XX curve. The central feature of Figure 16-17 is that the XX is flatter than D-U. The reason is in part making the current account changes as we move up along the D-U curve from points 1.


The prolonged U.S. economic expansion of the 1990s ended in the summer of 2000 as U.S. industrial output began a steep decline. The Federal Reserve, which had been using interest rates as a brake on inflation, abruptly changed course. Between January and November 2001, the Fed lowered its target rate of interest—the "Federal funds" rate, which is the rate at which banks make overnight loans to each other—from 6.5 to 2 percent.

With aggregate demand for U.S. goods falling, dollar interest rates dropped in the run-up to 2001, a decrease in the dollar's price, Y. The depreciating dollar triggered a tsunami of capital inflows as investors bought U.S. dollars to sell them in foreign exchange markets. Although the dollar fell 27% in real terms during its bull market in equilibrium.

The dollar was falling again by August 2001 but by the November 11 terrorist attacks on New York and Washington caused an appreciation despite another interest rate cut by the Fed. The two factors influencing exchange rates in 2001 were basically the same as those operating at the start of President Bush's administration—nine months earlier. The military and security response to the attacks was called to involve a large fiscal expenditure. In addition, markets noted that even though it was the United States that had been attacked, major industrial economies abroad were even more vulnerable.

In the diagram, the industrial production and exchange rate are shown over time from February 2000 to December 2001. The industrial production index is plotted on the x-axis, while the exchange rate index (U.S. dollar average exchange rate) is plotted on the y-axis.

As U.S. output began a sharp decline in the autumn of 2000, the Federal Reserve lowered interest rates aggressively but the dollar continued to appreciate.

The text explains that when interest rates are low, foreign loans are cheaper and the value of the dollar increases. When interest rates are high, foreign loans are more expensive and the dollar decreases. The exchange rate is inversely proportional to the interest rate.

The graph shows the relationship between industrial production and the exchange rate. As industrial production decreases, the exchange rate increases, indicating the dollar appreciates. Conversely, as industrial production increases, the exchange rate decreases, indicating the dollar depreciates.

The text also mentions the relationship between monetary policy and exchange rates. When the Federal Reserve decreases interest rates, it leads to lower exchange rates, indicating a depreciation of the dollar. When the Federal Reserve increases interest rates, it leads to higher exchange rates, indicating an appreciation of the dollar.

The text concludes by stating that the exchange rate is a complex interaction of supply and demand factors, including interest rates, economic growth, and international trade balances. It highlights the importance of understanding these factors to accurately predict exchange rate movements and make informed economic decisions.
explore significantly foreign consumption of domestic goods, for example, it may be necessary to build new export outlets abroad, a time-consuming process.

The result of these lags in adjustment is the gradually improving current account shown in Figure 16-18 as the move from point 1 to point 3. Only after point 3 does the current account reach its depreciation level. Eventually, the increase in the current account lapses off as the adjustment to the real depreciation is completed.

Empirical evidence indicates that most industrial countries' J-curve lasting more than six months but less than one year. Thus, point 3 in the figures is typically reached within a year of the real depreciation and the current account continues to improve afterward.15

The existence of a significant J-curve effect forces us to consider many of the earlier conclusions, at least for the short run of one to two years. Monetary expansion, for example, can depress output initially by increasing the home currency. In this case, it may take some time before we see an increase in the money supply result in an improved current account and therefore in higher aggregate demand.

If expansionary monetary policy actually depresses output in the short run, the domestic income rate will need to fall further than it normally would to clear the home money market. Correspondingly, the exchange rate will overshoot more sharply to ensure the larger expected domestic currency appreciation required for foreign exchange market equilibriums. By introducing an additional source of overestimating J-curve effects amplify the volatility of exchange rates.

Exchange Rate Pass-Through and Inflation

Our discussion of how the current account is determined in the D-D-A model has assumed that nominal exchange rate changes cause proportional changes in real exchange rates in the short run. Because the DD-A model assumes that the nominal output prices, P and P*, cannot suddenly jump, movements in the real exchange rate, e = E/P*, correspond perfectly in the short run to movements in the nominal rate, E. In reality, however, the short-run correspondence between nominal and real exchange rate movements, while close, is not as perfect as this model assumes. To understand how nominal exchange rate movements affect the current account in the short run, we examine more closely the linkage between the nominal exchange rate and the prices of exports and imports.

The domestic currency price of foreign output is the product of the exchange rate and the foreign currency price, or E/P*. We have assumed until now that if E/P* rises, for example, P* remains fixed so that the domestic currency price of goods imported from abroad rises in proportion. The pass-through by which domestic prices rise when the home currency depreciation by one percent is known as the degree of pass-through from the exchange rate to import prices. In the version of the DD-A model we studied above, the degree of pass-through is 1. Any exchange rate change is passed through completely to import prices.

Contrary to this assumption, however, exchange rate pass-through can be incomplete. One possible reason for incomplete pass-through is international market segmentation, which allows imperfectly competitive firms to price in markets by charging different prices for the same product in different countries (recall Chapter 15). A large foreign dealerships supplying automobiles in the United States may be so unsold about testing market share this...
PART 3 Exchange Rates and Open-Economy Macroeconomics

it does not immediately raise its U.S. prices by 10 percent. Suppose the fact that its revenue from American sales, measured in its own currency, will decline. Similarly, the first may hesitate to lower its U.S. prices by 10 percent after a dollar appreciation because it can satisfy earn higher profits by merging.

And the third scenario is no different. A 10 percent devaluation of the dollar, for example, will affect import prices for U.S. consumers. As a result, U.S. import prices will rise by only about 60 percent of the dollar depreciation. In other words, the dollar depreciation will have complicated effects, and it will take time for the full effects of the devaluation to be felt.

We thus see that a weaker currency can affect exchange rates and the real economy in various ways. In some cases, it may have a significant impact on the economy, while in others, the effects may be more indirect and subtle. However, regardless of the specific circumstances, the importance of understanding the link between exchange rates and the real economy cannot be overstated.
can no longer use fiscal policy to affect employment and output. (Hint: Analyze a "balanced-budget" increase in government spending, one that is accompanied by an equal tax hike.)

4. Suppose there is a permanent fall in private aggregate demand for a country's output (a downward shift of the entire aggregate demand schedule). What is the effect on output? What government policy response would you recommend?

5. How does a permanent cut in taxes affect the current account? What about a permanent increase in government spending? Remember the first case study in Chapter 12 and use your answer accurately reflects the U.S. experience in the early 1980s.

6. If a government initially has a balanced budget but then cuts taxes, it is earning a deficit that it must somehow finance. Suppose people think the government will finance its deficit by printing the money it now needs to cover its expenditures. Would you still expect the tax cut to cause a current-account deficit?

7. You observe that a country's currency depreciates because its current account worsens at the same time. What does this mean to decide whether you are witnessing a currency effect? What other macroeconomic changes might bring about a currency depreciation coupled with a deterioration of the current account, even if there is no currency?

8. A new government in elected and announces that state 1 is implemented, it will increase the money supply. Use the IS-LM model to study the economy's response to this announcement.

9. Many economists, put part of the blame for the prolonged U.S. current-account deficit of the late 1980s on the apparent small size of the relative price change among U.S. imports and exports. In the first case study in Chapter 11, however, linking the show current-account adjustment to private and government saving behavior. Try to give a satisfied account of the current account data, reconciling both price and expenditure effects.

10. How would you draw the IS-LM diagram when the government's current account response to the exchange rate changes follows a 1-year path? Use this modified diagram to examine the effects of temporary and permanent changes in monetary and fiscal policy.

11. What does the Marshall-Lerner condition look like if the country whose real exchange rate changes does not start out with a current account of zero? (The Marshall-Lerner condition is derived in Appendix 3 under the "saturated" assumption of an initially balanced current account.)

12. Our model takes the price level P as given in the short run, but in reality the currency appreciation caused by a permanent fiscal expansion might cause P to fall a bit by lowering some import prices. If P falls slightly as a result of a permanent fiscal expansion, is it still true that there are no output effects? (As above, assume an initial long-run equilibrium.)

13. Suppose that interest parity does not hold exactly, but that the true relationship is \( A = \alpha + \beta (\Delta E) + \gamma E \), where \( p \) is a term measuring the differential returns of domestic versus foreign deposits. Suppose a permanent rises in domestic government spending, by creating the prospect of future government deficits, also raise \( p \), that is, makes domestic currency deposits more risky. Evaluate the policy's output effects in this situation.

14. If an economy does not run out of full employment, is it still true that a permanent change in fiscal policy has no current effect on output?
The IS-LM Model and the DD-AA Model

In this appendix, we examine the relationship between the DD-AA model of the chapter and another world widely, and use to answer questions in international macroeconomics, the IS-LM model. The IS-LM model generalizes the DD-AA model by allowing the real domestic interest rate to affect aggregate demand.

The diagram usually used to analyze the IS-LM model has the nominal interest rate and output, rather than the nominal exchange rate and output, as its axes. Like the DD-AA diagram, the IS-LM diagram determines the short-run equilibrium of the economy as the intersection of two individual market equilibrium curves, called IS and LM. The IS curve is the schedule of nominal interest rates and output levels at which the output and foreign exchange markets are in equilibrium, while the LM curve shows points at which the money market is in equilibrium.

The IS-LM model assumes that investment, and some forms of consumer purchases (such as purchases of autos and other durable goods), are negatively related to the expected real interest rate. When the expected real interest rate is low, firms find it profitable to borrow and undertake investment plans. (The appendix to Chapter 7 presents a model of this link between investment and the real interest rate.) Low expected real interest rate also makes it more profitable to carry surrouses rather than alternative store.

For both these reasons, we would expect investment to rise when the expected real interest rate falls. Similarly, because consumers find borrowing cheaper and saving unattractive when the real interest rate is low, borrowers-in-savings consumer purchases also rise when the real interest rate falls. As the next appendix above, however, theoretical arguments as well as the evidence suggest the consumption response to the interest rate is weaker than the investment response.

In the IS-LM model, aggregate demand is therefore written as a function of the real exchange rate, disposable income, and the real interest rate.

\[ D(E, Y, R) = (C(Y - T) - n) = (C(Y - T - \pi) + R) = G + C(Y - T - \pi) \]

Where \( n \) is the expected inflation rate and \( R = n \) for the expected real interest rate.

The model assumes that \( E = \frac{P^d}{P^s} \), \( P = \frac{G}{T}, \), \( R = \frac{n}{T}, \) and \( E \) are all given. (To simplify the notation, we've left \( G \) out of the aggregate demand function.)

In a closed-economy scenario, the original expansion of the DD-AA model in J.J. Hausken's "The Keynes and the Classical: A Singular Transformation" (February 5 1997) pp. 1-149. Hausken finds world manufactures and the non-manufacturing major trading exits. The same (J.J. Hausken's) fact stands for a closed economy that is not necessarily in a fixed capacity, but is in equilibrium in a fixed capacity at a market with a real interest rate. Among the U.S. market, and economic macroeconomic facts, the total money supply is an important determinant of the economy's equilibrium.

The monetary authority of the model, with the expectations assumptions \( \pi = \frac{\pi}{2} \) made to simplify, is the model. The Mundell-Fleming model. Columbia University economist Robert Mundell was a Nobel Prize in 1976 for his work on the model.

CHAPTE 16
Output and the Exchange Rate in the Short Run

To find the IS curve of P and Combinations such that aggregate demand equals supply,

\[ Y = \left( P^d + R \right) = \left( T - \pi \right) \]

we must first write the output market equilibrium condition so that it does not depend on \( E \). We solve for \( E \) along the interest rate parity condition, \( P^d = \frac{E^d}{E^s} \). If we solve this equation for \( E \), the result is

\[ E = \left( \frac{P^d}{P^s} \right) = \left( 1 - \pi \right) \]

Substituting this expression into the aggregate demand function shows that we can express the condition for output market equilibrium as

\[ Y = \left( \frac{P^d}{P^s} \right) \left( 1 - \pi \right) - \pi \]

To get a picture of how major currency effects goods market equilibriums, we must remember that the inflation rate in the economy depends positively on the position between actual supply, \( E \), and full employment output, \( \pi \). We therefore write \( \pi \) as an increasing function of this gap:

\[ \pi = \left( \frac{E}{E^d} \right) \]

Under this assumption on expectations, the goods market is in equilibrium when

\[ Y = \left( \frac{P^d}{P^s} \right) \left( 1 - \pi \right) - \pi \]

This condition shows that a fall in the nominal interest rate \( R \) raises aggregate demand through two channels: (1) Given the expected future exchange rate, a fall in \( R \) causes a decrease in the current account, (2) Given expected inflation, a fall in \( R \) directly reduces consumption and investment spending that fall only partly \( R \).

The IS curve is found by solving how output meets expected to such a fall in the interest rate to maintain output market equilibrium. Since a fall in \( E \) raises aggregate demand, the output market will remain in equilibrium after \( R \) falls only if it falls too. The IS curve therefore shifts downward, as shown in Figure 16-6A. Even though the IS and DD curves both reflect output market equilibrium, IS slopes downward while DD slopes upward. The reason for this difference is that the interest rate and the exchange rate are inversely related by the interest parity condition, given the expected future exchange rate.

The slope of the LM (or money market equilibrium) curve is much easier to derive.

Money market equilibriums holds when \( MP^d = LR, \) because a rise in the interest rate
PART 3 Exchange Rates and Open-Economy Macroeconomics

Equilibrium is at point 1, where the output and money market simultaneously clear.

[Diagram of the LM curve showing equilibrium at point 1, where interest rate and output are determined by the intersection of the LM and IS curves.]

In a monetary equilibrium, the money market clears after the IS curve. The LM curve therefore can also be interpreted as a rise in interest rates because the money market clears as a result of an increase in the price level or output. The LM curve shows the equilibrium interest rate and output levels for different nominal money supplies. In this diagram, the equilibrium interest rate is r1 and the output level is Y1.

The IS-LM model can be used to analyze the effects of monetary and fiscal policies. A fiscal policy, such as increased government spending, shifts the IS curve to the right, increasing both interest rates and output. A monetary policy, such as an increase in the money supply, shifts the LM curve to the right, decreasing both interest rates and output. The intersection of the IS and LM curves at point 1 determines the equilibrium values of output, Y1, and the nominal interest rate, r1. The equilibrium interest rate, r1, is determined by the monetary policy, while the output level, Y1, is determined by the real economy.

A temporary increase in the money supply shifts the IS curve to the right, increasing both interest rates and output. A permanent increase shifts both the IS and LM curves in this direction.

Fiscal policy is analyzed in Figure 16A.1, which shows a permanent increase in government spending, leading to a shift in the IS curve to the right. The IS curve shifts to the right, increasing both interest rates and output. The LM curve does not shift, as it represents the long-run equilibrium in the money market. The intersection of the IS and LM curves at point 1 determines the new equilibrium values of output, Y1, and the interest rate, r1. The monetary policy is represented by the shift in the IS curve, while the output and interest rate are determined by the intersection of the IS and LM curves.

The IS-LM model differs from the IS-LM model in that it incorporates monetary policy as an independent variable. The monetary policy affects the money supply, which in turn affects the interest rate and output. The IS-LM model is useful for analyzing the effects of monetary policy on the money market and the real economy.
Intertemporal Trade and Consumption Demand

We assume in the chapter that private consumption depends in a function of disposable income, \( C = C(Y) \), with the property that when \( Y \) rises, consumption rises by less (so that saving, \( Y - C(Y) \), goes up too). This appendix expands this assumption in the context of the intertemporal model of consumption behavior discussed in the appendix to Chapter 7.

The discussion in Chapter 7 assumed that consumers’ welfare depends on present consumption demand \( D_0 \) and future consumption demand \( D_1 \). If present income is \( Q_0 \) and future income is \( Q_1 \), consumers can not borrow or save in order to allocate their consumption over time in any way consistent with the intertemporal budget constraint

\[ Q_0 + D_0 + \alpha = Q_1 + Q_1(1 + r) \]

where \( r \) is the real rate of interest.

Figure 16A1-1 reminds you of how consumption and saving were determined in Chapter 7. If present and future output are initially described by the point labeled 1 in the figure, consumers’ wish to pick the highest utility indifference curve consistent with their budget constraint leads to consumption at point 1 as well.

We have assumed zero saving at point 1 to show most clearly the effect of a rise in current output, which we have to test. Suppose present output rises while future output doesn’t, moving the income envelope to point 2, which lies horizontally to the right of point 1. You can see that the consumer will wish to spend the increase in consumption this allows her over her entire lifetime. She can do this by buying some of the present income rise, \( Q_2 - Q_0 \), and moving up to the right along her budget line from her environment point 1 to point 2.

If we now reintroduce the notation so that present output, \( Q_0 \), corresponds to disposable income, \( Y \), and present consumption demand corresponds to \( C(Y) \), we see that consumption certainly depends on factors other than current disposable income—namely, future income and the real interest rate—in behavior does imply that a rise in lifetime income that is concentrated in the present will tend lead to a rise in current consumption that is less than the rise in current income. Since the output changes we have been considering in this chapter are all temporary changes that result from the short-run stickiness of domestic money prices, the consumption behavior we simply assumed in the chapter does capture the feature of intertemporal consumption behavior essential for the DD0-A1 model to work.

We could also use Figure 16A1-1 to look at the consumption effects of a rise in interest rate, which we introduced in Appendix I. If the economy is initially at point 1, a fall in the real interest rate causes the budget line to rotate counterclockwise about point 1, causing a rise in present consumption. If initially the economy had been saving a positive amount, however, at point 2, this effect would be ambiguous, a reflection of the contrary things
The Marshall-Lerner Condition and Empirical Estimates of Trade Elasticities

The chapter assumed that a real depreciation of a country's currency improves its current account. As we noted, however, the validity of this assumption depends on the response of export and import volumes to real exchange rate changes. In this appendix we derive a condition on these responses for the assumption in the text to be valid. The condition, called the Marshall-Lerner condition, states that, all else equal, a real depreciation improves the current account if export and import volumes are sufficiently elastic with respect to the real exchange rate. (The condition is named after two of the economists who discovered it, Arthur Marshall and Albert Lerner.)

After deriving the Marshall-Lerner condition, we look at empirical estimates of trade elasticities and analyze their implications for actual current account responses to real exchange rate changes.

To start, write the current account, measured in domestic output units, as the difference between exports and imports of goods and services similarly measured:

\[ CA(E_P, X) = E_P(E_P, Y) - M(E_P, Y) \]

Above, export demand is written as a function of \( E_P \) alone because foreign income is being held constant.

Let \( y \) denote the real exchange rate \( E_P/X \) and let \( \lambda_P \) denote domestic import measures in terms of foreign, rather than domestic, output. The reaction \( \lambda_P \) is used because domestic imports from abroad, measured in foreign output, equal the volume of foreign exports to the home country. If we identify \( y \) with the price of foreign products in terms of domestic products, then \( \lambda_P \) and \( E_P \) are related by

\[ E_P = \lambda_P \times X \]

that is, imports measured in domestic output = (domestic output price/foreign output price) × (domestic output measured in foreign output units).

For example, see Abel and Bernanke, "Monetary Stability," Chapter 16.
The current account can therefore be expressed as

$$CA = (E) = EF(q) = q \times E^*$$

Now let $E^*_f$ stand for the effect of a rise in $q$ on real depreciation on export demand and let $E^*_m$ stand for the effect of a rise in $q$ on import demand. Thus,

$$E^* = A_D + E^*_f + E^*_m$$

As we saw in the chapter, $E^*_f$ is positive to real depreciation makes home products relatively cheaper and stimulates exports while $E^*_m$ is negative (relative depletion of home products reduces domestic import demand). Using these definitions, we can now ask how $\eta$ is affected by the current account, all else equal.

If superstructure indicates the initial value of a variable while subscript indicates its value after $\eta$ has changed by $\Delta \eta = \eta - \eta'$. Then the change in the current account caused by a real exchange rate change $\Delta \eta$ in

$$\Delta CA = C - CA = \eta (E^* - E^*) = (\eta - \eta') (E^* - E^*)$$

Dividing through by $\Delta \eta$ gives the current account's response to a change in $q$

$$\Delta CA/\Delta \eta = \eta - \eta'$$

This expression summarizes the two current account effects of a real depreciation discounted in the text, the welfare effect and the factor effect. The terms involving $E^*_f$ and $E^*_m$ represent the volume effect, the effect of the change in $q$ on the number of output units sold and imported. These terms are always positive because $E^*_f > 0$ and $E^*_m < 0$. The last term above, $E^*_m$, represents the welfare effect, and it is provided by $\Delta \eta$, the change in the capital account's output value of the imported volume of imports.

We are interested in knowing when the right-hand side of the equation above is positive, so that a real depreciation causes the current account balance to increase. To answer this question, we first define the elasticity of export demand with respect to $q$

$$\eta = q/E^*_f$$

and the elasticity of import demand with respect to $q$

$$\eta' = q/E^*_m$$

(These definitions $\eta$ and $\eta'$ involves a minus sign because $E^*_m < 0$ and we are defining trade elasticities as positive numbers.) Returning to our equation for $\Delta CA$, we multiply it by $q/E^*_m$ to express it in terms of terms of trade elasticities. Then if the current account is initially zero (that is, $E^* = q \times E^*$), this last step shows that $\Delta CA$ is positive whenever

$$\eta - \eta' > 0$$

This is the Marshall-Lerner condition. The condition states that if the current account is initially zero, a real currency depreciation causes a current account surplus if the sum of the relative price elasticities of export and import demand exceeds 1 ($\eta - \eta' > 0$). If the current account is not initially zero, the condition becomes substantially more complex. In applying the Marshall-Lerner condition, remember that its derivation assumes that disposable income is held constant when a change.

Note: The table's data are taken from James R. A. Allen and Theodore D. Kjeld. (in press) is the reference. International Monetary Fund. July 1994. Table 6.1A.11. Output elasticities are shown in the context of trade elasticities.
CHAPTER 17
Fixed Exchange Rates and Foreign Exchange Intervention

In the past several chapters we have developed a model that helps us understand how a country's exchange rate and national income are determined by the intersection of asset and output markets. Using this model, we saw how monetary and fiscal policies can be used to maintain full employment and a stable price level.

To keep our discussion simple, we assumed that exchange rates are completely flexible, that is, that nominal monetary authorities themselves do not trade in the foreign exchange market to influence exchange rates. In reality, however, the assumption of complete exchange rate flexibility is rarely accurate. As we mentioned earlier, the world economy operated under a system of fixed dollar exchange rates between the end of World War II and 1973, with central banks repeatedly adjusting foreign exchange to hold their exchange rates at internationally agreed levels. Industrialized countries now operate under a hybrid system of managed floating exchange rates—a system in which governments may attempt to moderate exchange rate movements without keeping exchange rates rigidly fixed. A number of developing countries have retained some form of government exchange rate fixing, for reasons that we discuss in Chapter 22.

In this chapter, we study how central banks intervene in the foreign exchange market to fix exchange rates and how macroeconomic policies work when exchange rates are fixed. The chapter will help us understand the role of central bank foreign exchange intervention in the determination of exchange rates under a system of managed floating.

Why Study Fixed Exchange Rates?

A discussion of fixed exchange rates may seem outdated in an era when newspaper headlines regularly highlight sharp changes in the exchange rates of the major industrial countries. Our interest in fixed exchange rates, however, is not the result of nostalgia, antipartheidism, or an attachment obsession with hypothetical worlds. There are four reasons why we must understand fixed exchange rates before analyzing contemporary macroeconomic policy problems:

1. Managed floating. As previously noted, central banks often intervene in currency markets to influence exchange rates. So while the dollar exchange rates of the Industrial
Central Bank Intervention and the Money Supply

In Chapter 16 we defined an economy's money supply as the total amount of currency and checking deposits held by its households and firms and assumed that the central bank determined the amount of money in circulation. To understand the effects of central bank intervention in the foreign exchange market, we wish to look first at how central bank financial transactions affect the money supply.  

As government tends to set exchange rate, and government imposes exchange rate policies without controlling foreign exchange rate. 

For example, in Chapter 12, government agencies often rely on central banks to respond to movements in the foreign exchange market, to finance their operations, and to manage their foreign exchange reserves. We should also note that government agencies use central banks to affect the amount of money in circulation. To simplify our discussion, we assume the government is not coordinating its central bank's foreign exchange interventions with other central banks in the foreign exchange market. 

However, this is not necessarily the case. The government's actions in the foreign exchange market may affect the amount of money in circulation by influencing interest rates and other economic variables. For example, if the government buys foreign exchange in order to support the domestic currency, it may cause the central bank to increase its money supply. Conversely, if the government sells foreign exchange in order to reduce the domestic currency, it may cause the central bank to decrease its money supply. 

Table 17-1

<table>
<thead>
<tr>
<th>Exchange Rate</th>
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<th>Exchange Rate Change</th>
<th>Monetary Aggregates</th>
<th>Inflation Targeting</th>
<th>Fiscal Rules (if any)</th>
<th>Exchange Rate Stabilization</th>
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*Note: Exchange rate arrangements are defined in terms of the primary exchange rate system, the secondary exchange rate system, and the tertiary exchange rate system.*
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<td><strong>Independent Floating</strong></td>
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**Table 17.1 (Continued)**

**Exchange Rate Regime**

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**CHAPTER 17: Fixed Exchange Rates and Foreign Exchange Intervention**

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**PART 3: Exchange Rates and Open Economy Macroeconomics**

**Table 17.1 (Continued)**

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The Central Bank Balance Sheet and the Money Supply

The central bank's balance sheet is a financial statement that shows the assets and liabilities of the central bank. The assets are the resources that the central bank holds, and the liabilities are the obligations it has to hold those resources.

### Central Bank Balance Sheet

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign assets</td>
<td>Domestic assets</td>
</tr>
<tr>
<td>$100</td>
<td>$500</td>
</tr>
<tr>
<td>Domestic assets</td>
<td>Currency in circulation</td>
</tr>
<tr>
<td>$150</td>
<td>$250</td>
</tr>
</tbody>
</table>

The assets side of the central bank's balance sheet includes:

- **Foreign assets**: These are claims on foreign residents, usually in the form of deposits in foreign central banks or other foreign financial institutions. They represent the central bank's holding of foreign currencies and foreign assets.
- **Domestic assets**: These include the central bank's holding of domestic currency and deposits in domestic banks. Domestic assets are the monetary base of the economy, as they are directly controlled by the central bank.

### The Money Supply

The money supply includes:

- **Currency in circulation**: This is the amount of physical currency that is in the hands of the public.
- **Demand deposits**: These are deposits held by the public in banks and are directly convertible into currency on demand.
- **Time deposits**: These are deposits that have a fixed term and cannot be withdrawn without a penalty.

The money supply is often divided into two categories:

- **M1**: This includes currency in circulation and demand deposits. M1 is a narrow measure of the money supply and is often used as a proxy for the velocity of money.
- **M2**: This includes M1 plus savings deposits, money market mutual funds, and other liquid assets. M2 is a broader measure of the money supply and includes more financial assets.

The money supply is important because it affects the economy by influencing the cost of credit and the level of economic activity. Changes in the money supply can lead to changes in interest rates, inflation, and economic growth.

In the example, the central bank holds $100 in foreign assets and $150 in domestic assets. The currency in circulation is $250, which is the sum of foreign and domestic assets.

---

*There are several ways in which a central bank's net asset position changes. For example, the government might issue bonds to the public, which increases the central bank's liabilities. Changes in the money supply affect the economy, leading to changes in interest rates, inflation, and economic growth.*

---

*For a detailed description of multiple deposit accounts and their monetary effects, refer to Financial Economics: Money, Banking, and Monetary Policy, 10th Ed., Chapter 16 (Pratt, M., & Atkeson, Greg., 1996).*
The payment of the Bank of Pakistan for listed foreign assets automatically reduces its liabilities by $100 as well. If the Bank of Pakistan is paid in domestic currency, the currency goes into its vault and out of circulation. Currency in circulation therefore falls by $100. As a result of the foreign asset sale, the central bank’s balance sheet changes as follows:

### Central Bank Balance Sheet after $100 Foreign Asset Sale (Buyer Pays with Currency)

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign assets $100</td>
<td>Deposits held by private banks $100</td>
</tr>
<tr>
<td>Domestic assets $100</td>
<td>Currency in circulation $100</td>
</tr>
</tbody>
</table>

After the sale, assets and liabilities are equal. Both banks have declined by $100, equal to the amount of currency the Bank of Pakistan had taken out of circulation through its intervention in the foreign exchange market. The change in the central bank’s balance sheet implies a decline in the Pakistani money supply.

What happens if the buyer of the foreign assets pays the Bank of Pakistan with a $100 check drawn on an account at the Pakistani central bank? The Bank of Pakistan converts $100 from Pakistan’s central bank account and the Pakistani bank deposits $100 from the buyer’s checking account. Private bank deposits with the central bank fall by $100, and the Bank of Pakistan’s balance sheet becomes as shown below:

### Central Bank Balance Sheet after $100 Foreign Asset Sale (Buyer Pays with Check)

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign assets $100</td>
<td>Deposits held by private banks $100</td>
</tr>
<tr>
<td>Domestic assets $150</td>
<td>Currency in circulation $150</td>
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</table>

Once again, the Bank of Pakistan’s liabilities fall by $100 and the Pakistani money supply shrinks.

A $100 purchase of foreign assets by the Bank of Pakistan would cause its liabilities to increase by $100. If the central bank paid for its purchase in cash, currency in circulation would rise by $100. If paid by writing a check on itself, private bank deposits at the Bank of Pakistan would similarly rise by $100. In either case, there would be a rise in the domestic money supply.

**Sterilization**

Central banks sometimes carry out equal foreign and domestic asset transactions in opposite directions to nullify the impact of foreign exchange operations on the domestic money supply. This type of policy is called sterilized foreign exchange intervention. We can see how this has inverted foreign exchange intervention works by considering the following example:

### Central Bank Balance Sheet before Sterilized $100 Foreign Asset Sale

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign assets $100</td>
<td>Deposits held by private banks $100</td>
</tr>
<tr>
<td>Domestic assets $150</td>
<td>Currency in circulation $150</td>
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### Central Bank Balance Sheet after Sterilized $100 Foreign Asset Sale

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
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</thead>
<tbody>
<tr>
<td>Foreign assets $900</td>
<td>Deposits held by private banks $900</td>
</tr>
<tr>
<td>Domestic assets $1600</td>
<td>Currency in circulation $1600</td>
</tr>
</tbody>
</table>

The $100 decrease in the central bank’s foreign assets is matched with a $100 increase in domestic assets, and the liabilities side of the balance sheet does not change. The sterilized foreign exchange policy therefore has no effect on the money supply.

Table 17.2 summarizes and compares the effects of sterilized and nonsterilized foreign exchange interventions.

### The Balance of Payments and the Money Supply

In our discussion of balance of payments (discussed in Chapter 12), we defined a country’s balance of payments as an official settlements balance (an offset of foreign asset transactions) by the home central bank less its net purchases of domestic assets by foreign central banks. The sterilized intervention reduces the balance of payments in the sense of the current account and the nonreservable component of the capital account. That is, the sterilized intervention is the opposite of a current account surplus or a nonreservable capital inflow. As a result of the sterilized intervention, currency in circulation does not change, and the central bank’s balance sheet remains unchanged.

What we have learned in this section illustrates the importance of the connection between the balance of payments and the growth of money supplies in a home and abroad. If central banks sterilize foreign asset sales, they do so to limit the impact of the sale on domestic money supplies.
Table 17-2

<table>
<thead>
<tr>
<th>Domestic Central Bank's Action</th>
<th>Effect on Domestic Money Supply</th>
<th>Effect on Central Bank</th>
<th>Effect on Foreign Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominalized foreign exchange purchase</td>
<td>+$100</td>
<td>0</td>
<td>+$100</td>
</tr>
<tr>
<td>Stabilized foreign exchange purchase</td>
<td>0</td>
<td>-$100</td>
<td>+$100</td>
</tr>
<tr>
<td>Nominalized foreign exchange sale</td>
<td>-$100</td>
<td>0</td>
<td>-$100</td>
</tr>
<tr>
<td>Stabilized foreign exchange sale</td>
<td>0</td>
<td>+$100</td>
<td>0</td>
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are not sterilizing and the home country has a balance of payments surplus, for example, any associated increase in the home central bank's foreign assets implies an increased foreign money supply. Similarly, any associated decrease in a foreign central bank's actions on the home country implies a decreased foreign money supply.

The extent to which a meaningful one can define payments disparity will affect home and foreign money supplies is, however, quite uncertain in practice. For one thing, we have to know how the burden of balance of payments adjustment is divided among central banks, that is, how much financing of the payments gap is done through home official intervention and how much through foreign. This division depends on various factors, such as the macroeconomic goals of the central banks and institutional arrangements governing intervention (differential rates in this chapter). Second, central banks may be able to counter the monetary effects of reserve changes. Finally, as we noted in Chapter 12 (p. 315), some central bank transactions (b) help to finance a country's balance of payments deficit, but they do not affect up in the latter's published balance of payments figures. Such transactions may influence the direct liabilities of the bank that undertakes them.

How the Central Bank Fixes the Exchange Rate

By paying to foreign central banks for foreign exchange transactions, the real money supply, we can now look at how a central bank fixes the domestic currency's exchange rate through foreign exchange intervention. To hold the exchange rate constant, a central bank must always be willing to take additional foreign central banks for foreign exchange transactions at the fixed exchange rate with the private sectors in the foreign exchange market. For example, if the foreign exchange rate is $120 per dollar, the Bank of Japan must be willing to buy yen with $120 for dollars, and to pay that amount the market desires, at a rate of $120 per dollar. The base bank must also be willing to buy any amount of dollar monetaries the market wants to sell for yen at that exchange rate. If the Bank of Japan did not remove such excess supply or demand for yen by intervening in the market, the exchange rate would have to change to restore equilibrium.

The central bank can succeed in holding the exchange rate fixed only if its financial transactions ensure that domestic markets remain in equilibrium when the exchange rate is at its fixed level. The process through which such market equilibrium is maintained is illustrated by the model of simultaneous foreign exchange and money market equilibria used in previous chapters.

### Foreign Exchange Market Equilibrium under a Fixed Exchange Rate

To begin, we consider how equilibria in the foreign exchange market can be maintained when the central bank fixes the exchange rate permanently at the level $E^*$. The foreign exchange market is in equilibrium when the interest parity conditions hold, that is, when the domestic interest rate, $r$, equals the foreign interest rate, $R$, plus $\left(\frac{\pi}{\pi^*}\right)$, the expected rate of depreciation of the domestic currency against foreign currency. When the exchange rate is fixed at $E^*$, however, and market participants expect it to remain fixed, the expected rate of depreciation of the domestic currency depreciation is zero. The interest parity conditions therefore imply that $E^*$ is today's equilibrium exchange rate only if

$$E = E^*$$

Because the exchange rate change is expected by participants in the foreign exchange market, the central bank must be able to hold $E$ equal to $E^*$. Because the domestic interest rate is determined by the interaction of real money demand and the real money supply, we must look at the money market to compute our analysis of exchange rate fixing.

### Money Market Equilibrium under a Fixed Exchange Rate

To hold the domestic interest rate at $R^*$, the central bank's foreign exchange intervention must adjust the money supply so that $E^*$ operates aggregate real money demand and the real money supply.

$$M/P = L(M, Y, F)$$

Given $F$ and $Y$, the above equilibrium condition tells what the money supply must be if a permanently fixed exchange rate is consistent with asset market equilibrium at a foreign interest rate of $R^*$.
When the central bank intervenes to hold the exchange rate fixed, it must automatically adjust the domestic money supply so that money market equilibrium is maintained with \( R = E \). Let's look at an example to see how this process works. Suppose the central bank has been fixing \( E \) at \( E_0 \) and that money supply initially are in equilibrium. Suddenly output rises. A necessary condition for holding the exchange rate permanently fixed at \( E_0 \) is that the control bank returns current asset market equilibrium at that rate, given that people expect \( E_0 \) to prevail in the future. So we frame our question as: What monetary mechanism keeps the exchange rate constant given unchanged expectations about the future rate?

In order to maintain the real money demand for domestic money, and this increase in money demand would push the domestic interest rate upward. To prevent the appreciation of the home currency that would occur (given that people expect exchange rate at \( E_0 \) in the future), the central bank must intervene in the foreign exchange market by buying foreign assets. This foreign asset purchase eliminates the excess demand for domestic money because the central bank issues money to pay for the foreign assets it buys. The bank automatically increases the money supply in this way until asset markets again clear with \( E = E_0 \) and \( R = E_0 \).

If the central bank does not purchase foreign assets when output increases but instead holds the money supply constant, it will shift the exchange rate fixed at \( E_0 \). The answer is no. When the central bank did not satisfy the excess demand for money caused by a rise in output, the domestic interest rate would begin to rise above the foreign rate, \( E_0 \), to balance the foreign money market. Traders in the foreign exchange market, perceiving that domestic currency deposits were offering a higher rate of return (given expected returns), would begin to bid up the price of domestic currency in terms of foreign currency. In the absence of central bank intervention, the exchange rate would fall below \( E_0 \). To prevent this appreciation, the bank must sell domestic currency and buy foreign assets, thereby increasing the money supply and preventing any excess money demand from pushing the domestic interest rate above \( E_0 \).

A Diagrammatic Analysis

The preceding mechanism of exchange rate fixing can be pictured using a diagrammatic and developed as follows. Figure 17.1 shows the simultaneous equilibrium of the foreign exchange and domestic money markets when the exchange rate is fixed at \( E_0 \) and is expected to remain fixed at \( E_0 \) in the future.

Money market equilibrium is specified as point 1 in the box part of the figure. The diagram shows that for a given price level, \( P \), and a given national income level, \( Y \), the money supply must equal \( P \) when the domestic interest rate equals the foreign rate, \( E_0 \). The upper part of the figure shows the equilibrium of the foreign exchange market at point 1. If the expected future exchange rate is \( E_0 \), the interest parity condition holds when \( E = E_0 \) only if today's exchange rate also equals \( E_0 \).

To see how the central bank must react to macroeconomic changes to hold the exchange rate fixed at \( E_0 \), let's look again at the example of an increase in income. A rise in income (from \( Y^3 \) to \( Y^5 \)) raises the demand for real money holdings at every interest rate, thereby shifting the aggregate money demand function in Figure 17.1 downward. As noted above, a necessary condition for maintaining the fixed rate is to return current asset market equilibrium given that \( E_0 \) is still the expected future exchange rate. So we can assume that the downward sloping curve in the figure's top panel doesn't move.

If the central bank were to take no action, the new money market equilibrium would be at point 2. Because the domestic interest rate is above \( E_0 \) at point 2, the currency would have to appreciate to bring the foreign exchange market in equilibrium at point 2.

The central bank cannot allow this appreciation of the domestic currency to occur if it is fixing the exchange rate, as it will buy foreign assets. As we have seen, the increase in the central bank's foreign assets is accompanied by an expansion of the domestic money supply. The central bank will continue to purchase foreign assets until the domestic money supply has expanded to \( E_0 \). At this resulting money market equilibrium (point 2 in the figure), the domestic interest rate again equals \( E_0 \). Given the domestic interest rate, the foreign exchange market equilibrium remains at point 1 with an equilibrium exchange rate still equal to \( E_0 \).
Having seen how the central bank uses foreign exchange intervention to fix the exchange rate, we can now analyze the effects of various macroeconomic policies. In this section we consider three possible policies: monetary policy, fiscal policy, and an abrupt change in the exchange rate's fixed level, δp.

The stabilization policies we studied in the last chapter have surprisingly different effects when the central bank fixes the exchange rate rather than allowing the foreign exchange market to determine it. By fixing the exchange rate, the central bank gives up its ability to influence the economy through monetary policy. Fiscal policy, however, becomes a more potent tool for affecting output and employment.

As in the last chapter, we use the D-A-4-A model to describe the economy's short-run equilibrium. You recall that the D-A-4-A model shows combinations of the exchange rate and output for which the output market is in equilibrium, the A-A schedule shows combinations of the exchange rate and output for which the money market is in equilibrium, and the short-run equilibrium of the economy as a whole is in the intersection of D and A-A. To apply the model in the case of a permanently fixed exchange rate, we add the assumption that the a-monopolist's exchange rate, δp, equals the rate δ2 at which the central bank is pegging.

Monetary Policy

Figure 17.2 shows the economy's short-run equilibrium at point 1, where the central bank fixes the exchange rate at the level δ2. Output equals y1, p = p1, and, as in the last section, the money supply is at the level where domestic currency demand equals the foreign currency demand (A) claims the domestic money market. Suppose now that, hoping to increase output, the central bank decides to increase the money supply through a purchase of domestic money. Under a floating exchange rate, the increase in the central bank's domestic assets would push the original asset market equilibrium curve A-A rightward to A1-A1 and would therefore result in a new equilibrium at point 2 and a domestic depression. To prevent this depreciation and hold output at δ2, the central bank sells foreign assets for domestic money in the foreign exchange market. The money the bank receives goes out of circulation, and the asset market equilibrium moves back toward its initial position at the home money supply falls. Only when the money supply has returned to its original δ = δ2, can the asset market schedule be again A-A, the exchange rate no longer under pressure.

The intent to increase the money supply under a fixed exchange rate thus leaves the economy in its initial equilibrium (point 1). Under a fixed exchange rate, central bank monetary policy tools are powerless to affect the economy's money supply or output.

The result is very different from the case under a floating exchange rate. In Chapter 16, a central bank can use monetary policy to raise the money supply and output when the exchange rate floats, so it is instructive to ask why the difference arises. By purchasing domestic assets under a floating exchange rate, the central bank causes the nominal quantity of domestic money that simultaneously pushes the domestic interest rate downward and weakens the currency. Under a fixed exchange rate, however, the central bank will resist any tendency for the currency to depreciate by selling foreign assets for domestic money and in removing the initial excess supply of money its policy move has caused. Because any increase in the domestic money supply, no matter how small, will force the domestic currency to depreciate, the central bank must continue selling foreign assets until the money supply has returned to its original level. In this way, the amount in the central bank's domestic assets is exactly offset by an equal decrease in the bank's official international reserves. Similarly, an attempt to decrease the money supply through a sale of domestic assets would cause an equal increase in reserves that would keep the money supply from changing in the end. Under a fixed rate, monetary policy can affect international reserves but not money supply.

By fixing the exchange rate, then, the central bank loses its ability to use monetary policy for the purpose of macroeconomic stabilization. However, the government's second key policy instrument, fiscal policy, is still effective under a fixed rate and therefore a floating rate.

Fiscal Policy

Figure 17.3 illustrates the effects of expansionary fiscal policy when the economy's initial equilibrium is at point 1. As we saw in Chapter 14, fiscal expansion shifts the money market equilibrium schedule to the right. D-D1 therefore shifts to D1-D1 in the figure. The central bank is initially fixed exchange rate; hence it can't alter the exchange rate. If the central bank is fixed exchange rate, hence it can't alter the exchange rate. If the foreign exchange market set a levels for the real interest rate, an increase in the exchange rate would lead to a decline in the foreign exchange market, which would reduce the exchange rate. The central bank would then have to alter the exchange rate to maintain the fixed exchange rate. If the central bank is fixed exchange rate, hence it can't alter the exchange rate. If the foreign exchange market set a levels for the real interest rate, an increase in the exchange rate would lead to a decline in the foreign exchange market, which would reduce the exchange rate. The central bank would then have to alter the exchange rate to maintain the fixed exchange rate.
money derived from pushing up the home interest rate and appreciating the currency, the central bank must buy foreign assets with money, thereby increasing the money supply. In terms of figure 17-5, intervention holds the exchange rate at $E^o$ by shifting AA rightward to AA' at the new equilibrium point $E^o$. However, since the exchange rate (output) is originally higher than originally, the exchange rate is unchanged, and official international reserves (and the money supply) are higher.

Unlike monetary policy, fiscal policy can be used to offset output under a fixed exchange rate. Instead, it is more effective than under a floating rate. Under a floating rate, fiscal policy is accomplished by an appreciation of the domestic currency that makes domestic goods and services more expensive and so tends to counteract the policy's positive direct effect on aggregate demand. To prevent this appreciation, a central bank that is fixing the exchange rate is forced to expand the money supply through foreign exchange purchases. The additional expansionary effect of this involuntary increase in the money supply explains why fiscal policy is more potent than under a floating rate.

**Changes in the Exchange Rate**

A country that is fixing its exchange rate sometimes decides on a sudden change in the foreign currency value of the domestic currency. A devaluation occurs when the central bank raises the domestic currency price of foreign currency, F, and a revaluation occurs when the central bank lowers it. All the central bank has to do is to be more or less disinterested in foreign currency, in unlimited issue, at the foreign exchange rate.

Figure 17-4 shows how a devaluation affects the economy. A rise in the level of the foreign exchange rate, from P to $P^o$, raises domestic goods and services relative to foreign goods and services (given that $P$ and $P^o$ are fixed in the short run). Output therefore moves to the higher level $E^o$ shown by point 1 on the DD schedule. Point 2, however, does not lie on the initial asset market equilibrium schedule AA. At point 2, there is initially an excess demand for money due to the rise in transactions accompanying the output increase. This excess money demand would push the interest rate above the world interest rate if the central bank did not intervene in the foreign exchange market. To maintain the exchange rate at its new fixed level, $F^o$, the central bank must disburse foreign assets and expend the money supply until the asset market curve reaches AA' and passes through point 2. Devaluation therefore causes an increase in output, a rise in official reserves, and an expansion of the monetary supply. A private capital inflow matches the central bank's reserve gain (an official surplus) in the balance of payments accounts.

The effects of devaluation illustrate the three main reasons why governments sometimes choose to devalue their currencies. First, devaluation allows the government to fight domestic unemployment despite the lack of effective monetary policy. If government spending and budget deficits are politically unpopular, for example, or if the legislative process is slow, a government may opt for devaluation as the most convenient way of lowering aggregate demand. A second reason for devaluing is the need for devaluation in the current account, a development the government may believe to be desirable. The third reason behind devaluations is their effect on the central bank's foreign reserves. If the central bank is running a loss on reserves, a sudden, one-time devaluation can be used to draw in more.

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Footnotes:

1. The terms 'domestic currency price' and 'foreign currency price' are used throughout this chapter. The terms 'exchange rate' and 'foreign exchange rate' are used in the chapter to refer to the world interest rate.

2. The terms 'interest rate' and 'foreign exchange rate' are used in this chapter to refer to the world interest rate.

3. The terms 'interest rate' and 'foreign exchange rate' are used in this chapter to refer to the world interest rate.

4. The terms 'interest rate' and 'foreign exchange rate' are used in this chapter to refer to the world interest rate.

5. The terms 'interest rate' and 'foreign exchange rate' are used in this chapter to refer to the world interest rate.

6. The terms 'interest rate' and 'foreign exchange rate' are used in this chapter to refer to the world interest rate.
Adjustment to Fiscal Policy and Exchange Rate Changes

If fiscal and exchange rate changes occur when there is full employment and the policy changes are maintained indefinitely, they will ultimately cause the domestic price level to move in such a way that full employment is returned. To understand this dynamic process, we discuss the economy's adjustment to fiscal expansion and revaluation in turn.

If the economy is initially at full employment, fiscal expansion raises output, and this rise in output above the full-employment level causes the domestic price level, P, to begin rising. As P rises basic output becomes more expensive, so aggregate demand gradually falls, reducing output to the initial, full-employment level. Once this point is reached, the upward pressure on the price level stops.

In the short run, as there is a floating exchange rate, but regardless of whether the exchange rate is floating or fixed, the real exchange rate appreciation is the long run by the same amount. The present case real appreciation (a fall in E/P) takes the form of a rise in P rather than a fall in E.

At first glance, the long-run price level increase caused by a fiscal expansion under fixed rates seems inconsistent with the conclusion of Chapter 16 that for a fixed output level and interest rate the price level and the money supply move proportionally in the long run. There is no inconsistency because fiscal expansion does cause a money supply increase by forcing the central bank to intervene in the foreign exchange market. To fix the rate throughout, the adjustment process, the central bank ultimately must increase the money supply through intervention in proportion to the long-run increase in P.

The case study focuses on the exchange rate during the Bretton Woods system, which operated from 1944 to 1971. During this period, countries agreed to fix their exchange rates to the U.S. dollar at a rate of $1 = 4.00 gold. This system was designed to stabilize international trade and investment, but it ultimately failed due to various economic and political factors.
How is this possible? One usual argument is that a temporary increase in the money supply reduces the interest rate (and depreciates the currency) since the assumption that people will add money to their portfolios only if bonds become less attractive to hold. At an interest rate of A = 0, however, people may be indifferent about sales of bonds and money—both yield a nominal rate of interest rate equal to zero. Thus, an open-market purchase of bonds for money, won't disturb the markets: people will be happy to accept the additional money in exchange for their bonds with no change in the interest rate; thus, no change in the exchange rate. In contrast to the case we examined in Chapter 16, an increase in the money supply will not have any effect on the economy. A central bank that progressively reduces the money supply by selling bonds will eventually succeed in pushing the interest rate up—the economy cannot function without some money—but that possibility is not helpful, of course, unless the economy is in a slump.

Figure 17.2 shows how the A-A DD diagram can be modified to depict the liquidity trap region of potential equilibrium positions. The DD schedule is the same, but the AA schedule now has a flat segment at levels of output so low that the money market clears at an interest rate R equal to zero. The flat segment of AA shows that the currency cannot depreciate beyond the level (B1) — (B2). At the equilibrium point 1 in the diagram, output is trapped at a level (F1) that is below the full-employment level (F2).

Let’s consider how an open-market expansion of the money supply works in this strange zero-interest world. As the action shifts AA to the right at an unchanged exchange rate, an increase in output forces money demand, leaving people content to hold more money at the unchanged interest rate R. Notice how the horizontal stretch of AA becomes longer as a result. With more money in circulation, real output and money demand can rise further than before until nominal interest rates are driven to positive levels by increased money demand (resulting in currency appreciation along the downward-sloping segment of AA). The surprising result is that the equilibrium simply remains at point 1. Monetary expansion has no effect on output or the exchange rate. This is the sense in which the economy is “trapped.”

Our earlier assumption was that the expected future exchange rate will be fixed. In Z is a key ingredient in this liquidity trap story. Suppose the central bank is credibly prepared to raise the money supply permanently, so that Z1 rises at the same time as the current money supply. In that case the AA schedule will shift up as well as to the right, so that output will expand and the currency will depreciate. Observers of Japan have argued, however, that its officials are so fearful of depression and inflation (as were many central bankers during the early 1930s) that neither will not believe their promises to appreciate the currency permanently. Instead they will suspect an intention to reverse an appreciated exchange rate later on, and limit any monetary expansion as temporary.

A more sure-fire way of jumping-starting the Japanese economy has been suggested by Larry E. Q. Overson of Princeton University. He recommends pegging the exchange rate at a higher level so as to make market expectations more direct. A simplified form of Overson’s

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102 A simulation would generally be accompanied by a change in the nominal money supply, which increases productivity since the exchange rate is fixed. Because the policy in Figure 17.6 simultaneously moves the monetary interest rate and money, we cannot infer that the money supply changes in this. In the former case, the vertical stretch of AA changes, while in the latter case it shrinks.
By pegging the exchange rate at $E^*$, the government sets exchange rate expectations and shifts AA to AA'. As a result, the economy enters the liquidity trap and returns to full employment.

Balance of Payments Clocks and Capital Flight

Until now, we have assumed that participants in the foreign exchange market believe that a fixed exchange rate will be maintained at its current level forever. In many prevision situations, however, the central bank may find it undesirable or infeasible to maintain the current fixed exchange rate. The central bank may be running short on foreign reserves, for example, or it may face high domestic unemployment. Because market participants know the central bank may respond to such situations by devaluing the currency, it would be unreasonable for them to expect the current exchange rate to be maintained forever.

The market's belief in an impending change in the exchange rate gives rise to a balance of payments shock, a sharp change inofficial foreign reserves stimulated by a change in expectations about the future exchange rate. In this section we see how the model of asset market equilibrium to examine how balance of payments shocks can occur under fixed exchange rates.

Figure 17.7 shows the asset markets in equilibrium at points 1 (the money market) and 1 (the foreign exchange market) with the exchange rate fixed at $E^*$ and expected to remain indefinitely. $M^*$ is the money supply consistent with this initial equilibrium. Suppose a sudden decrease in the current account, for example, leads the foreign exchange market to expect the government to devalue in the future and adopt a new fixed exchange rate, $E^*$, that is higher than the current rate, $E^*$. The figure's upper part shows this change in expectations as a rightward shift in the curve that measures the expected domestic currency return on foreign currency deposits. Since the current exchange rate still is $E^*$, equilibrium in the foreign exchange market (point 2) requires a rise in the domestic interest rate to $r^* + (E^* - E^*/E^*) = r^*$, which will cause the expected domestic currency return on foreign currency assets.

Initially, however, the domestic interest rate remains at $r^*$, which is below the expected return on foreign assets. This differential causes an excess demand for foreign currency assets in the foreign exchange market; to continue holding the exchange rate at $E^*$, the central bank must sell foreign reserves and thus shrink the domestic money supply. The bank's intervention comes to an end once the money supply has fallen to $M^*$, so that the money market is in equilibrium at the interest rate $r^* + (E^* - E^*/E^*) = r^*$ that clears the foreign exchange market (point 2). The expectation of a future devaluation causes a balance of
CHAPTER 17 Fixed Exchange Rates and Foreign Exchange Intervention

Floating and Sterilized Intervention

In previous sections we argued that a central bank given up on its ability to influence output through monetary policy is forced to intervene in foreign exchange markets. Under managed floating, however, monetary policy is influenced by exchange rate changes without being completely subordinated to the requirements of a fixed rate. Instead, the central bank faces a trade-off between domestic objectives such as employment or the inflation rate and exchange rate stability. To manage this trade-off, the central bank uses its foreign exchange reserves to maintain the value of the exchange rate. The foreign exchange intervention will tend to reduce the money supply, but not necessarily neutralizing the central bank’s attempts to reduce unemployment.

Discussions of foreign exchange intervention in policy documents and newspaper articles often appear to ignore the interplay between intervention and the money supply as it was explored in detail above. In reality, these discussions often assume that foreign exchange intervention is being neutralized by the offsetting domestic policy actions that prevent it from affecting the money supply. The empirical results of central bank behavior in contrast confirm this assumption and consistently show that central banks have practiced sterilized intervention throughout the twentieth century.

In spite of widespread sterilized intervention, there is considerable debate among economists about its effects. In this section we study the role of sterilized intervention in exchange rate management.

Perfect Asset Substitutability and the Ineffectiveness of Sterilized Intervention

When a central bank carries out a sterilized foreign exchange intervention, its transactions leave the domestic money supply unchanged. A motivating factor in this is the model used for intervention rate determination previously developed, as the model predicts

The term “sterilized intervention” refers to policies that aim to intervene in foreign exchange markets without affecting the domestic money supply.
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under a fixed rate and why our model says the policy will fail. Recall that to hold the
exchange rate constant when fiscal policy becomes more expansionary, the central bank must buy foreign assets and expand the money supply. The policy may cause the government to
sell foreign assets to keep the exchange rate fixed. The inefficiency of monetary policy under a fixed exchange rate implies that sterilization is a self-defeating policy.

The key feature of our model that leads to these results is the assumption that the foreign exchange market is in equilibrium only when the expected returns on domestic and foreign currency bonds are the same. This assumption is often called perfect asset substitutability. Two assets are perfect substitutes when, as our model assumed, investors don’t care how their portfolios are divided between these two bonds until they are some expected rate of return. With perfect asset substitutability in the foreign exchange market, the exchange rate is predetermined so that the interest parity condition holds. When this is the case, there is nothing a central bank can do to influence foreign exchange intervention that would not also be sufficient to determine the exchange rate.

In contrast to perfect asset substitutability, imperfect asset substitutability exists when it is possible for assets’ expected returns to differ in equilibrium. As we saw in Chapter 13, the main factor that may lead to imperfect asset substitutability is the foreign exchange market is risk. If bonds demonstrated in different currencies have different degrees of risk, investors may be willing to earn lower expected returns on bonds that are less risky. Consequently, they will hold a very risky asset only if the expected return offers a sufficiently high.

In a world of imperfect asset substitutability, participants in the foreign exchange market can only expect rates of return, since these rates are determined by monetary policy, actions such as sterilized intervention that do not affect the money supply also do not affect the exchange rate. Under imperfect asset substitutability, both bonds and return rates, an central bank actions that alter the riskiness of domestic currency assets can move the exchange rate even when the money supply does not change. To understand how sterilized intervention can alter the riskiness of domestic currency assets, however, we must modify our model of equilibrium in the foreign exchange market.

Foreign Exchange Market Equilibrium

under Imperfect Asset Substitutability

When domestic and foreign currency bonds are imperfect substitutes, the foreign exchange market is in equilibrium only if the interest parity condition holds:

$$R = \rho^* - \sigma - E \cdot Y$$

Where domestic and foreign currency bonds are imperfect substitutes, the condition above does not hold in general. Instead, equilibrium in the foreign exchange market requires that

\[ R = \rho^* - \sigma - E \cdot Y \]

We are assuming that all domestic government (domestic) bonds issued in the same currency, whether issued by domestic governments, or foreign governments in a different currency. The real term “bonds” will generally refer to all these bonds.
the domestic interest rate equal the expected domestic currency return on foreign bonds, plus a risk premium, \( p \), that reflects the difference between the yields of domestic and foreign bonds:

\[
R = R^* + (\theta - E\theta) + p
\]

(37.2)

Appendix 1 to this chapter develops a detailed model of foreign exchange market equilib-
rium with imperfect asset substitutability. The main conclusion of that model is that the
risk premium on domestic assets rises when the stock of domestic government bonds avail-
able to be held by the public rises and falls when the central bank's domestic asset stock.
It is not hard to grasp the economic reasoning behind this result. Private investors become
more vulnerable to unexpected changes in the home currency exchange rate as the stock
of domestic government bonds they hold rises. Investors will be unwilling to assume the
increased risk of holding more domestic government bonds, however, unless they are com-
 pensated by a higher expected rate of return on foreign currency assets. An increased
stock of domestic government bonds will therefore raise the difference between the expected
returns on domestic and foreign currency assets. Similarly, when the central bank buys
domestic assets the market need no longer hold them; private investors are able to hold cur-
rency exchange rate risk is then lower, and the risk premium on these assets falls.

This alternative model of foreign exchange market equilibrium implies that the risk premium
depends positively on the stock of domestic government bonds, depicted by \( \theta \), less the
domestic assets of the central bank, denoted by \( A \).

\[
p = p(\theta - A).
\]

(37.3)

The risk premium on domestic bonds therefore rises when \( \theta - A \) rises. This relation
between the risk premium and the central bank's domestic asset holdings allows the basic
assumptions of the extended foreign exchange intervention. It also implies that
official operations in domestic and foreign assets may differ in that asset market impacts.

The Effects of Sterilized Intervention

with Imperfect Asset Substitutability

Figure 17-8 modifies our earlier picture of asset market equilibrium by adding imperfect
asset substitutability to illustrate how sterilized intervention can affect the exchange rate.
The lower part of the figure, which shows the money market in equilibrium at point I, does not
change. The upper part of the figure is almost the same as in the lower part, except that the
downward-sloping schedule now shows how the sum of the expected domestic currency
return on foreign assets and the risk premium depends on the exchange rate. This curve
continues to slope downward because the risk premium itself is assumed not to depend on the
exchange rate. (Equilibrium in the foreign exchange market is at point I, which corre-
sponds to a domestic government bond of \( B \) and central bank domestic asset holdings of \( A \).
At that point, the domestic interest rate equals the risk-adjusted domestic currency return on
foreign deposits (as in (17.2)).

The stock of central bank domestic assets is also called domestic cash.
home currency to appreciate. A slight modification of our analysis shows that the central bank can also use sterilized intervention to hold the exchange rate fixed if it varies the money supply to achieve domestic objectives such as full employment. In effect, the exchange rate and monetary policy can be managed independently of each other when sterilized intervention is effective.

Evidence on the Effects of Sterilized Intervention

In the early 1980s European countries called on the United States to increase systematically in the foreign exchange market and resist sharp movements in the dollar’s exchange rate against other currencies. Language of the stronger industrial nation discussed interven-

tions as an economic measure in meeting held at Versailles in June 1982.21 As a result of the discussion, government economists in the United States were asked to prepare a study of the effects of alternative intervention practices.

The conclusions of the study were published in 1983 as the “Report of the Working Group on Exchange Market Intervention.” The report asked in particular if sterilized interven-
tion might allow central banks to manage exchange rates without requiring agree-
ments in domestic monetary policies. Little evidence was found to support the idea that sterilized intervention had been a major independent factor influencing exchange rates. This conclusion agrees with the one reached by most academic models of sterilized intervention. As we discuss in depth in Chapter 2.1, however, there is also considerable evidence against the view that both determined in different currencies are perfect sub-
stitutes. Some economic measures from those conflicting results that while risk premia are important, they do not depend on central bank asset interactions in the simple way our model assumes.22 Others claimed that the sorts that have been used in the effects of the owners of sterilized intervention and foreign.23 Given the evidence that sterilized intervention has a reliable effect on exchange rates, however, a skeptical attitude is probably in order.

The Signaling Effect of Intervention

A phenomenon sometimes referred to as the signaling effect of foreign exchange interven-
tion is an important complicating factor in economic studies to study the effects of sterilized intervention. One discussion of another intervention has assumed that it does not change the market’s exchange rate expectations. If market participants are unsure about the future direction of macroeconomic policies, however, sterilized intervention may give an indica-
tion of where the central bank expects (or desires) the exchange rate to move. This signal,
gold as official international reserves. The heyday of the international gold standard was between 1870 and 1914, although many countries attempted unsuccessfully to restore a permanent gold standard after the end of World War I in 1918.

Both reserve currency standards and the gold standard result in fixed exchange rates between all pairs of currencies in the world. But the two systems have very different implications about how countries share the burdens of balance of payments financing and about the growth and control of national money supplies.

The Mechanics of a Reserve Currency Standard

The workings of a reserve currency system are illustrated by the system based on the U.S. dollar set up at the end of World War II. Under that system, every central bank sold its dollar exchange rate of its currency through foreign exchange markets under all domestic currency for dollar assets. The frequent need to exchange cash meant that each central bank had to have in hand sufficient dollar reserves to meet any export supply of its currency that might arise. Countries therefore held a large portion of their international reserves in the form of U.S. Treasury bills and short-term dollar deposits, which pay interest and can be turned into cash at relatively low cost.

Because each country's dollar price was fixed by its own central bank, the exchange rate between any two currencies was automatically fixed as well through arbitrage in the foreign exchange market. How did this process work? Let's suppose the French franc price of dollars was fixed at FFr 5 per dollar while the deutsche mark price of dollars was fixed at DM 4 per dollar. The exchange rate between the franc and the mark had to remain constant at DM 0.80 per franc = (DM 4 per dollar) × (FFr 5 per dollar) = FFr 20, so the relative price of these two currencies fixed. At a DM/FFr rate of 0.83 franc per dollar, for example, you could have made a sure profit of DM 3.75 by selling DM 250 to the French, exchanging it for FFr 200, buying your FFr 200 in the foreign exchange market for FFr 300 at the DM/FFr rate of DM 0.83 per franc = DM 250, and then selling the DM to the German Bundesbank (Germany's central bank) for DM 250 = DM 0.83 per dollar = $313.45. With everyone trying to exploit this profit opportunity by selling francs for DM in the foreign exchange market, however, the DM would appreciate against the franc until the DM/FFr rate reached DM 0.80 per franc. Similarly, at a rate of DM 0.85 per franc, the francs would be exchanged for DM at the same rate. The result was that the French franc was worth 0.85 francs to the dollar, and the mark was worth 1.25 francs to the dollar. The relative prices of these two currencies fixed.

The Asymmetric Position of the Reserve Currency

In a reserve currency system the country whose currency is held as reserve currency occupies a special position because it never has to intervene in the foreign exchange market. The reason is that if there are N countries with N currencies in the world, there are only N - 1 exchange rates among them. But in the N - 1 nonreserve currency countries there are as many exchange rates against the nonreserve currency as there are exchange rates left for each of the nonreserve countries. The reserve country need never intervene and hence bears no of the burdens of financing the balance of payments.

This set of conditions puts the reserve currency country at a privileged position because it can use its monetary policy for economic stabilization even though it has fixed exchange rates. Wages fall in this country when a country must intervene to hold its exchange rate constant, an attempt to expand its money supply is bound to be frustrated by losses of international reserves. Because the reserve country is the base country in the system that can enjoy fixed exchange rates without the need to intervene, it is still able to use monetary policy for stabilization purposes.

What would be the effect of a positive movement of domestic assets by the central bank of the reserve currency country? The resulting expansion in its money supply would momentarily push its interest rate below those prevailing abroad, and thereby cause an excess demand for foreign currencies in the foreign exchange market. To prevent its currencies from appreciating against the reserve currency, all other central banks in the system would be forced to buy reserve assets with their own currencies, expanding their money supplies and pushing their interest rates down to the level established by the reserve country. Output throughout the world, as well as at home, would experience a purchase of domestic assets by the reserve country.

Our account of monetary policy under a reserve currency system points to a basic asymmetry. The reserve country has the power to affect its own economy, as well as foreign economies, by using monetary policy. Other central banks are forced to relinquish monetary policy as a stabilization tool, and must manage relatively large and sometimes unstable foreign exchange reserves. Any change in the size of the reserve country's foreign exchange reserves is therefore likely to have a major effect on foreign exchange rates, and hence the output and unemployment in the rest of the world. The result is that the central bank of the reserve country can achieve a higher level of output and employment with a given rate of price inflation than any other country's central bank. The reserve country is, therefore, in a special position as far as monetary policy is concerned.

The Gold Standard

An international gold standard avoids the asymmetry inherent in a reserve currency standard by avoiding the "wage" problem. Under a gold standard, each country fixes the price of its currency in terms of gold by standing ready to trade domestic currency for gold whenever necessary to defend the official price. Because the official rates and N - 1 prices of gold in terms of those currencies, each country occupies a privileged position within the system. Each is at once both the seller and buyer of its currency's price in terms of the official international reserve asset, gold.

The Mechanics of a Gold Standard

Because countries tie their currencies to gold under a gold standard, official international reserves take the form of gold. Gold standard rules also require each country to allow
unhindered imports and exports of gold across its borders. Under these arrangements, a gold standard, like a reserve currency system, results in fixed exchange rates between all currencies. For example, if the dollar price of gold is pegged at $35 per ounce by the Federal Reserve while the gold price of gold is pegged at $4.28 per ounce by Britain's central bank, the dollar-exchange rate must be in at $35 per ounce = $4.28 per ounce = $7.40 per pound. The same structural forces that hold cross exchange rates fixed under a reserve currency system keep exchange rates fixed under a gold standard as well.10

Symmetric Monetary Adjustment under a Gold Standard

Because of the pressures of a gold standard, no country in the system occupies a privileged position by being allowed of the commitment to intervene. By considering the international effects of a package of domestic assets by one central bank, we can see that monetary policies under a gold standard.

Support the banks of England decides to increase in the money supply through a purchase of domestic assets. The initial increase in Britain's money supply will put downward pressure on British interest rates and make foreign currency more attractive than British assets. Holders of foreign deposits will attempt to sell them for foreign deposits, but no price buyers will come forward. Unlike fluster exchange rates, the pound would appreciate against foreign currencies until interest parity had been reassessed. This depreciation cannot occur when all currencies are tied to gold, however. What happens? Because central banks are obligated to trade their currencies for gold at fixed rates, unembry holders of pounds can sell them to the Bank of England for gold, sell the gold to other central banks for their currencies, and then make the purchase of foreign deposits that drive interest rates higher than the interest rate on gold. Britain therefore experiences a capital outflow and foreign countries experience an inflow.

This process reverses itself in the foreign exchange market. The Bank of England loses foreign reserves since it is forced to buy pounds and sell gold to keep the pound price of gold fixed. Foreign central banks gain reserves as they pay for their currencies. Countries share equally in the burden of a balance of payments adjustment. Because official foreign reserves are declining, Britain is increasing abroad, the British money supply is falling, pushing up British interest rates. As for foreign money supplies are rising, pushing foreign interest rates down. Once interest rates have again become equal across countries, asset markets are in equilibrium and there is no further incentive for the Bank of England to lose gold or for foreign central banks to gain it.

Our example illustrates the symmetric nature of international monetary adjustment under a gold standard. Whenever a country is losing reserves and seeing its money supply shrink as a consequence, foreign countries are gaining reserves and seeing their money supplies expand. In contrast, monetary adjustment under a reserve currency standard is highly asymmetric. Countries can gain or lose reserves without inducing any change in the money supply.
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and currencies whose prices in terms of gold are fixed, and each central bank fixes its exchange rate to a currency with a fixed gold price. A gold exchange standard can operate like a gold standard in restraining excessive monetary growth throughout the world, but it allows more flexibility in the growth of international reserves, which can consist of assets beyond gold. A gold exchange standard is, however, subject to the same limitations as a gold standard listed above.

The post-WWII gold reserve system centered on the dollar was, in fact, originally set up as a gold exchange standard. While official foreign banks did not engage in direct exchange rate intervention, the U.S. Federal Reserve was responsible for holding the dollar price of gold at $35 an ounce. By the mid-1960s, however, the system became considerably more flexible: reserve currency banks traded in their own reserve currency system than a gold standard. Further, some countries did intervene in the exchange market to support the dollar's value in August 1971, shortly before the system of fixed dollar exchange rates was abandoned.

Summary

1. There is a direct link between central bank intervention in the foreign exchange market and the domestic money supply. When a country's central bank purchases foreign currency, the country's money supply automatically increases. Similarly, a country's bank sale of foreign assets automatically lowers the money supply. The central bank's balance sheet shows how foreign exchange intervention affects the money supply because the central bank's liabilities, which rise or fall when it acquires or sells, are the basis of the domestic money supply process. The central bank can ensure the money supply's effective measure through intervention. With no sterilization, there is a link between the balance of payments and national money supplies that depends on how central banks alter the balance of financing payments.

2. A central bank can fix the exchange rate of its currency against foreign currency if it is willing to understate or overstate its domestic money supply or money supply. In effect, the central bank adjusts in foreign money to ensure that the domestic money supply to ensure that asset markets are always in equilibrium under the fixed exchange rate system.

3. A commitment to fix the exchange rate forces the central bank to sacrifice its ability to use money policy for stabilization. A position of domestic assets by the central bank causes an equal fall in its official international reserves, limiting the money supply and output exchanged. Similarly, a slide of domestic assets by the central bank causes foreign reserves to rise by the same amount but has no other effects.

4. Fiscal policy, unlike monetary policy, has a more powerful effect on output under fixed exchange rates than under floating rates. Under a fixed exchange rate, fiscal expansion does not, in the short run, cause a real appreciation of the currency. Instead, a foreign currency bank purchased foreign assets and an expansion of the money supply. Countercyclical policies also raise aggregate demand and the money supply in the short run. (Countercyclical has opposite effects) to the long run.
fiscal expansion could result in an appreciation of the exchange rate, and a rise in the price level, while devaluation causes the foreign reserves of the money supply and prices to rise in proportion to the exchange rate.

5. Balance of payments crisis: every economy, in the current era, must decide whether to maintain a stable exchange rate. If the exchange rate is maintained, the domestic interest rate and foreign reserves will fluctuate significantly in response to changes abroad. Self-adjusting currency crises can occur when an economy is vulnerable to speculation. In other circumstances, an exchange rate collapse may be the inevitable result of insufficient government policies.

6. A system of managed floating allows the central bank to resist some ability to control the domestic money supply, but at the cost of greater exchange rate instability. If domestic and foreign bonds are perfect substitutes, however, the central bank may be able to control both the money supply and the exchange rate through sterilized foreign exchange intervention. Empirical evidence provides little support for the idea that sterilized intervention has a significant effect on exchange rates. Even when domestic and foreign bonds are imperfect substitutes, such as the case for the United States and Japan, i.e., it is unlikely that market intervention from one or both countries can influence the exchange rate. However, the sterilized intervention of the Community's central banks to intervene in the foreign exchange market to offset the impact of European integration could improve the market's psychological effect.

7. The world system of fixed exchange rates in which countries peg the price of their currency to the price of another currency is a variable currency standard that also places constraints on the growth of countries' money supplies. (A related arrangement is the domestic standard based on both silver and gold.) But the gold standard has serious drawbacks that make it impractical as a way of organizing today's international monetary system. Even the so-called gold-exchange standard set up after World War II ultimately proved unsatisfactory.

Key Terms
- balance of payments crisis, p. 502
- balance of payments, p. 502
- capital flight, p. 502
- foreign exchange market, p. 502
- gold standard, p. 502
- imperfect exchange substitutability, p. 502
- sterilized foreign exchange intervention, p. 488
- perfect substitute substitability, p. 502
- perfect substitute substitutability, p. 507
- reserve currency, p. 511
- self-adjusting currency, p. 502
- sterilized foreign exchange intervention, p. 488

Problems
1. Describe how an expansion in the central bank’s domestic asset reduces effectively a balance sheet shock in a fixed exchange rate system. How can the central bank's reaction in the foreign exchange market, reflected in the balance of payments accounts?
2. Do country prices increase due to a decrease in government spending? Does this increase in government spending?
3. Describe the effects of an unexpected devaluation on the central bank's balance sheet and its balance of payments accounts.
4. Explain why a sterilization improves the current account in this chapter's model.


To keep the dollar from falling against the West German mark, the European central banks would have to sell dollars and buy marks, a procedure known as intervention. But the need for intervention in the marketplace is vastly larger than all the governments' holdings.

Billions of dollars worth of currencies are traded each day. Without support from the United States and Japan, it is unlikely that market intervention from even the two most economically influential members of the European Community—Britain and West Germany—would have much impact on the market. However, just the statement of intention from the Community's central banks to intervene could dampen the market's psychological effect.

Economists say that intervention works only when markets are unusually quiet, as they are when the gap between expectations of a devaluation or a devaluation is used to push the mark up on a direction from which they are already hulked away.

a. Do you agree with the statement in the article that Germany had little ability to influence the exchange rate of the DM?

b. Do you agree with the last paragraph's evaluation of the efficacy of intervention?

c. Describe how "just the stated intention" could have a "psychological effect" on the foreign-exchange market.

d. Try your hand at revising the above paragraphs in more precise language so that they reflect what you learned in this chapter.

e. Can you think of reasons why a government might willingly sacrifice some of its ability to use monetary policy so that it can have more responsible exchange rate?

f. How does fiscal expansion affect a country's current account under a fixed exchange rate?”

6. Explain why temporary and permanent fiscal expansions do affect different effects under fixed exchange rates, as they do under floating.

7. Derivatives are often used by countries to improve their current accounts. Since the current account equals national saving minus domestic investment, however (see Chapter 12), this improvement won't occur only if investments are equal, saving, not on both. How might intervention affect national saving and domestic investment?

10. Using the ZLB concept, analyze the output and balance of payments effects of an expansion shock.
Further Reading


Further Reading


Equilibrium in the Foreign Exchange Market with Imperfect Asset Substitutability

This appendix develops a model of the foreign exchange market in which risk factors may make domestic currency and foreign currency assets imperfect substitutes. The model gives rise to a risk premium that can explain the expected rate of return on domestic and foreign assets.\(^1\)

**Demand**

Because individuals derive many utilities in which their wealth may vary greatly from day to day, they decide to allocate wealth among different assets by looking at the likelihood of the resulting portfolio as well as the expected return it offers. Someone who puts his wealth entirely into British pounds, for example, may expect a high return but can be wiped out if the pound unexpectedly depreciates. A more sensible strategy is to invest in several currencies, even if some have lower expected returns than the pound, and thus reduce the importance of any one currency. By spreading risk in this way among several currencies, an individual can reduce the variability of his wealth.

Considerations of risk make it reasonable to assume that an individual's demand for interest-bearing domestic currency assets increases when the interest they offer \((R)\) rises relative to the domestic currency return on foreign currency assets \((R_f - R)\).

Put another way, an individual will be willing to increase the number of his portfolio by investing more heavily in domestic currency assets only if\(^2\) the interest rate on foreign assets exceeds the domestic interest rate.

We summarize this assumption by writing the individual's demand for domestic currency bonds, \(D_f\), as an increasing function of the rate of return difference between domestic and foreign bonds:

\[
D_f = a(R_f - R) + b(R_f - R)_E
\]

Of course, \(D_f\) also depends on other factors specific to individual \(i\), such as his wealth and income. The demand for foreign currency bonds can be negative or positive, and\(^3\) in the former case individual \(i\) is a net borrower in the home currency, that is, a supplier of domestic currency bonds.

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\(^1\) The Mechanical Exchange in Chapter 21 develops a microeconomic model of individual demand for risky assets.

\(^2\) The rate of return difference guaranteed.

\(^3\) For an individual with a positive demand for foreign currency bonds, the demand for domestic currency bonds is limited by the interest rate on foreign currency assets.
The Monetary Approach to the Balance of Payments

The close link discussed above between a country's balance of payments and its money supply suggests that fluctuations in central bank reserves can be thought of as the result of changes in the money stock. This method of analyzing the balance of payments is called the monetary approach to the balance of payments. The monetary approach was developed in the 1950s and 1960s by the International Monetary Fund's research department under Jacques J. Polak, and by Harry G. Johnson, Robert A. Mundell, and their students at the University of Chicago.1

The monetary approach can be illustrated through a simple model linking the balance of payments to developments in the money market. To begin, recall that the money market is in equilibrium when the real money supply equals real money demand, that is, when

\[ M/P = L(R, Y). \]  

(17A1-1)

Now let \( F^* \) denote the central bank's foreign assets (measured in domestic currency) and \( A^* \) its domestic assets (domestic credit). If \( p \) is the money multiplier that defines the relation between total central bank assets \( (F^* + A) \) and the money supply, then

\[ M = p(F^* + A). \]  

(17A2-2)

The change in central bank foreign assets over any time period, \( \Delta F^* \), equates the balance of payments (for a nonreserve currency country). By combining (17A1-1) and (17A2-2), we can express the central bank's foreign assets as

\[ F^* = (1/p)P(L(R, Y) - A). \]

If we assume that \( p \) is a constant, the balance of payments surplus is

\[ \Delta F^* = (1/p)P[L(R, Y)] = \Delta A. \]  

(17A3-3)

The last equation parameterizes the monetary approach. The first term on its right-hand side reflects changes in nominal money demand and with us that, all else equal, an increase in money demand will bring about a balance of payments surplus and an accompanying increase in the money supply that maintains money market equilibrium. The second term in

---

the balance of payments equation reflects supply factors in the money market. An increase in domestic credit raises money supply relative to money demand, all else equal. The balance of payments must go into deficit to reduce the money supply and restore money market equilibrium.

Because the balance of payments equals the sum of the current and (nonreserves) capital account surpluses (see Chapter 12), much of the economics literature that appeared before the monetary approach was developed explored balance of payments movements as the result of current or capital account changes. An important contribution of the monetary approach was to argue that in many situations, balance of payments positions result directly from imbalances in the money market and a policy solution that relies on monetary policy is therefore more appropriate. A large balance of payments deficit may be the result of excessive domestic credit creation. For example, even though this balance of payments deficit will generally involve deficits as both the current and private capital accounts, it would be misleading to view it as fundamentally due to an excessive fall in relative world demand for domestic goods or assets.

There are many realistic cases, however, in which a balance of payments analysis based on the monetary approach is misleading and possibly misleading as a guide to policy. Suppose, for example, that a temporary fall in foreign demand for domestic products does occur. This change will cause a fall in the national account and in the balance of payments, but these effects can be counteracted if the central bank takes reserve deposits of foreign currency.

Because output and then money demand fall, the monetary approach also predicts that a balance of payments deficit will either be reduced or even become a surplus. However, for policymakers to conclude that the balance of payments deficit is associated with a fall in money demand, a contraction of domestic credit is the best response. If the central bank is currently fixing the balance of payments, unemployment would remain high and might even rise.

While the monetary approach is an extremely useful analytical tool, it must be applied with caution in seeking solutions to macroeconomic problems. It is most useful for providing solutions to policy problems that are a direct result of flexible or untethered money demand or supply.

APPENDIX III TO CHAPTER 17

The Timing of Balance of Payments Crises

In the last half of the 1980s, balance of payments crises have been a rare and sudden event. In the current account, a balance of payments crisis is often defined as the point at which a country's current account deficit is unusually high. In some cases, a currency crisis may occur when a country's current account deficit is unusually high, but the country's central bank does not have the ability to finance the deficit through borrowing. In other cases, a currency crisis may occur when a country's central bank does not have the ability to finance the deficit through borrowing, but the country's government does not have the ability to finance the deficit through borrowing. In these cases, the foreign exchange market can be destabilized by a sudden and unexpected increase in the demand for foreign currency, leading to a sharp and sudden appreciation of the domestic currency.

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CHAPTER 17  Fixed Exchange Rates and Foreign Exchange Intervention

The market engages in speculative attacks and buys the remaining foreign reserve stock $F^*$ at time $T$, when the exchange rate $e^*$ equals the pre-crisis fixed exchange rate $e^*$. This forces the central bank to intervene to maintain the fixed exchange rate.

The foreign reserve stock $F^*$ falls as the exchange rate $e^*$ depreciates. The central bank purchases foreign currency to maintain the fixed exchange rate, thereby depleting its foreign reserve stock.

The foreign reserve stock $F^*$ is defined as:

$$F^* = e^*$$

which implies that if reserves suddenly drop to zero at time $T$, the exchange rate remains initially at its pegged level, and only subsequently falls upward.

The loss of any reserves initially in the exchange rate, either upward or downward, reduces the possibility for arbitrage (described above): that prevents speculative attacks at times $T^*$ or $T^*$. In addition, the money market remains in equilibrium at time $T$, even though the exchange rate's drift is not zero. Two factors offset each other exactly. As the reserves drop sharply to zero, the money supply falls (see equation (17.21)). We also note that at the moment fixed exchange rate is abandoned, people will expect the currency to begin depreciating over time. The domestic interest rate $i^*$ will therefore move upward to maintain interest parity, and this change reduces real money demand is line with the fall in the real money supply.
We have therefore tried to stress the exact date on which a balance of payments crisis forces the authorities off the fixed exchange rate. New work again that in our example, a crisis must occur at some point because preventive monetary policy made one inevitable. The fact that a crisis occurs while the central bank's foreign reserves are still positive might suggest to uninterested observers that ill-founded market sentiment is leading to a premature panic. This is not the case here. The speculative attack we have analyzed is the only outcome that does not confound market participants with arbitrage opportunities. There are alternative self-fulfilling crises models, however, in which attacks can occur even when the exchange rate could have been sustained indefinitely in the absence of an attack.

\*Our finding that reserves fell in a single attack comes from our assumptions that the market can foresee perfectly the future course of events, and that trading takes place continuously. However, in more limited cases, sudden reversals are more probable, causing a cascade of "speculative" currency disequilibria prior to the final depletion of foreign reserves. Each of these speculative attacks would be similar in the type of crisis described in this chapter.

PART 4
International Macroeconomic Policy
CHAPTER 18
The International Monetary System, 1870–1973

In the previous two chapters we saw how a single country can use monetary, fiscal, and exchange rate policies to change the levels of employment and production within its borders. Although the analysis usually assumed that macroeconomic conditions in the rest of the world were not affected by the actions of the country we were studying, this assumption is not, in general, a valid one. Any change in the home country’s real exchange rate automatically implies an opposite change in foreign real exchange rates, and any shift in overall domestic spending is likely to change domestic demand for foreign goods. Unless the home country is significantly small, developments within its borders affect macroeconomic conditions abroad and therefore complicate the task of foreign policymakers.

When the world is not isolated, the Keynesian model of international macroeconomic policy-making and performance during the period of the gold standard era (1870–1914), the interwar period (1919–1939), and the post-World War II years during which exchange rates were fixed under the Bretton Woods agreements (1946–1973).

In an open economy, macroeconomic policy has two basic goals, internal balance (full employment with price stability) and external balance (avoiding excessive imbalances in international payments). But the country cannot achieve its internal payments position without automatically causing an opposite change in equal magnitude in the payments position of the rest of the world. One country’s pursuit of its macroeconomic goals inevitably influences how well other countries attain their goals. The goal of external balance therefore substitutes a new criterion in policy actions taken abroad may change the economy’s position relative to the position it government prefers.

Throughout the period 1870–1973, with its various international currency arrangements, how did countries achieve internal and external balance, and how successful were they? Did policymakers worry about the foreign repercussions of their actions, or did they adopt national aggregates that were self-deluding for the world economy as a whole? The answers to these questions depend on the international monetary system in which the countries operated.

Macroeconomic Policy Goals in an Open Economy

In open economies, policymakers are motivated by the goals of internal and external balance. Simply defined, internal balance requires the full employment of a country’s resources and domestic price level stability. External balance is attained when a country’s current account is neither in excess nor in deficit. The country may be unable to repay its foreign debts in the future, its future surplus in surplus countries must be put in this position.

In practice, neither of these definitions captures the full range of possible policy concerns. Along with full employment and stability of the overall price level, for example, policymakers may have a particular domestic distribution of income as an additional internal target. Depending on exchange rate arrangements, policymakers may worry about swings in balance of payments accounts other than the current account. To make matters even more complicated, the line between internal and external goals can be fuzzy. How should one classify as an employment target for export promotion, for example, when export growth influences the economy’s ability to repay its foreign debts?

The simple definition of internal and external balance given above, however, captures the goals that most policymakers share regardless of the particular economic environment. We therefore organize our analysis around these definitions and discuss possible additional aspects of internal or external balance when they are relevant.

Internal Balance: Full Employment and Price-Level Stability

When a country’s productive resources are fully employed and its price level is stable, the country is in internal balance. The wage and price level that occur when resources are underemployed is a clear. If a country’s economy is "overshadowed" by foreign economies, however, none of these definitions adequately describes the situation. For example, workers in one country might prefer to be working less and enjoying leisure, but their country requires them to put in longer hours during periods of high demand. This影响 is that are being worked more intensely than usual will tend to suffer more frequent breakdowns and in expectation more quickly.

Under- and overemployment also lead to general price-level movements that reduce the economy’s efficiency by making the real value of the monetary unit less constant and thus a less useful guide for economic decisions. Since domestic wages and prices rise when the demand for labor and output exceeds full-employment levels, and fall in the opposite case, the government tries to preserve substantial or movements as aggregate demand relative to its full-employment level to maintain a stable, predictable price level.

Inflation or deflation can occur even under conditions of full employment, of course, if the expectations of workers and firms about future monetary policy lead to an upward or downward wage-price spiral. Such a spiral can continue, however, only if the central bank allows expectations through continuing injections or withdrawals of money (Chapter 14). One particularly drastic effect of an available price level is its effect on the real value of foreign contracts. Because bases tend to be denominated in the same currency, unexpected price level changes cause income to be reclassified between creditors and debtors. A sudden increase in the U.S. price level, for example, makes those with dollar debts better off, since the money they owe to lenders is now worth less in terms of goods and services. At the same time, the price-level increase makes creditors worse off. Because such accidental
CHAPTER 18 The International Monetary System, 1970–1975

Most generally, we may think of current account initiatives as providing another example of how countries gain from trade. The trade involved is what we have called international trade; that is, the trade of commodities over time (Chapter 7). As countries with differing abilities to produce goods at a single price in time gain from concentrating their production on what they do best and trading, countries can gain from concentrating the world’s investment in those economies that are able to net current output into future output. Countries with weak investment opportunities should receive some of their invested savings from countries with more productive investment opportunities. For another way, countries where investment is extremely productive should not expect their current account surplus, while countries where investment is relatively productive should be the importers of current output (and have current account deficits). To pay off their foreign debts when the investments mature, the latter countries export output to the former countries and thereby complete the exchange of present output for future output.

Considerations may also justify an unbalanced current account. A country whose currency drops temporarily (for example, because of an unusually bad crop failure) may wish to borrow from foreigners to avoid the sharp temporary fall in its consumption that would otherwise occur. In the absence of this borrowing, the price of present output in terms of future output would be higher in the low-output country than abroad; so the import-excess trade that eliminates this price difference leads to trade surplus.

Initiating that all countries be in current account equilibrium makes no allowance for those important gains from trade ever time. Thus, any policy maker would want to adopt a balanced current account as a policy target appropriate in all circumstances.

As a given point, however, policymakers generally adopt some current account target as an objective, and the country achieves its external balance goal. While the precise level of the current account is generally not set, the government usually strives to avoid excessive large and rapid changes in the current account. For example, excessive and rapid changes in the current account are associated with balance of payments problems and deficits unless they are consistent with the economy’s growth potential.
CHAPTER II The International Monetary System, 1970–1973

The gold standard period between 1870 and 1914 was based on the idea that international macroeconomic policy very different from those that have followed the basis of international monetary arrangements in the second half of the twentieth century. Nevertheless, the period warrants attention because subsequent attempts to reform the international monetary system on the basis of fixed exchange rates can be viewed as attempts to build on the experience of the gold standard while avoiding its weaknesses. Some of these strengths and weaknesses were discussed in Chapter I. This section looks at how the gold standard functioned in practice before World War I and discusses how well it was designed to ensure stability of national and external balance.

Origins of the Gold Standard

The gold standard had its origin in the use of gold coins as a medium of exchange, unit of account, and store of value. While gold has been used in this way since ancient times, the gold standard as a legal tender law was passed in 1819, when the British Parliament passed the Bank of England Act—dissolved by the Bank Act of 1836. Finally, domestic investment by any firm may have beneficial technological spillover effects on other domestic producers that the investing firm does not capture.

External Balance Under the Gold Standard

Under the gold standard, the primary responsibility of a central bank was to preserve the official parity between its currency and gold; to maintain this parity, the central bank needed an adequate stock of gold reserves. Policymakers therefore viewed external balances not in terms of a central account target but in terms of the amount of gold that a country held abroad. A country's gold reserves, however, were not a pure balance of payments surplus and foreign exchange reserves. Foreign exchange reserves included gold held abroad, the sum of the current account balance, the capital account balance, and the reserve compensatory common of the financial account balance.
or deficit in the balance of payments had to be financed by gold shipments between central banks? To avoid large gold movements, central banks adopted policies that pushed the reserve component of the financial accounts surplus (or deficit) into line with the ideal current surplus (or deficit). A country is said to be in balance of payments equilibrium when the sum of its current, capital, and reserve financial accounts equals zero, so that the current account surplus/deficit $S$ is financed entirely by international lending without reserve movement.

Many governments took capital controls aimed at stabilizing the current account. Britain's current account surpluses averaged 5.7% of GDP, a figure that is remarkably high by pre-1945 standards. Today, a current account/GDP ratio this high would suggest a balance of payments crisis. Several borrowing countries, however, did experience difficulty at one time or another in paying their foreign debts. Perhaps because Britain was the world's leading exporter of international economic theory as well as capital during these years, the economic writing of the gold standard era places little emphasis on problems of current account adjustment.1

**The Price-Specie-Flow Mechanism**

The gold standard consists of powerful automatic mechanisms that contribute to the simultaneous achievement of balance of payments equilibrium by all countries. The most important of these, the price-specie-flow mechanism, was recognized by the eighteenth-century Swiss physician and poet Friedrich von Schiller, who wrote in 1757:

> The price-specie-flow mechanism in action:

Suppose you are in the position of central banks to be in equilibrium in a single commodity and capital accounts on an international scale. The excess of payments on commodity exports over payments on commodity imports must be equal to the excess of payments on capital exports over payments on capital imports. The excess of payments on commodity exports over payments on commodity imports plus the excess of payments on capital exports over payments on capital imports equals the sum of the excess of payments on commodity imports over payments on commodity exports and the excess of payments on capital exports over payments on capital imports.

**The Gold Standard "Rules of the Game": Myth and Reality**

The price-specie-flow mechanism could operate automatically under the gold standard to bring current and capital accounts into line and eliminate international gold movements. But the restrictions on central banks' gold flows across their borders forestalled another potential mechanism to help restore balance of payments equilibrium. Central banks that were persistently losing gold faced the risk of becoming insolvent to meet their obligations to 3.2.2. The restored flow of gold to the reserves of the central bank to which it is due would be sufficient to restore the balance of payments equilibrium.

Agar, suppose that all the gold in Great Britain were shipped to India in a single commodity and capital accounts on an international scale. The excess of payments on commodity exports over payments on commodity imports must be equal to the excess of payments on capital exports over payments on capital imports. The excess of payments on commodity exports over payments on commodity imports plus the excess of payments on capital exports over payments on capital imports equals the sum of the excess of payments on commodity imports over payments on commodity exports and the excess of payments on capital exports over payments on capital imports.

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Internal Balance under the Gold Standard

By fixing the prices of currencies in terms of gold, the gold standard aimed to link monetary growth in the world economy and thus to ensure stability in world price levels. While price levels without gold standard countries did not rise as much between 1870 and 1914 as they did later, the rate of price increase after World War I, national price levels moved upward considerably over many countries in periods of inflation and deflation followed each other. The gold standard's standard record on price stability suffered a problem discussed in the last chapter, change in the relative prices of gold and other commodities.

In addition, the gold standard did not seem to work much to assure full employment.

The U.S. unemployment rates averaged 2.8 percent between 1890 and 1913, but averaged over 5 percent between 1940 and 1942.

A fundamental cause of short-term instability under the pre-1914 gold standard was the substitution of economic policy to search for solutions. Before World War I, governments had removed responsibility for maintaining internal balance as in Europe, but the United States, the leading economic power, led to political opposition to the gold standard, as the Case Study below explains. The importance of internal policy objectives increased after World War I, because of the worldwide economic instability of the interwar years, 1918-1939. And the unsustainability apparent consequence of attempts to sustain the gold standard after 1918 helped undo the thinking of the architects of the pre-World War I system adopted after 1914. To understand how the grand design of the international monetary system worked to reconcile the goals of international and national economics, we can examine the economic events of the period between the two world wars.

CASE STUDY

The Political Economy of Exchange Rate Regimes

Our examination of Chapter 17, the United States had a domestic monetary standard until the Civil War, with both silver and gold in circulation. Once war broke out the country moved to a paper currency (called the "greenbacks") and a floating exchange rate, with a 79 percent gold ratio.

Note on the gold ratio (or gold content of currency) is based on the currency standard in the 19th century, which was the gold 100. Exchange rate policies are discussed in later chapters.

Note on price levels net gains in the U.S. economy are adapted for the same source. Costs should be read to include inflation and out of production costs in the price levels. A critical study of the 1933-1934 U.S. employment data is in the "Great Depression," a case study of the U.S. economy in the 1930s. A critical study of the 1933-1934 U.S. employment data is in "The Great Depression: A Case Study."
PART 4 International Macroeconomic Policy

The Intarwar Years, 1918-1939

Governments effectively suspended the gold standard during World War I and financed part of their massive military expenditures by printing money. Further, labor force and productive capacity had been reduced sharply through war losses. As a result, price levels were higher everywhere at the war’s conclusion in 1918.

Several countries experienced runaway inflation in their governments attempted to aid the reconstruction process through public expenditures. These governments financed their purchases simply by printing money, “...and they sometimes fed through the war...”

The result was a sharp rise in money supplies and price levels.

The German Hyperinflation

The most celebrated episode of inflationary inflation is the German hyperinflation during which Germany’s price index rose from a level of 71 in January 1923 to a peak of 16,200,000,000,000 in December 1923—a factor of 4.815 billion. The Weimar Treaty ending World War I saddled Germany with a huge burden of reparations payments to the Allies. Rather than raising taxes to meet these payments, the German government ran printing press. The inflation accelerated most dramatically in January 1923 when France, citing German payments violation of the Treaty, sent its troops into Germany’s industrial heartland, the Ruhr. German workers were on strike to protest the French occupation, and the German government supported their actions by issuing even more money to pay them. Within the year, the price level rose by a factor of 473 trillion, 386 billion. Under these conditions, people were unwilling to hold the German currency, which became all but useless.

The hyperinflation was ended toward the end of 1923 when Germany issued a currency reform, obtained some relief from its reparations burden, and moved toward a balanced government budget.

The Floating Return to Gold

The United States returned to gold in 1919. By the early 1920s, eastern countries yearned increasingly for the comparative financial stability of the gold standard era. In 1922, at a conference in Genoa, Italy, a group of countries including Britain, France, Italy, and Japan agreed on a program calling for a general return to the gold standard and cooperative among central banks in attaining external and internal objectives. Realizing that gold supplies might be insufficient to meet current needs, demands for international reserves (a problem of the gold standard noted in Chapter 17), the Genoa Conference sanctioned a partial gold


"Gold would have been ineffective in helping farmers and miners. A depression of the U.S. dollar, however, promised to raise the dollar prices of primary products relative to the prices of manufactured goods. Through a careful analysis of Congressional voting in bills relating to the monetary system, Friedman showed that the Legislative power for silver was retaken to state levels but was limited heavily correlated with state employment in agriculture and mining."
CHAPTER 18 The International Monetary System, 1870-1973

Economy disintegrated into increasingly severe (but in self-sustaining) national crises in the early 1930s. In the face of the Great Depression, many countries had resolved the choice between external and internal balance by curtailing their lending links with the rest of the world and eliminating, by government decree, the gold standard and the convertibility of their currencies. But this path, by minimizing the gains from trade, imposed high costs on the world economy and contributed to the slow recovery from the depression, which is many countries was still incomplete in 1939. All countries would have been better off in a world of free international trade, and the international cooperation that helped each country preserve its external balance and financial stability without sacrificing its national goals was crucial to the stabilization that inspired the blueprint for the postwar international monetary system, the Breton Woods agreement.

CASE STUDY

The International: Gold Standard and the Great Depression

One of the most intriguing features of the acute-long Great Depression that started in 1929 was its global nature. Rather than being confined to the United States and its main trading partners, the downturn spread rapidly and profoundly to Europe, Latin America, and elsewhere. What explains the Great Depression's nearly universal scope? Recent scholarship shows that the international gold standard played a central role in starting, deepening, and spreading the twentieth century's greatest economic crisis.2

In 1929 most market economies were once again on the gold standard. At the same time, however, the United States, attempting to lower its overburdened economy through monetary contraction, and France, having just ended an inflationary period and returned to gold, faced large capital inflows. Through the resulting balance-of-payments surpluses, both countries were absorbing the world's monetary gold at a startling rate. By 1932 the two countries alone held more than 70 percent of the world's gold. Other countries on the gold standard had no choice but to engage in domestic asset sales if they wished to conserve their shrinking gold stocks. The resulting worldwide monetary contraction, coinciding with the shock waves from the October 1929 New York stock market crash, sent the world into deep recession.

Widespread bank failures around the world only accelerated the world's downward economic spiral. The gold standard again was a key culprit. Many countries desired to expand their gold reserves in order to be able to remain on the gold standard. This often heuristically increased their gold reserves from providing banks with the liquidity that might have allowed the banks to stay in business.

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After all, any cash provided to banks by their home governments would have increased potential prime claims to the government's precious gold holdings. 1 Perhaps the clearest evidence of the gold standard's role in the contrasting behaviors of output and the price level in countries that left the gold standard relatively early, such as the United Kingdom, and those that stubbornly hung on. Figure 18-1 plots 1935 industrial production levels relative to their 1939 values against 1935 wholesale price indices relative to their 1929 values for a number of countries. Countries that abandoned the gold standard freed themselves to adopt more expansionary monetary policies that limited or prevented both domestic deflation and output contractions. Thus, Figure 18-1 shows a strong positive relationship between price level and output changes over 1929-1935. The countries with the highest deflations and output contractions include France, Switzerland, Belgium, the Netherlands, and Poland, all of which exited the gold standard until 1936.

The Bretton Woods System and the International Monetary Fund

In July 1944 representatives of 44 countries meeting in Bretton Woods, New Hampshire, drafted and signed the Articles of Agreement of the International Monetary Fund (IMF). Even in the war context, agreement in the Allied countries was lacking about the economic needs of the peace world. Recognizing the disastrous economic events of the interwar period, they hoped to design an international monetary system that would foster full employment and price stability while allowing individual countries to maintain external balance without imposing restrictions on international trade. 2

The system set up by the Bretton Woods agreement called for fixed exchange rates against the U.S. dollar and an averaging dollar price of gold—$35 an ounce. Member countries held their official international reserves largely in the form of gold or dollar assets and had the right to sell dollars in the Federal Reserve for gold at the official price. The system was thus a gold exchange standard, with the dollar as the principal reserve currency. In the terminology of Chapter 17, the dollar was the "SIT currency" in terms of which the $-1 exchange rates of the system were defined. The United States itself interested only narrowly in the foreign exchange market. Usually, the $-1 foreign currency bonds


2The conference was originally called a "money conference," the World Bank, whose goals were to help the developing nations that shrank and to help the former colonial countries to start and maintain trade. Only in 1947 was the General Agreement on Tariffs and Trade (GATT) established as a forum for the multinational reduction of trade barriers. The GATT was at the outset of this measure of its interest in promoting, (NO), whose goal was the same that would parallel those of the IMF in that forum. Instead, the IMF was governed by the United States, which held in the hands of the IMF, and the GATT became the organization. WTO Trade Organizations (WTO).

In 1895 Indonesia was one of the United States was responsible in theory for fixing the dollar price of gold.

Goals and Structure of the IMF

The IMF Articles of Agreement were heavily influenced by the international experiences of financial and price level instability, unemployment, and international economic integration. The articles tried to avoid repetition of those events through a mixture of discipline and flexibility. The major discipline on monetary management was the requirement that exchange rates be fixed to the dollar, which, in turn, was tied to gold. If a currency broke the Federal Reserve's precious monetary expansion, it would lose international reserves and eventually become unable to maintain the fixed dollar exchange rate of its currency. Since high U.S. monetary growth would lead to dollar abandonment by foreign-credit banks, the Fund itself was committed in its monetary policies by its obligation to defend those dollars for gold. The official gold price of $35 an ounce served as a further brake on American monetary policy, since that price would be pushed upward if too many dollars were created. Fixed exchange rates were viewed as more than a device for imposing monetary discipline
PÄRT 4 International Macroeconomic Policy

on the system, however. Rightly or wrongly, the interwar experience had convinced the Fund's authorities that finding exchange rates were a case of spontaneous instability and were harmful to international trade.

The interwar experience had also shown that national governments would not be willing to maintain both free trade and fixed exchange rates at the price of long-term domestic disequilibria. After the experience of the Great Depression, governments were widely viewed as responsible for maintaining full employment. The IMF Agreement intended to incorporate sufficient flexibility to allow countries to stem capital outflows (or an orderly introduction of speculative interventions) in response to unforeseen international or domestic events.

Two main features of the IMF Articles of Agreement helped promote this flexibility in external adjustment:

1. Sterling convertibility. The IMF Article 9 dealt with the mandatory conversion of sterling into gold under certain conditions, which included the maintenance of full empl

2. Adjustable parities. Although most countries' exchange rate was fixed, it could be changed—deviated or revalued—under the agreement that the country's balance of payments was in a situation of "fundamental disequilibrium." The term "fundamental disequilibrium" was not defined in the Articles of Agreement, but the clauses were meant to cover situations that required permanent changes in the demand for their products. Without deviation, such a country would experience higher unemployment and a higher current account deficit until the domestic price level fell enough to ensure internal and external balance. A deviation, on the other hand, could simultaneously improve employment and the current account, thus enabling a longer and painful adjustment process during which international reserves might in any case run out. Recognizing Britain's experience with an unwieldy exchange rate after 1925, the IMF's founders built in the flexibility of (temporarily) imperfectly adjustable rates.

The system was operational, however, in the "7th century" of the Bretton Woods system, the U.S. dollar's standard.

Conversely

Just as the general instability of national economics eliminated the costs of being within a single economy, the use of national currencies in international trade makes the overall economy function more efficiently. To prevent efficient multilateral trade, the IMF Articles of Agreement seek to ensure convertibility in the form of dollar convertibility, which is the centerpiece of the Bretton Woods system.
United States, the issue of the principal reserve currency, was a major concern that led to proposals to reform the system.

The Changing Meaning of External Balance

In the first decade of the Brunei Woods system, many countries ran current account deficits as they reconstructed their war-time economies. Since the main external problem of these countries, taken in a group, was to acquire enough dollars to finance necessary payments from the United States, these years often called the period of “plutocratic short-termism.” The United States helped link the countries to the dollar system through the Marshall Plan, a program of dollar grants from the United States to European countries initiated in 1948.

Individually, each country’s overall current account deficit was limited by the difficulty of borrowing any foreign currency in an environment of heavily restricted financial sector transactions. With virtually no private capital movements, current account imbalances had to be financed almost entirely through official reserve transactions and government loans. (The overall current plus capital account deficit equals the sum of the private and official financial account surpluses.) Without access to foreign credits, countries could therefore run current account deficits only if their central banks were willing to reduce their foreign exchange reserves. Central banks were unwilling to lose reserves, but low levels, in part because their ability to fix the exchange rate would be endangered.

The pressures of remembrance in 1958 gradually began to change the nature of policymakers’ external constraints. As foreign exchange trading expanded, financial markets in different countries became more tightly integrated—an important step toward the creation of today’s worldwide foreign exchange market. With growing opportunities to move funds across borders, national interest rates became more closely linked and the speed with which policy changes might cause a country to lose or gain international reserves increased. After 1958, and increasingly over the next 15 years, central banks had to be more attentive to foreign financial conditions or the risk that sudden reserve losses might leave them without the resources needed to peg exchange rates. Fixed with a sudden rise in foreign interest rates, for example, a central bank would be forced to sell domestic assets and raise its domestic interest rate to hold its international reserves steady.

The restriction of convertibility did not result in immediate and complete international financial integration, as measured in the model of fixed exchange rates set out in Chapter 17. On the contrary, most countries continued to maintain restrictions on financial access transactions, as noted above. But the opportunity for disguised capital flows increased dramatically. For example, imports within a country could effectively purchase foreign assets by receiving payments to foreign suppliers in actual shipments of goods; they could effectively borrow from foreign suppliers by deferring payments. These real practices—known, respectively, as “laissez” and “laisser”—provided two of many ways through which official barriers to private capital movements could be evaded. Even though the conditions of international interest rate equality assumed in the last chapter did not hold exactly, the links among countries’ interest rates tightened in the Brunei Woods system.

Speculative Capital Flows and Cries

Current account deficits and surpluses took on added significance under the new conditions of increased private capital mobility. A country with a large and persistent current account deficit might be expected of being in a “fundamental disequilibrium” under the IMF Arrangements of Agreement, and thus to face a currency devaluation. Suspicion of an impending devaluation could, in turn, trigger a balance of payments crisis (see Chapter 17).

Anyone holding a dollar in a devaluation of the pound, for example, would suffer a loss, since the foreign currency value of pound assets would decrease suddenly by the amount of the exchange rate change. If Britain had a current account deficit, therefore, holdings of pounds would become more and would shift their wealth into other currencies. To hold the pound’s exchange rate against the dollar pegged, the Bank of England would have to buy pounds and supply the foreign asset the market participants wanted to hold. This loss of foreign reserves, if large enough, might force a devaluation by letting the Bank of England without enough reserves to peg the exchange rate.

Similarly, countries with large currency account surpluses might be viewed by the market as conditions for revival. In this case their central banks would find themselves swamped with official reserves, the result of selling the home currency to finance the exchange market to keep it from appreciating. A country in this position would face the problem of having to reduce supply growth accordingly, a development that could push the price level up and upon internal balance.

Balance of payments crises became increasingly frequent and violent throughout the 1960s and early 1970s. A serious British trade balance deficit in early 1963 led to a period of renewed speculation against the pound that compelled British policy-making until November 1967, when the pound was finally devalued. France declared its franc and Germany revealed its deutschemark in 1969 after similar speculative attacks. These crises became so massive by the early 1970s that they eventually brought down the Brunei Woods system of fixed exchange rates. The events leading up to the system’s collapse are covered later in this chapter.

The possibility of a balance of payments crisis thus represented the external goal of a current account target. Even current account imbalances justified by differing international investment opportunities or caused by poorly temporary forces might fuel market suspicions of an impending parity change. In this environment, policymakers had additional incentives to avoid sharp current account changes.

Analyzing Policy Options under the Brunei Woods System

To describe the problems an individual country (perhaps the United States itself) faced in running internal and external balance under the Brunei Woods system of fixed exchange rates, let’s return to the framework used in Chapter 17. Assume that domestic ($D$) and foreign ($F$) interest rates are always equal. $R = 0$.

As noted above, this equality does not fit the Brunei Woods facts exactly (particularly just after 1958), but it leads to a fairly simple symmetric of the external constraints that policymakers then faced in using their macroeconomic tools. The framework will show how a country’s position with respect to its internal and external goals depends on the level of its fixed exchange rate, $R$, and its fiscal policy. Throughout, $F$ is the domestic money price of the
Maintaining Internal Balance

First consider internal balance. If both \( P^* \) and \( I^* \) are permanently fixed, domestic inflation depends primarily on the amount of aggregate demand pressure in the economy. The demand for foreign exchange through the balance of international payments is on a permanent basis, and the demand for price goods on a temporary basis. Therefore, any increase in aggregate demand will cause the domestic inflation rate to rise, and vice versa.

Recall that aggregate demand derives from domestic output and the sum of consumption, investment, and government purchases. The expansion of the economy increases aggregate demand and causes inflation. Therefore, any increase in aggregate demand will cause the domestic inflation rate to rise, and vice versa.

Fiscal policy is the policy that affects the real economy, and it affects the economy's aggregate demand. The real economy is the economy's real output and its real labor force. Fiscal policy is the policy that affects the real economy, and it affects the economy's aggregate demand. The real economy is the economy's real output and its real labor force.

Fiscal policy is the policy that affects the real economy, and it affects the economy's aggregate demand. The real economy is the economy's real output and its real labor force. Fiscal policy is the policy that affects the real economy, and it affects the economy's aggregate demand. The real economy is the economy's real output and its real labor force.

The diagram shows what happens if the exchange rate and fiscal policy are used to maintain internal balance. The diagram shows what happens if the exchange rate and fiscal policy are used to maintain internal balance. The diagram shows what happens if the exchange rate and fiscal policy are used to maintain internal balance. The diagram shows what happens if the exchange rate and fiscal policy are used to maintain internal balance.

Maintaining External Balance

We have seen how fiscal policy or exchange rate changes can be used to influence output and help the government achieve its internal goal of full employment. How does the fiscal policy tool affect the exchange rate?

Fiscal policy is the policy that affects the real economy, and it affects the economy's aggregate demand. The real economy is the economy's real output and its real labor force. Fiscal policy is the policy that affects the real economy, and it affects the economy's aggregate demand. The real economy is the economy's real output and its real labor force. Fiscal policy is the policy that affects the real economy, and it affects the economy's aggregate demand. The real economy is the economy's real output and its real labor force.
Exchange rate, E

The diagram shows the exchange rate and its relationship to other economic variables. The exchange rate affects the balance of payments, and changes in the exchange rate can have significant implications for the economy. The currency is denominated in a given currency, and the exchange rate is determined by market forces. An appreciation of the currency makes imports more expensive and exports cheaper, while a depreciation makes imports cheaper and exports more expensive. The diagram also illustrates the concept of the monetary policy transmission channel, where changes in monetary policy affect the exchange rate and, in turn, the balance of payments.

[Diagram]

The diagram includes the following elements:
- The exchange rate (E)
- The balance of payments (BOP)
- The current account (CA)
- The capital account (KA)
- The monetary base (MB)
- The inflation rate (π)
- The output gap (Yg)

The diagram illustrates how changes in monetary policy and other economic variables affect the exchange rate and the balance of payments. For example, an expansionary monetary policy (increase in the money supply) leads to an appreciation of the currency, as the demand for domestic goods increases and the supply of foreign goods decreases. Conversely, a contractionary monetary policy (decrease in the money supply) leads to a depreciation of the currency, as the demand for foreign goods increases and the supply of domestic goods decreases. The diagram also shows the relationship between the exchange rate and other macroeconomic variables, such as inflation, output, and the balance of payments.
CHAPTER 18 The International Monetary System, 1870-1973

Pronoun, often of how much Bolivia's gold holdings were, helped bring down the gold standard by suddenly attempting to reduce its supply for gold.

One possible solution to the crisis was an increase in the official price of gold in terms of the dollar and other currencies. The ratio increase would have been inflationary and would have led to a politically acceptable consequence of catching the world's gold-producers countries. Further, an increase in gold's price would have caused central banks to expect further declines in the gold value of their dollar reserve holdings in the future, thus possibly worsening its confidence problem rather than solving it.

Triffin himself proposed a plan in which the IMF was to purchase currency, which central banks would hold as international reserves in place of dollars. According to the plan, the IMF would cause an increase in the exchange rate of international reserves in much the same way a central bank causes an analogous increase in the domestic money supply. In effect, Triffin's plan would transform the IMF into a world central bank.

The IMF had never been agreed upon the creation of the Special Drawing Right (SDR), an international reserve asset similar to the IMF's currency Triffin had envisioned. SDRs are used in transactions between central banks, but their creation had relatively little impact on the functioning of the international monetary system. Their impact was limited partly because by the late 1960s, the system of fixed exchange rates was beginning to show strains that would soon lead to its collapse. These strains were closely related to the special position of the United States.

CASE STUDY

The Decline and Fall of the Bretton Woods System

The system of fixed parities makes it difficult for countries to maintain simultaneous internal and external balance without a direct exchange between monetary systems. As capital movements and transfer flows across borders, however, it is virtually impossible for exchange rates to be changed at least in order to contain the financial crisis of 1969.

The Burke system's breakdown is the story of countries' unsuccessful attempts to reconcile internal and external balance within its order.

The Cahn Before the Storms: 1958-1965

In 1958, the year before the crisis was to be opened in Europe, the U.S. current account surplus fell sharply. In 1959 it turned into deficit. Although the current account improved in 1960 as the U.S. economy entered a recession, foreign central banks converted nearly $2 billion of their dollar holdings into gold that year, after having converted around $3 billion in 1958 and 1959. The year 1960 marked the end of the period of "dollar shortage" and the beginning of a period dominated by fears that the United States would lose the dollar's convertibility.

Triffin's plan was similar to one Keynes had outlined while the IMF was first being designed in the early 1940s. Keynes's thoughts were not adopted. However,

To read the full text, please refer to the original source.
On the whole, the period from 1961 to 1965 was a calm one for the United States, although some other countries, most notably Britain, faced serious problems. The U.S. current account surplus widened and the drain of large-scale repatriation of dollars into gold by foreign central banks receded. Continuing private capital outflows from the United States, which engendered the dollar crisis at foreign official sources, were, however, a source of concern to the Kennedy and Johnson administrations. Starting in 1965, therefore, the United States moved to discourage capital outflows by taxes on purchases of foreign stocks by Americans and other nations.

Early in this period, Germany faced a dilemma between internal and external balance that was to recur more dramatically toward the end of the decade. In 1960 Germany experienced an employment boom coupled with large inflows of international reserves. In terms of Figure 18-12, the German authorities found themselves in zone 1. Attempts to restrain the boom through conventional monetary policy only succeeded in reducing the Bundesbank's international reserves more quickly as the central bank was forced to sell DM to dollars to keep the DM from appreciating. A small reallocation of the DM (by 5 percent) in March 1961 showed the economy closer to internal and external balance than output growth slowed and the current account surplus declined. Although the system successfully avoided a major crisis in this case, this was just part due to the foreign exchange market's perception that the DM reallocation reflected German macroeconomic problems rather than American problems. This perception was in change over the next decade.

The Vietnam Military Buildup and the Great Society 1965-1968
Many economists view the U.S. macroeconomic policy package of 1965-1968 as a major blunder that helped unravel the system of fixed exchange rates. In 1965, government military purchases began rising as President Lyndon B. Johnson widened America's involvement in the Vietnam conflict. At the same time, other categories of government spending also rose dramatically as the president's "Great Society" programs (which included funds for public education and urban redevelopment) expanded. Figures 18-4a and 18-4c show how the growth rate of nominal government purchases began in 1961, more than 1960 and 1950. They sharply the next year. These increases in government expenditures were not matched by a price increase in since 1966 was an election year, and President Johnson was reluctant to invoke chronic congressional sensitivity of his spending by asking for a tax increase.

The result was a substantial fiscal expansion that helped on U.S. prices rising and caused a sharp fall in the U.S. current account surplus (Figures 18-4b and 18-3c). Although monetary policy (as measured by the growth rate of the money supply) initially turned contractionary as output expanded, the negative effect of the rising high-interest rates on the construction industry led the Federal Reserve to choose a more expansionary monetary course in 1967 and 1968 (Figures 18-4a). As Figure 18-4b shows, this further push to the domestic price level left the United States with an inflation rate of 2 percent per year by the end of the decade.

From the Gold Crisis to the Collapse 1968-1973
Early signals of future problems came from the London gold market. In late 1967 and early 1968 private speculators began buying gold in anticipation of a rise in its dollar price. It was thought at the time that the speculation had been triggered by the British government's decision in November 1967, but the sharp U.S. monetary expansion over 1967 and 1968 U.S. inflation probably influenced speculative volume as well. After massive gold sales by the Bank of England and European central banks, the Bank of England closed the gold market on March 15, 1968. Two days later the central banks announced the creation of a new dollar gold market that was to be open private and the other official. Private gold premium would continue in London gold market, but the gold price set there would be allowed to fluctuate. In contrast, central banks would continue to maintain with each other in the official rate at the official gold price of $35 an ounce.

The creation of the new dollar market was a turning point for the British Westway System. A prime goal of the gold exchange standard created at Breton Woods was to prevent inflation by tying down gold's dollar price. By availing the link between the supply of dollar and a fixed market price of gold, the central banks had instituted the system's built-in safeguard against inflation. The new arrangements did not eliminate the constraint on the United States altogether, because foreign central banks retained the right to purchase gold for dollars from the
CHAPTER 10 The International Monetary System, 1870-1973

The accretion of American inflation in the late 1960s, shown in Figure 14-1, was a worldwide phenomenon. Table 18-1 shows that by the end of the 1960s, inflation had also spread up to European economies. The theory in Chapter 17 predicts that when the domestic currency country speeds up its money growth, in the United States did in the second half of the 1950s, one effect is an automatic increase in monetary growth and inflation abroad in foreign central banks purchase the reserve currency to maintain their exchange rates and expand their money supplies in the process. One interpretation of the Bretton Woods system's collapse is that foreign countries were forced to import U.S. inflation through the mechanism described in Chapter 17. To stabilize their price levels and regain interest balance, they had to abandon fixed exchange rates and allow their currencies to float. How much this theory fits the present environment can be given in U.S. macroeconomic policies?

To understand how inflation can be imposed from abroad come exchange rates are adjusted, look again at the graphical picture of internal and external balance shown in Figure 16-2. Suppose the home country is in an inflationary gap above full employment. Above, however, 

18Many developing countries continued to peg it to the dollar but a number of European countries were continuing to try to maintain exchange rate on part of their internal arrangement called the "snake." As were the other currencies, the countries involved in the "snake" included a unit of currency, the escudo.

Worldwide Inflation and the Transition to Floating Rates

We can see that a dollar peg is not a long-term solution. It is more likely that the dollar will eventually float. Figure 15-2 shows the relationship between inflation and the dollar price level. A dollar peg is more likely to result in a higher inflation rate than a floating exchange rate. Therefore, if the U.S. government wants to reduce inflation, it should consider floating the dollar price level to a floating exchange rate. The benefits of floating the dollar price level include the following:

1. A floating exchange rate provides flexibility in adjusting to changes in the world economy.
2. A floating exchange rate reduces the risk of currency appreciation or depreciation.
3. A floating exchange rate allows for the free flow of capital.

However, floating the dollar price level has its drawbacks. The main drawback is that it can lead to higher inflation rates than a fixed exchange rate. Therefore, the U.S. government should consider floating the dollar price level only if it is confident that the world economy will remain stable.

The United States is one of the largest economies in the world and has a significant impact on the global economy. Therefore, a floating exchange rate can have a significant effect on the world economy. Therefore, the U.S. government should consider floating the dollar price level only if it is confident that the world economy will remain stable.
You can see how the two schedules shift by asking what would happen if the nominal exchange rate were to fall in proportion to the rise in P* in Figure 18-5. In this case, the real exchange rate would be unaffected (given P) and the money supply would remain in internal balance under an external balance of either of these conditions originally held. Figure 18-5 therefore shows that for a given initial exchange rate, a rise in P* shifts both the π and X curves (because of the same distance equal to the proportional increase in P* since the initial exchange rate). The intersection of the new schedule of π* and X* (point 2) lies directly below point 1. If the economy is in point 1, a rise in P* given fixed exchange rate and domestic price level, therefore means the economy is in point 1 with overemployment and an unacceptably high surplus in its current account. The factor that causes this situation is a real currency appreciation that shifts the domestic currency (P*P*) curve to the left because of P* rises. If nothing is done by the government, overemployment pushes up the pressure on the domestic price level, and this pressure gradually shifts the two schedules back to their original position. The schedule of shifting curve P has its root in properties of P*. At this stage the real exchange rate, employment, and the current account are at their initial levels, so point 1 is once again a position of internal and external balance.

The way to counter this real exchange rate shift is to revalue the currency (that is, lower E) and move to point 2. A revaluation reduces internal and external balance (without domestic inflation) by lowering the nominal exchange rate to offset the effect of the rise in P* on the real exchange rate. Only an expenditure-switching policy is needed to respond to a pure increase in foreign prices.

The rise in domestic prices that occurs when no revaluation takes place requires a rise in the domestic money supply, since prizes and the money supply move proportionately in the long run. The relationship that brings this rise about is foreign exchange intervention by the home central bank. As domestic output and prices rise after the rise in P*, the real money supply shrinks and the demand for real money holdings increases. To prevent the resulting upward pressure on the home interest rate from appreciating the currency, the central bank must purchase international reserves and expand the home money supply. In this way, inflationary policies pursued by the receiver center spill over into foreign countries’ money supplies.

The close association between U.S. and foreign inflation evident in Figure 18-4 and Table 18-1 suggests that some European inflation was imported from the United States. But the timing of the inflationary surge in different countries suggests that factors peculiar to

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**Table 18-1 Inflation Rates in European Countries, 1966–1972**

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**CHAPTER 18 The International Monetary System, 1870–1973**

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**Figure 18-1 The International Balance of a Rise in P* in the United States**

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**Note:** The behavior of one is in zone 1 (overemployment and an excessive surplus). Resolution (a fall in E) requires balance immediately by moving the policy vector to zero 2.

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individual economies also played a role. In Britain, for example, inflation speeds up markedly in 1968, the year following the pound's devaluation. Since we see in the last chapter) devaluation is neutral in the long run, it must cause the long-run domestic price level proportionately. The devaluation is probably part of the explanation for the rise in British inflation. Stabilization. Stabilization in France in 1968 led to large wage increases. A French-German currency crisis, and a devaluation of the franc in 1968. These events partly explain the sharp increase in French inflation in 1968–1969. The rise of imported inflation was greater in Germany, where the painful earlier experience with hyperinflation had made policymakers determined to keep price level increases.

Evidence on money supplies confirms that European and Japanese monetary growth accelerated in the late 1960s, as our theory predicts. Table 18-2 shows the evolution of the international reserve and money supply of West Germany over the years 1950–1972. The table shows how monetary growth rates dramatically after 1965 as the Bundesbank's international reserves expanded. This evidence is consistent with the view that American

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*P* is the balance of one is in zone 1 (overemployment and an excessive surplus). Resolution (a fall in E) requires balance immediately by moving the policy vector to zero 2.
inflation was imported into Germany through the Bundesbank's purchases of dollars in the foreign exchange market.

The acceleration of German money growth probably cannot be explained entirely as a direct consequence of the acceleration in U.S. monetary growth, however. A comparison of Figure 18-4 and Table 8-2 shows that German money growth accelerated by much more than U.S. monetary growth after 1960. This difference suggests that much of the growth in Germany's international reserves reflected speculative on a possible dollar devaluations in the early 1970s and the resulting shift by market participants away from dollar assets and into devalued mark assets.

U.S. monetary policy certainly contributed to inflation although its direct effect on prices and money may have been small. In fact, efforts to control monetary policy with a choice between fixed rates and inflationary stimuli. But the U.S. fiscal policy that helped make a dollar devaluation necessary contributed to foreign inflation by giving further magnification to speculative capital flows out of dollars. U.S. fiscal policy in the late 1960s must be viewed as an additional cause of the Bretton Woods system's demise.

Thus, the collapse of the Bretton Woods system was due, in part, to the limited macroeconomic power of the United States. But it was also due to the fact that the key specification of a fixed exchange rate system was that the trade balances of the participating countries be kept in balance by speculative capital flows out of dollars. U.S. fiscal policy in the late 1960s must be viewed as an additional cause of the Bretton Woods system's demise.

SUMMARY

1. In an open economy, policymakers try to maintain internal balance (full employment and a stable price level) and external balance (current account level that is neither

2. The gold standard system contains a powerful automatic mechanism for maintaining external balance, the price specie flow check. In the absence of gold standard, policies that influence the exchange rate can influence the money supply and thus lead to changes in the domestic economy. This system's performance in maintaining internal balance was mixed. However, with the collapse of World War I in 1914, the gold standard was abandoned.

3. Attempts to return to the prewar gold standard after 1919 were unsuccessful. As the world economy moved into a general depression after 1929, the mandated gold standard fell apart and international economic integration weakened. In this period, the United States and other countries attempted to maintain internal balance through voluntary agreements and to avoid the external balance problem by partially sharing their economic fortunes with the rest of the world. The result was a world economy in which all countries' situations could be furthered through international cooperation.

4. The architecture of the International Monetary Fund (IMF) helped to design a fixed rate exchange rate system that would encourage growth in international trade while making the requirements of external balance sufficiently flexible that they could be met without sacrificing internal balance. To this end, the IMF aimed to establish a system of fixed exchange rates and to allow exchange rate adjustments in conditions of "fundamental disequilibrium." All countries were committed to maintaining their exchange rates in the dollar. The United States pegged the dollar to gold and invited other countries to peg their currencies to the dollar.

5. After the currency convertibility was restored in Europe in 1958, countries' financial markets became more closely integrated, monetary policy became less effective (except for the United States), and movements between international reserves became more frequent. These changes revealed a new weakness in the system. To reach internal and external balance at the same time, exchange rate adjustments as well as monetary and fiscal policies were needed. But the possibility of preventing speculative attacks on fixed exchange rates (exchange market interventions) could give rise to speculation capital flows that undermined fixed exchange rates. As the main reserve currency country, the United States faced a unique external balance problem: the confidence problem that would arise if foreign official dollar holdings inevitably grew to exceed U.S. gold holdings.

6. U.S. macroeconomic policies in the late 1950s helped ease the breakdown of the Bretton Woods system by early 1973. Overzealous U.S. fiscal policy contributed to the need for a devaluation of the dollar in the late 1970s, and fears that this would occur furthered speculative capital flows out of dollars that could not compete for better returns in other currencies. Higher U.S. monetary growth fueled inflation at home and abroad, making foreign governments increasingly reluctant to continue importing U.S. inflation through fixed exchange rates. A series of international crises beginning in the spring of 1971 led to a collapse of the gold and dollar exchange rate system and the end of the Bretton Woods system.
PART 4 International Macroeconomic Policy

Key Terms
balance of payments equilibrium, p. 558
Brexit, p. 550
commercial policy, p. 558
economic policy, p. 554
exporters, p. 558
international monetary fund (IMF), p. 546
export-oriented strategy, p. 558
IMF stand-by agreement, p. 541
special drawing rights (SDR), p. 557

Problems
1. If you were in charge of macroeconomic policies in a small open economy, what qualitative effect would each of the following have on your target for external balance?
   a. Large deposits of reserves are discovered in the territory of your country.
   b. The world price of your main export good, copper, rises permanently.
   c. The world price of copper rises temporarily.
   d. There is a temporary rise in the world price of oil.
   e. Under a gold standard of the kind analyzed by Fisher, describe how balance of payments equilibrium between two countries, A and B, would be restored after a transfer of balance from A to B.
   f. In spite of the fall of the pre-1914 gold standard, exchange rate changes were rare. In contrast, such changes become quite frequent in the interwar period. Can you think of reasons for this change?
2. Under a gold standard, countries may adopt essentially consecutive monetary policies as all scramble in vain for a larger share of the limited supply of world gold reserves. Can the same problem arise under a reserve currency standard when bonds denominated in different currencies are all perfect substitutes?
3. A central bank that allows a fixed exchange rate may sacrifice its autonomy in setting domestic monetary policy. It is sometimes argued that when the central bank gives up the ability to set the currency policy to control the wage-price spiral. The argument goes as follows: Suppose workers demand higher wages and employers give in, but that the employees then raise output prices to counter their higher costs. Now the price level is higher and real balances are nominally fixed, so to prevent an interest rate rise that would depreciate the currency, the central bank must buy foreign exchange and expand the money supply. This action accommodates the initial wage demands with monetary growth and the economy moves permanently to a higher level of wages and prices. With a fixed exchange rate there is no way of keeping wages and prices down. What is wrong with this argument?
4. Economists have long debated whether the growth of dollar reserve holdings in the Eurozone years was "demand-determined" (that is, determined by central banks’ desire to add to their international reserves) or "supply-determined" (that is, determined by the speed of U.S. monetary growth). What would your answer be? What are the consequences for analyzing the relationship between growth in the stock of international reserves and worldwide inflation?

CHAPTER 18 The International Monetary System, 1973-1993

1. Is the central bank of a small country fixed in a risk in the 'world interest rate? What is the impact on its foreign exchange market? Does it have a positive or negative impact on the value of its currency? What measures can be taken to mitigate these effects?
2. How might restrictions on private financial account transactions affect the problem of stabilizing internal and external balance with a fixed exchange rate? What are the potential benefits of such restrictions?

Further Reading


CHAPTER 19 Macroeconomic Policy and Coordination

Macroeconomic Policy and Coordination under Floating Exchange Rates

As the Bretton Woods system of fixed exchange rates began to lose its grip, many economists recommended that countries allow currency values to be determined freely in the foreign exchange market. When the governments of the industrialized countries adopted floating exchange rates early in 1973, they viewed their step as a temporary emergency measure and were not consistently following the policies of the economists who argued for permanent floating-rate systems. So far, however, it has proved impossible to put the fixed-rate system back together again. The dollar exchange rates of the industrialized countries have continued to float since 1973.

The advocates of floating saw it as a way out of the conflicts between internal and external balance that often arise under the rigid Bretton Woods exchange rates. By the mid-1960s, however, economists and policymakers had become more skeptical about the benefits of an international monetary system based on floating rates. Some critics described the fixed-rate currency arrangements as an international monetary "nonsystem," a framework that national macroeconomic policies were frequently at odds. Many observers now think that the current exchange rate system is badly in need of reform.

Why has the performance of floating rates been so disappointing, and what direction should reform of the current system take? In this chapter we model fixed and floating exchange rates and examine their performance in the current macroeconomic policy problems of different exchange rate systems.

The Case for Floating Exchange Rates

As an international currency system, the floating rate system has several advantages over the Bretton Woods system. For example, a floating rate system can be used to adjust to changes in the foreign exchange market or fix rates would not only automatically ensure currency value flexibility but would also produce beneficial effects for the global economy. This case for floating exchange rates is based on three major claims:

1. Monetary policy autonomy. If central banks were no longer obliged to intervene in currency markets to fix exchange rates, governments would be able to use monetary policy to achieve internal and external balance. Furthermore, no country would be forced to import inflation (or deflation) from abroad.

2. Synergy. Under a system of floating rates, the inherent ties between the domestic and international economies would be weaker because the country could influence its exchange rate against foreign currencies.

3. Exchange rates as automatic stabilizers. Even in the absence of an active monetary policy, the shifts in demand and supply of exchange rates would help countries maintain internal and external balance in the face of changes in aggregate demand.

Monetary Policy Autonomy

Under the Bretton Woods fixed-rate system, countries other than the United States had little scope to use monetary policy to achieve internal and external balance. Monetary policy was neutralized by the mechanisms of floating rates (discussed in Chapter 17). A central bank under a fixed-rate system, for example, would have to worry about the domestic economy's response to changes in the foreign exchange market. The exchange rate was fixed in that part of the market the central bank could intervene directly to affect the foreign exchange market rate. The exchange rate was its primary instrument of monetary policy, and the central bank had the advantage of being able to intervene in the foreign exchange market.

Advocates of floating rates pointed out that the need to peg currency values would render monetary control over central banks. If, for example, the central bank faced unemployment and wished to expand the money supply in response, it would no longer be able to use interest rates to influence the economy. In contrast, the floating rate system would allow the central bank to pursue its own policies without worrying about the impact of its actions on other countries.

Advocates of floating rates also argued that floating rates would allow countries to choose their own desired long-term inflation rate rather than being constrained by higher inflation rates in other countries. This would give countries the freedom to choose their own inflation rates and avoid the cost of using floating rates. The floating rate system would allow countries to pursue their own policies without worrying about the impact of their actions on other countries.

In summary, floating exchange rates would allow countries to pursue their own policies without worrying about the impact of their actions on other countries. This would give countries the freedom to choose their own inflation rates and avoid the cost of using floating rates. The floating rate system would allow countries to pursue their own policies without worrying about the impact of their actions on other countries.
The asymmetry behind this insularity is particularly power parity (Chapter 15). Recall that when all changes in the world economy are invariant, PPP holds true in the long run.

Exchange rates essentially move in an exactly reverse proportion in a market where the balance of payments is equal to zero. PPP predicts that the long-run equilibrium price of the dollar will be fulfilled. This nominal exchange rate change leaves the real exchange rate between the dollar and DEM unchanged and thus maintains a constant and current balance. In other words, the long-run exchange rate change predicted by PPP is exactly the change that maintains Germany from U.S. inflation.

A monetary induced increase in U.S. prices also causes an innovation appreciation of foreign currencies against the dollar when the exchange rate is flexible. In the short run, the rise of this appreciation rate will raise the dollar exchange rate, but the foreign exchange speculators who might have reasoned an attack on fixed dollar exchange rates speed the adjustment of floating rates. Since they believe that the foreign currency will appreciate according to PPP in the long run, they act on their expectations and push exchange rates in the direction of their long-run levels.

Countries operating under the Bretton Woods rules were forced to choose between achieving U.S. inflation to hold their dollar must appreciate fixed rate is indiscriminately violating their currencies in proportion to the dollar in U.S. prices. Under floating, however, the foreign exchange market automatically brings about the exchange rate changes. American countries from U.S. inflation. Since this outcome does not require any government policy decisions, the resolution rates that occurred under fixed exchange rates are reduced.

Symmetry

The second argument put forward by the advocates of floating rates was that abandoning the Bretton Woods system would remove the asymmetries that caused so much international disagreement in the 1960s and 1970s. There were two main arguments, both the result of the dollar's current role in the international monetary system. First, because central banks pegged their currencies to the dollar and accumulated dollars at international reserves, the U.S. Federal Reserve's monetary policy in determining the world money supply and central banks abroad had little scope in determining their own domestic monetary supply. Second, any foreign country could defend its currency against the dollar in conditions of "fundamental disequilibrium." But the system's rules did not give the United States the option of deviating against foreign currencies. Thus, when the dollar was last devalued in December 1962, the United States would not have any special mechanisms to prevent its exchange rate with the exchange rate rises, its proponents argue, would do away with these asymmetries. Since countries would no longer peg dollar exchange rates or need to hold dollar reserves for this purpose, each would be in a position to guide monetary policies at home. For the same reason, the United States would not face any special problems in altering its exchange rate through monetary or fiscal policies. All countries' exchange rates

Exchange Rates as Automatic Stabilizers

The third argument is in favor of floating rates increased their ability, strenuously, to promote much more relatively price adjustments in certain types of economic changes. One such change, previously discussed, is foreign inflation. Figure 19-2, which uses the D-O-A model presented in Chapter 18, examines another type of change by comparing the economy's response under a fixed and a floating exchange rate to a temporary fall in foreign demand for its exports. A fall in demand for the home country's exports reduces aggregate demand for every level of the exchange rate, E, and so shifts the IS-LM schedule inward from IS1 to IS2 (recall that the 200 schedule shows exchange rate and output prices for which aggregate demand equals aggregate output). Figure 19-3 shows how this shift affects the economy's equilibrium when the exchange rate is fixed. Because the demand shift is measured in percentage, it does not change the long-run expected exchange rate and so does not affect the market equilibrium schedule A1. (Recall that the AD schedule shows exchange rate and output prices at which the foreign exchange market and the domestic money market are in equilibrium.)

The economy's short-run equilibrium is therefore at point 2, compared with the long-run equilibrium at point 1, the currency depreciates (E1 to E2) and output falls. Why does the exchange rate rise from E1 to E2? As demand and output fall, the interest rate demands for money, the home interest rate must also decline to keep the money market in equilibrium. This fall in the interest rates causes the domestic currency to depreciate in the foreign exchange market, and the exchange rate thereby rises from E1 to E2.

The effect of the latter rate increase demands under a fixed exchange rate is shown in Figure 19-1. Since the central bank must preserve the currency's depreciation, it reduces under a floating rate, the demand for money decreases, and the money supply and thus the relative foreign exchange rate falls. The net effect on the equilibrium exchange rate is shown in Figure 19-2.
The response in a fall in expected demand occurs in the shift from $D^0$ to $DD^1$ shifts under floating and fixed exchange rates. (a) With a floating rate, output falls only to $Y^2$ as the currency appreciation from $E^0$ to $E^1$ directly reduces the money supply (reflected in the shift from $AA'$ to $AA'1$).

Exported exchange rate $E^0$ also rises and $AA'$ shifts upward as a result. A permanent shock causes a greater depreciation than a temporary one, and the movement in the exchange rate therefore cushions domestic output more when the shock is permanent.

Under the Bretton Woods system, a fall in expected demand such as the one shown in Figure 19.6 would, if permanent, have led to a situation of "fundamental disequilibria" calling for a devaluation of the currency in a long period of domestic unemployment in export prices fall. Uncertainty about the government's intentions would have encouraged speculative capital inflows, further worsening the situation by deflecting central bank reserves and contracting the domestic money supply at a time of unemployment. Advocates of floating rates pointed out that the foreign exchange market would automatically bring about the required real currency depreciation through a movement in the nominal exchange rate. This exchange rate change would reduce the need to push the price level down through unemployment, and because it would occur immediately there would be no risk of speculative disruption, as there would be under a fixed rate.

The Case Against Floating Exchange Rates

The experience with floating exchange rates between the world wars had left many doubters about how they would function in practice if the Bretton Woods rules were scrapped. Some economists were skeptical of the claim advanced by the advocates of floating and predicted instead that floating rates would bring adverse consequences for the world economy. The case against floating rates rested on five main arguments:

1. Discipline. Central banks freed from the obligation to fix their exchange rates might embark on inflationary policies. In other words, the "discipline" imposed by individual countries by a fixed rate would be lost.

2. Destabilizing speculation and monetary disorder. Speculation on changes in exchange rates could lead to instability in foreign exchange markets and this instability, in turn, might have negative effects on countries' internal and external balances. Further, disharmonies in the home money markets could be more disruptive under floating than under a fixed rate.

3. Inefficiency in international trade and investment. Floating rates would make relative international prices more unpredictable and thus impair international trade and investment.

4. Unbalanced economic policies. If the Bretton Woods rules on exchange rate adjustments were abandoned, the door would be opened to competitive currency practices harmful to the world economy. As happened during the interwar years, countries might adopt policies without considering their possible negative spillover effects. All countries would suffer as a result.

5. The illusion of macroeconomic policy. Floating exchange rates would not really give countries more policy autonomy. Changes in exchange rates would have such pervasive macroeconomic effects that central banks would feel compelled to intervene heavily in foreign exchange markets even without a formal commitment to do so. Thus, floating would increase the uncertainty in the economy without really giving macroeconomic policy greater freedom.

Discipline

Propositions of floating rates argue they give governments more freedom in the use of monetary policy. The advocates of floating rates believed that floating rates would lead to lower interest rates. Fixed the rate is to worry about the absence of foreign reserves, governments might embark on excessive fiscal or monetary policies, falling into the inflation bias trap discussed in Chapter 16 (p. 455). Policies ranging from political objectives (such as stimulating the economy in time to win an election) to simple incompetence might set off an inflationary spiral. In the minds of those who made the discipline arguments, the German
CHAPTER 19 Macroeconomic Policy and Coordination

A rise in money demand (the shift from A to A') works exactly like a fall in the money supply causing the currency to appreciate to E2 and output to fall to Y'. Under a fixed exchange rate the central bank would prevent A' from shifting by purchasing foreign exchange and thus automatically offsetting the money supply to meet the rise in money demand.

Under a fixed exchange rate, however, the change in money demand does not affect the economy at all. To preserve the home currency from Appreciating, the central bank buys foreign reserves with domestic money still the real money supply rises, but as the increase in real money demand is offset by an increase in the reserve ratio, the rise is neutral in real money demand. This intervention has the effect of keeping A' in its original position, preventing any change in output or the price level. A fixed exchange rate therefore automatically stabilizes inflation in the domestic economy from affecting the economy. This is a powerful argument in favor of fixed rates of most of the countries that have the country came from the home money market (this is, if they result from shifts in A). But as we saw in the previous section, fixing the exchange rate will worsen macroeconomic performance if average output works that (is, shocks involving shifts in D) predominate.

Injury to International Trade and Investment

Critics of floating also point out that the changes in floating exchange rates would injure international trade and investment. Non-deterministic speculate that shifts in speculative demand could move currency reserves, which reduces price levels in the future and makes exporters more competitive. A more telling argument against floating rates is that it makes the economy more unstable than stock market. As the D-M-A model illustrates this point. The figure shows the effect of a rise in real money demand (A to A') on the real money market (A to A'). The rise in the real money demand causes the interest rate to fall. Because the lower level of income is negative, and the money supply falls, the exchange rate appreciates. As the exchange rate falls, the money supply increases, causing the interest rate to rise. This process continues until the exchange rate reaches its equilibrium level, E2. The exchange rate is now back to its original level, and the money supply is back to its original level. A rise in money demand works exactly like a fall in the money supply, and it is permanent, the exchange rate stabilizes at a new level, E2, where the money supply is the same as before the rise in money demand. The rise in money demand causes the interest rate to rise, and the exchange rate falls back to its original level.
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Macroeconomic Policy and Coordination

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Exchange Rates Experience Between the Oil Shocks, 1973–1980

While group was right, the advocates of floating rates or the critics of the Case Study and the next, we surveyed the experience with floating exchange rates since 1973 in an attempt to answer this question. To avoid false comparisons, however, it is best to look at the data that, as is often the case in economics, the data do not lead to a clear verdict. Although a number of predictions made by the critics of floating were borne out by subsequent events, it is also unclear whether a regime of fixed exchange rates would have survived the series of economic shocks that have shaken the world economy since 1973.

The First Oil Shock and Its Effects, 1973–1975

As the industrialized countries’ exchange rates were allowed to float in March 1973, an official group representing all IMF members was preparing plans to restore world monetary order. Forum in the fall of 1972, this group, called the “Hawks,” had been assigned the job of designing a new system of fixed exchange rates free of the asymmetries of Bentham Woods. By the time the committee issued its final “Outline of Reform” in July 1974, however, so upheaved in the world prosperity market had made an early referee to fixed exchange rates unthinkable.

Energy Prices and the 1974–1975 Recession

In October 1973 war broke out between Israel and the Arab countries. To protect support of Israel by the United States and the Netherlands, Arab members of the Organization of Petroleum Exporting Countries (OPEC), an international cartel including major oil producers, imposed an embargo on oil shipments to these two countries. Fearing more general disruptions in oil shipments, buyers bid up market oil prices to levels they tried to build speculative inventory. Encouraged by these developments in the oil market, OPEC countries began raising the prices they charged to their main consumers, the large oil companies. By March 1974 the oil price had quadrupled from its prewar price of $3 per barrel to $12 per barrel.

The massive increase in the price of oil raised the energy price index and the consumer prices of goods and services. In the operating costs of energy-using firms and also for the prices of nonenergy-petroleum goods, such as plastics. To understand the impact of these price increases, think of them as a large tax on oil imposed by the oil producers of OPEC. The oil shock had the same macroeconomist effect as a simultaneous increase in consumer and business taxes. Consumption and investment slowed down everywhere, and the world economy was thrown into recession.

The current account balance of oil-importing countries worsened.
The Acceleration of Inflation. The world as we developed in Chapters 13 through 17 predicts that inflation tends to run at higher and higher in expectation. As the world went into deep recession in 1974, however, inflation accelerated in most countries. Table 19-1 shows how inflation in the seven largest industrial countries moved upward in that year. A number of these countries inflation rates rose as much as doubling even though unemployment was rising. What happened? An important contributing factor was the oil shock itself. By directly raising the prices of petroleum products and the costs of energy-using industries, the increase in the oil price caused price levels to jump upward. Furthermore, the worldwide inflationary pressures that had built up since the end of the 1960s had become entrenched in the wage-setting process and were being transferred to consumers in spite of the deteriorating employment picture. The same inflationary expectations that were driving new wage contracts were also pushing upward pressure on commodity prices as speculators built up stocks of commodities whose prices they expected to rise.

Finally, the oil price shock, it seemed, would have been the only supply side shock affecting the world economy at the time. From 1972 on, a multitude of adverse supply disturbances pushed up prices upward and thus contributed to the general inflation. These supply disturbances included poor harvests in the United States and the Soviet Union; stormages of sugar and cocoa; and the mysterious disappearance of the Peruvian anchovies from their customary fishing grounds. Although you may think these anchovies are eaten only by consumers of pizza and Caesar salad, they are also important to farmers since they are used in the fish meal that is fed to livestock. The precocious drop in the anchovy catch led to sharp increases in the prices of competing feed grains (mostly corn and soybeans).

Stagflation. To describe the unusual macroeconomic conditions of 1974–1975, economists coined a new word that has since become commonplace: stagflation. A combination of stagnation and high inflation, stagflation was the result of two factors:

1. Increases in commodity prices that directly raised inflation while at the same time depressing aggregate demand and supply.

<table>
<thead>
<tr>
<th>Table 19-1</th>
<th>Inflation Rates in Major Industrial Countries: 1973–1979 (percent per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>6.2</td>
</tr>
<tr>
<td>Britain</td>
<td>9.2</td>
</tr>
<tr>
<td>Canada</td>
<td>7.6</td>
</tr>
<tr>
<td>France</td>
<td>7.5</td>
</tr>
<tr>
<td>Germany</td>
<td>6.9</td>
</tr>
<tr>
<td>Italy</td>
<td>10.8</td>
</tr>
<tr>
<td>Japan</td>
<td>11.2</td>
</tr>
</tbody>
</table>


2. Expenditures of future inflation that fed into wages and other prices in spite of recession and rising unemployment.

Even before the oil shock hit, the move to firmer rates had allowed the industrialized countries to adopt more restrictive monetary and fiscal policies aimed at containing the accelerating inflation. These initially restrictive policies helped dampen the 1976–1978 slump.

Reaching Internal and External Balance. The commodity shock hit most oil-importing countries much harder than the zero-sum country. The decline in oil prices began in 1973. Countries were in no position to give up the expenditure-switching advantages of exchange-rate-based and bond-money monetary policy with the goal of defending a fixed rate. This commitment to fixed rates would have been undermined by the growing fear that rising inflation was eroding the real value of the krona or the franc. Nor did many countries wish to increase the inflationary pressures that were driving current inflation. The inability to use exchange-rate-based monetary policy added to the dilemma of stagflation. The normal countercyclical responses of fiscal and monetary authorities were inadequate to combat stagflation.

How did countries use their policy tools to regain internal and external balance? As the recession deepened over 1974 and early 1975, most governments shifted to expansionary fiscal and monetary policies. In the seven largest industrial countries, monetary growth rates rose from between 1974 and 1975 as current rates turned to rising unemployment. As a result of these policy actions, a strong recovery was underway in most industrialized countries by the second half of 1975. At the same time inflation was falling (see Table 19-1). Unfortunately, however, the unemployment rates of industrialized countries failed to return to pre-recession levels even as output recovered.

The 1974 current account deficit of the industrial countries, taken as a group, turned into a surplus in 1975 and remained in surplus in 1976. The OPEC countries, which could not raise spending quickly enough to match their increased income, were running a substantial current-account surplus in 1975 and 1976, but that was reversed by the deficit of the oil-importing developing countries. Because the non-oil developing countries did not cut back on spending as sharply as industrial countries, GNP growth in developing countries as a group did not become negative in 1975, as it did in many developed countries. The developing countries focused their oil deficits in part by borrowing funds that the OPEC countries had deposited in the industrial countries' financial centers.

Most economists and policymakers viewed the international adjustment to the first oil shock as a success for floating exchange rates. Proof of the need to define a fixed exchange rate, such governments had chosen the monetary and fiscal responses that best suited their goals. The United States and Germany had even been able to reduce the capital controls they had set up before 1974. This relaxation eased the adjustment problems of the developing countries, which were able to borrow more easily from developed country financial markets to support their own spending and economic growth. In turn, the relative strength of the developing world's demand for industrial-country exports helped mitigate the severity of the 1974–1975 recession.

Revising the IMF's Charters, 1975–1976

Because floating rates had assumed too favorable a position in conditions of adversity, the governments of the industrialized countries acknowledged in 1975 that they were prepared to live with floating exchange rates for the indefinite future. Meeting at the Château de Rambouillet, near Paris, in the first of a series of annual economic summit meetings, leaders of the main industrial countries
called on the IMF to revise its Articles of Agreement to take account of the reality of floating exchange rates. The participating governments committed themselves to securing "sterilized fluctuations" in exchange rates but made no provision for a return to fixed prices.

In response to the Boeing-Boeing decisions, the IMF’s directors met in Kingston, Jamaica, in January 1976 to approve a revision of the fourth IMF Articles of Agreement, which opened exchange rate arrangements. The new Article IV implicitly endorsed floating rates by foreseeing each member country to choose exchange rate system it preferred. Governments were urged to follow macroeconomic policies that would promote price stability and growth, and they were to avoid "manipulating exchange rates ... to gain an unfair competitive advantage over other members." But most-developed countries were not placed on IMF members’ policies.

The extended Article IV called on the IMF to assist member countries’ exchange rate policies to ensure compliance with the new guidelines. Although this "acceleration" of exchange rate policies went beyond IMF conditionality in that it applied over countries not borrowing from the Fund, in practice was created to give the "real" shock in influencing member countries’ policies. In practice, therefore, the new article did no more than see what had already existed for nearly three years: a scheme of decontrolled policies-making in which each country pursued what is prescribed to its own interest.

**The Weak Dollar, 1976–1979**

As the recovery from the 1974–1975 recession slowed in late 1978 and the unemployment remained persistently high, the United States urged the two other industrial giants, Germany and Japan, to join in adopting monetary policies that would push the world economy out of its doldrums. Only at the G20 economic summit of July 1978 did Germany and Japan, less fearful of inflation than they had been two years earlier, agree to join the United States as "acceleration" of world economic growth. Until then, the United States had been attempting to get alone, and its policies, while easing a sharp drop in the U.S. unemployment rate (to 6.4 percent in 1978 from a recession high of 8.7 percent in 1975), had sparked inflation and pushed the U.S. current account into deficit. In contrast, inflation in Germany and Japan had reached relatively low levels by 1978 (see Table 19-1).

The result of this policy imbalance—vigorous expansion in the United States restrained by relatively sound policies in Europe and Japan—was a sharp depreciation of the dollar starting in 1978. The depreciation of the dollar in these years is shown in Figure 19.1, which shows both nominal and real effective exchange rates index of the dollar. These indexes measure, respectively, the price of a dollar in terms of a basket of foreign currencies and the price of U.S. output in terms of a basket of foreign outputs. That is, a rise in the index is a nominal or real dollar depreciation, whereas a fall is a appreciation.

International monetary and financial considerations increased the dollar’s future value in view of the widening gap between U.S. and foreign inflation rates. In addition, the weakening dollar helped fuel U.S. inflation by raising import prices and the inflation expectations of wage setters. To reduce inflation in the dollar, President Carter appointed a new Federal Reserve Board chairman with broad experience in international financial affairs, Paul A. Volcker. The dollar remained weak in the foreign exchange market until October 1979, when Volcker announced a tightening of U.S. monetary policy and the adoption by the Fed of more stringent procedures for controlling money supply growth.

The sharp U.S. monetary contraction of 1979 illustrated the limits of one point made by the critics of floating exchange rates. Governments could not be indifferent to the behavior of the U.S. dollar effective exchange rate index

<table>
<thead>
<tr>
<th>Year</th>
<th>Real Index</th>
<th>Nominal Index</th>
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<tbody>
<tr>
<td>1975</td>
<td>120</td>
<td>140</td>
</tr>
<tr>
<td>1976</td>
<td>130</td>
<td>150</td>
</tr>
<tr>
<td>1977</td>
<td>140</td>
<td>160</td>
</tr>
</tbody>
</table>

The indexes are measures of the trend and spot value of the U.S. dollar in terms of a basket of 15 industrial-country currencies. An increase in the index is a dollar depreciation, a decrease a dollar appreciation. For both indexes, the 1990 value is 100.


exchange rates and inevitably undermined some of their policy autonomy in other areas to preserve exchange rate competitiveness they viewed as essential to their economies.

**The Second Oil Shock, 1979–1980**

The fall of the Shah of Iran in 1979 sparked a second round of oil price increases by disrupting oil exports from that country. Oil prices rose from around $13 per barrel in 1978 to nearly $32 per barrel in 1980. As they did after the 1973–1974 episode, oil-importing economies faced stagflation. Table 19-4 shows the influence accelerated sharply in all the industrialized economies between 1973 and 1980. Output growth generally slowed and unemployment generally rose, but the effects were weaker in northern Europe than as those of the first oil shock. Oil-importing developing countries, like the developed countries, experienced higher inflation coupled with slower growth.

In 1975 macroeconomic policymakers in the industrial countries had responded to the first oil shock with expansionary monetary and fiscal policies. They suspended very differently to the second oil shock. Over 1979 and 1980, monetary growth was actually reduced to most major industrial countries in an attempt to offset the rise in inflation accompanying the oil price rise.**
increase. After struggling to contain the higher inflation of the early 1970s, central banks were given the means to prevent the 1978-1980 raging in inflation might be here to stay. Inflation was allowed to rise to inflationary expectations and the wage-setting process.

The policy was to limit the price of employment and output, unemployment rates started to take a harder swing upward in 1983 (see Table 19.2), and restrictive macroeconomic policies boosted a decisive output recovery. In fact, the recovery from the oil shock family had more to do with the world economy, in 1981, started with the deepest recession since the Great Depression of the 1930s.

Macroeconomic Interdependence under a Floating Rate

Up until now, our modeling of the open economy has focused on the relatively simpler case of a sort of country that causes adverse output, price levels, or interest rates, whereas it is a monetary and fiscal policies. This description obviously does not fit the United States, however, with a national output level equal to a fifth of the world's total product. To discuss macroeconomic interactions between the United States and the rest of the world, we therefore must look at the transmission of policies between countries linked by a floating exchange rate. We will offer a brief qualitative discussion of the model, and restrict ourselves to the short run in which we can see where nominal output prices are fixed.

Imagining a world economy of two large countries, Home and Foreign. Our goal is to evaluate how Home's macroeconomic policies affect Foreign. The main complicating factor is that neither country can be thought of any longer as facing a fixed external interest rate. To simplify, we consider only the cases of perfect foresight in monetary and fiscal policy.

Let's look first at a permanent monetary expansion by Home. We know that in the small-country case (Chapter 16), Home's currency would depreciate and its output would rise. The same happens when Home's economy is large, but now the rest of the world is affected too. Because Home is experiencing a real liquidity shortage, Foreign must be experiencing a real currency appreciation, which makes Foreign goods relatively expensive and thus depresses output in Home. The increase in Home output, however, works in the opposite direction, as Home spends some of its extra income on Foreign goods and, on that account, aggregate demand for Foreign output rises. Home's monetary expansion therefore has two opposing effects on Foreign output, with the net result depending on which effect is the stronger. Foreign output may rise or fall.

Now let's think about a permanent expansionary fiscal policy in Home. In the small-country case of Chapter 16, a permanent fiscal expansion causes a real liquidity expansion and a current account deterioration that fully offsets any positive output effect on aggregate demand. In the expansionary impact of the Home export would be limited slightly abroad (because the counterpart of the Home current account surplus must be the country's highest current account balance abroad, in the large-country case. Foreign output stilff falls since Foreign's exports become relatively cheaper when Foreign's currency appreciates. In addition, new source of Foreign's increased spending increases output. According to this, Foreign's output actually does increase along with Foreign's.4

We summarize our discussion of international interactions between large countries as follows:

1. Effect of a permanent monetary expansion by Home. Foreign output increases, Foreign's currency depreciates, and Foreign output may rise or fall.
2. Effect of a permanent fiscal expansion by Home. Foreign output increases, Foreign's currency appreciates, Foreign output increases.

4Regarding the Home imports and exports equation (1 in Table 19.2 in the previous discussion), one can see that Foreign's imports increased and Foreign's trade.

Table 19.2

<table>
<thead>
<tr>
<th>Year</th>
<th>United States</th>
<th>United States</th>
<th>Canada</th>
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<th>Germany</th>
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CASE STUDY

Disinflation, Growth, Crisis, and Recession, 1980–2002

The years after 1980 brought a number of dramatic changes in the world economy. On the positive side, inflation rates throughout the industrialized world fell to levels even below those of the Breton Woods years (see Table 19.2). At long last, price stability seemed to have been restored. But the negative aspects of the period were so severe that they threatened the relatively open world trading and financial system that had been labored to establish after World War II. Many economists and policymakers began to see growing evidence that a new, more cautious approach to monetary policy might be required if the system was to be preserved.

Disinflation and the 1981–1983 Recession

In October 1979, Federal Reserve Chairman Volcker announced an abrupt change in U.S. monetary policy aimed at fighting domestic inflation and stemming the dollar's fall. Volcker's announce- ment12 (and others) now questioned the foreign exchange market that the Fed chairman would make good his promise — easing inflation out of the American economy. With the November 1980 election of President Reagan, who had campaigned on an anti-inflation platform, the dollar's value soared. Between the end of 1979 and the end of 1981, the dollar appreciated against the DM by 23.2 percent. U.S. interest rates after rate sharp rise in 1979 by 1981, short-term interest rates in the United States were nearly double their 1979 levels.

By pushing up the U.S. interest rates and raising interest rates to export a 'stronger dollar in the future', the U.S. acted to reduce an immediate appreciation of the dollar. This appreciation more U.S. goods more expensive relative to foreign goods, thereby reducing U.S. exports.

The dollar's appreciation was not welcomed abroad, however; even though the amount, they had lost foreign currencies some positive elements in a period of slow growth. The reason that a stronger dollar hindered foreign countries in their own fight against inflation, both by raising the import prices they faced and by encouraging higher wages demands by their workers.

A stronger dollar had the opposite effect in the United States, exacerbating the decline in inflation. The U.S. monetary policy therefore had a two-edged-economic effect on foreign economies, in that it lowered American inflation in part by exporting inflation to other countries.

Foreign central banks responded by intervening in the foreign exchange markets to slow the dollar's rise. Through the process of selling dollar reserves and buying their own currencies, some central banks reduced their monetary growth rates for 1980 and 1981, driving interest rates upward.

Synchronized monetary policies in the United States and abroad, following their lead on the heels of the second oil shock, drove the world economy into a deep recession, the worst since the Great Depression of the 1930s. Table 19.2 shows how unemployment moved in the major industrial countries. In 1982 and 1983 unemployment throughout the world rose to levels unprecedented in the post-World War II period. You can appreciate the severity of the unemployment rates shown in the table by comparing them with the average unemployment rates for the same seven countries over the years 1965–1975 (3.2 percent). As Table 19.3 shows, however, monetary contraction and the recession it brought quite clearly led to a dramatic drop in the inflation rates of industrialized countries.

Fiscal Policies, the Current Account, and the Resurgence of Protectionism

During his election campaign, President Reagan proposed to lower taxes and balance the federal budget. He made good on the first of these promises in 1981 when Congress approved legislation lowering personal taxes and providing fiscal incentives to businesses. At the same time, the Reagan administration pushed for an acceleration of defense spending, accompanied by cuts in government spending on domestic programs. The net result of these and subsequent congressional actions was a ballooning federal government budget deficit and a sharp fiscal stimulus to the economy.

As a result of U.S. fiscal measures is complicated because the fiscal policy measures in 1981 was phased out and began to be reversed in 1982, and whose expansive impact was probably not felt.
fully until 1983. The anticipation of future fiscal expansion in 1981 would simply have appreci­ated the dollar, thereby deepening the early stages of the 1981-1983 recession in the United States. Only by late 1982 or 1983 can we draw on the last section's discussion to conclude that the U.S. fiscal expansion stimulated output both at home and abroad.

All said, however, the U.S. fiscal stimulus has continued dollar appreciation (see Figure 19-3), as did the contractionary policies practiced in some form at times by Japan and Germany. By February 1983 the dollar's cumulative appreciation against the DM since the end of 1979 was only 15 percent. The recession reached its low point in the United States in December 1982, and output began to recover both there and abroad as the U.S. fiscal stimulus was transmit­ted to foreign countries that joined in the dollar appreciation. Also contributing to the recovery was a lesser Paul Volcker monetary policy.

Foreign central banks remained fearful of encouraging inflation through expansionary poli­cies of their own. As easier U.S. money bought dollar-denominated assets in the second half of 1982, however, some foreign central banks began to feel they could ease their monetary policies without fear of triggering in their countries too. By early 1984 U.S. unemployment had fallen and U.S. growth was outpacing Europe. Unemployment remained high in other indus­trialized countries, however, and the growth of output abroad was slow by historical standards.

While the U.S. fiscal expansion contributed to world recovery, growing federal budget deficits raised serious worries about the future sustainability of the world economy. Growing govern­ment deficits were not new with offshore locators in private security or disasters in invest­ment, but the American current account balance declined sharply. By 1987 the United States had become a net debtor to foreign countries and its current account deficit was at the postwar level of 3 percent of GDP. Some analysts worried that foreign creditors would lose con­fidence in the future value of the dollar and begin to accumulate and sell them, causing a sudden, precipitous dollar depreciation.

Economists worried the strong dollar's impact on the distribution of income within the United States. The dollar's appreciation had reduced U.S. inflation and allowed consumers to purchase imports more cheaply, but those who already were in trade differentio­r and more vocal than those who had benefited. Persistently poor economic performance in the 1980s led to increased pressure on governments to protect industries in the exporting and import-competing sectors. As the U.S. recovery slowed in 1984, protectionist pressures mounted.

The Reagan administration had, from the start, adopted a policy of "federal neglect" toward the foreign exchange market, refusing to intervene except in unusual circumstances (for example, after a world recession sent President Reagan). By 1985, however, the link between the strong dollar and the gathering protectionist storm became impossible to ignore.

From the Plaza to the Louvre and Beyond: Trying to Manage Exchange Rates

Paying a divorce for the international monetary system, economic officials of the Group of Five (G-5) countries—the United States, Britain, France, Germany, and Japan—announced at New York's Plaza Hotel on September 22, 1985, that they would jointly intervene except in unusual circumstances (for example, after a world recession sent President Reagan). By 1985, however, the link between the strong dollar and the gathering protectionist storm became impossible to ignore.

The Plaza agreement announced a sharp change in the policy of the Reagan admin­istration, a reversal of its opposition to foreign exchange intervention. The Plaza communique included growing dissatisfaction in government with the performance of floating exchange rates and marked the start of a period in which countries included the United States reacted intermit­tent, sometimes moribund, and in cooperative fashion, to influence exchange rates.

By the end of 1986, the dollar's exchange rate had become a focus of disagreement among governments. The United States still had a large current account deficit. Faced with foreign reluctance to adopt expenditure-changing policies, American leaders pushed to reduce external balance through the expenditure-reducing policy of further dollar depreciation. Leaders of other industrial countries, however, felt the appreciation of their currencies had gone far enough. Their own troubled industries were finding it difficult to meet foreign competition, and so the expenditure change of a U.S. fiscal and monetary contraction appeared preferable to them. A measured effort to cooperate on exchange rates was a meeting in the Louvre in Paris on February 22, 1987. Finance ministers and central bank governors from the G-5 countries plus Canada issued a statement pledging to stabilize nominal exchange rates around the levels then prevailing, which the officials viewed as "basically consistent with underlying economic funda­mentals," including the requirement of generalized external balance. The Louvre accord was the more, however, than a mere verbal pronouncement on exchange rates. In an unspoken agreement, governments set up target zones for exchange rates and agreed to defend them by interven­ing in the foreign exchange market. While these target zones were not made public, observers believe the Louvre accord called for bands of plus or minus 5 percent around the rates of 1.5250 per dollar and 1.5150 per dollar. (In contrast, exchange rates in the weeks after the Plaza announcement were in the neighborhood of DM 3.70 per dollar and V100 per dollar.) After adjusting the range for the pecuniary rise in April 1987, the industrial countries suc­ceeded in maintaining their exchange rate bands for several months. The U.S. external deficit remained high, however, and the dollar stayed within heavy pressure centers; the bands thus could be maintained only with the help of slow U.S. monetary growth and a slowly ris­ing interest difference favoring dollar assets. Market participants wondered whether the U.S. economy would be driven into recession to forestall exchange change that occurred increasingly from current account equilibrium, given output parity for the United States and abroad.

In October 1987 the brief period of exchange stability ended abruptly when the U.S. stock market dropped and then crashed following Asian cries of criticism of a German interest rate hike. Major stock markets around the world followed Wall Street's downward plunge. In the United States, a more general economic crisis was triggered as by the new Federal Reserve chairman. Alan Greenspan, who promised the Fed's readiness to provide liquidity to a insolvent financial system. Gains in foreign central banks acted similarly and interest rates throughout the world accelerated. In the process, however, U.S. authorities allowed the dollar to depreciate for the first time since 1980.

New exchange rate zones were subsequently established, but these apparently have been changed on several occasions, with little on-the-record public acknowledgment. By the early 1990s, any pretense of zones had been abandoned. Figure 19-4 gives an overview of exchange rate movements after the Louvre accord. Skewers argue that the implicit zones for exchange policy and push-dollar interest rates down relative to foreign currency rates. (See Figure 19-3.)

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Global Slump Once Again, Recovery, Crisis, and Slowdown

Throughout the 1980s inflationary pressures engendered in the main industrial countries (see Table 19.3). Inflation was the result of real developments rather than a global shock, and it caused wide differences in timing and force in each country.

In the United States, real monetary growth in 1983 and 1984 helped push inflation upward by 1985 and 1986. The Federal Reserve responded with exceptionally tight monetary policy, which led to the U.S. economy into a prolonged economic downturn by the summer of 1990. The U.S. economic rebound, starting in 1992, set the stage for a prolonged American expansion characterized by low inflation, a booming stock market, and low unemployment rates unmatched since before the first oil shock in the early 1970s.

The contractions of West and East Germany on July 1, 1990, following the collapse of the former Soviet Union's efforts to convert currency, set off inflationary pressures in Germany. At the same time, some European countries were pegging their exchange rates to Germany's former currency, the DM, within the European Union's fixed exchange rate mechanism, the European Monetary System (EMS). Germany's contractionary monetary response to its internal inflation pressures led to slower growth in its EMS partners, many of whom were not afflicted by rising inflation as Germany was. The resulting asymmetric pressures within the EMS led to a massive speculative attack on the EMS fixed parities, as we shall see in Chapter 20.

Japanese inflation rose in 1995, in part the result of a relatively loose monetary policy from 1986 to 1998. Two very visible symptoms of these pressures were skyrocketing prices for Japanese real estate and stocks. The Bank of Japan's strategy of supporting these asset price bubbles through extensive monetary policy and high interest rates succeeded well, and Tokyo's Nikkei stock price index hit more than twice its value between 1990 and 1995. Unfortunately, the sharp fall in asset prices threw Japan's banking system into crisis and the economy into recession by early 1992. Even by 2001 the Japan's recession was still unresolved.

Japan's growth picked up in 1996, but its governments, worried by a growing public debt, raised taxes. The economy slowed in 1997, the deep and widespread problems of Japanese financial institutions became more apparent, and the yen fell sharply, dropping dramatically from ¥160 per dollar early in 1995 to around ¥115 per dollar in the summer of 1998, before recovering somewhat later that year. By 1998, however, the Japanese economy seemed to be in free fall, with shrinking GDP, declining prices, and its highest unemployment level in more than four decades.

The problems of the Japanese economy spilled over to the developing countries in East Asia, with which it trades heavily. As we shall see in Chapter 22, many of these economies had experienced spectacularly rapid rates of GDP growth for many years through 1997. Many of them also held their exchange rates fixed, or in target ranges, against the U.S. dollar. Japan's slowdown in 1997 therefore weakened the East Asian economies directly, but also through an exchange-rate channel. Being tied to the dollar, East Asian currencies tended to appreciate against the yen as the yen tumbled against the dollar. The East Asian economies, feeling the direct effect of Japan's slower growth on the demand for their imports, simultaneously found their exports priced out of foreign markets.

The crucial link was a cascading series of speculative attacks on East Asian currencies, beginning with Thailand's baht in the spring of 1997 and moving on to Malaysia, Indonesia, and Korea. These economies fell into deep recessions, as we shall discuss in detail in Chapter 22, being pulled down by Japan but also pulling Japan down in a vicious circle. Other economies in the...
What Has Been Learned Since 1973?

The first two sections of this chapter outlined the main elements of the cases for and against floating exchange rates. Having examined the essence of the recent floating-rate period, we now compare experience with the predictions made before 1973 by the proponents and opponents of floating and ask whether monetary history supports a definitive judgment about the merits of the current exchange-rate system.

Monetary Policy Autonomy

There is no question that floating gave central banks the ability to control their money supplies and to choose their preferred rates of inflation. A comparison of Tables 19.1 and 19.3 (which show inflation rates over the floating-rate period) with Table 18.1 and Figure 18.3 (which apply to the fixed-rate period) shows that floating rates allowed much larger international variation in inflation rates. The exchange-rate inflation differentials between countries over the floating-rate period reflect this. Figure 19.3 compares domestic inflation differentials against the dollar with the difference between domestic and U.S. inflation for the six largest industrial market economies outside the United States. The PPP theory predicts that the points in the figure should lie along the 45-degree line indicating proportionate exchange-rate changes and relative price level changes, but this is not exactly the case. While Figure 19.3 therefore confirms the lesson of Chapter 13 that PPP has not held closely, it does show that high-inflation countries have tended to see weaker movements than their low-inflation neighbors. Furthermore, most of the difference in depreciation rates is due to differences in inflation rates, making PPP a weaker factor behind long-run nominal exchange-rate variability.

While the inflation substitution part of the monetary autonomy argument is broadly supported as a long-run proposition, evidence and experience both show that in the short run, the effects of monetary policy may be transmitted across national borders under floating rates. The monetary macroeconometric model developed earlier, for example, shows that the reserve-policy variables output in the short run both at home and abroad as long as it

Over the floating-rate period it is a whole history of inflation has been associated with greater currency depreciation. The currency relationship predicted by modified PPP however, has not held for most countries. The inflation differentials on the horizontal axis are calculated as \( ri = r_t + \pi_t \times 100 \) using the relative real PPP relation given in footnote 1 on p. 291.


This graph shows the nominal exchange rate of the dollar against various currencies over the period 1973-2000. It illustrates the relationship between inflation rates and exchange rates. The graph indicates that there is a general pattern of depreciation in countries with higher inflation rates relative to the United States. The data for 1973-2000 show significant variation, with some currencies appreciating and others depreciating. The graph also highlights the importance of real exchange rates in understanding monetary policy coordination.
PART 4 International Macroeconomic Policy

CHAPTER 19 Macroeconomic Policy and Coordination

Although spurred the rapid growth of a global financial industry and allowed countries to realize greater gains from intertemporal trade.

The effects of the U.S. fiscal expansion after 1981 illustrate the stabilizing properties of a floating exchange rate. As the dollar appreciated, U.S. inflation went up, American consumers enjoyed an improvement in their scores of costs, and economic recovery was spread abroad.

The dollar’s appreciation after 1981 also illustrated a problem with the view that floating rates can stabilize the economy from real disturbances such as shifts in aggregate supply. Even though overall output and the price level may be constant, some sectors of the economy may be hurt. For example, while the dollar’s appreciation helped internationals U.S. fiscal expansion abroad in the 1980s, it worsened the plight of American agriculture, which did not benefit directly from the higher grain prices. Floating exchange rates can do damage by causing excessive adjustment problems in some sectors and by generating cyclic aid for increased protection.

Permanently changes in goods market conditions require eventual adjustments in real exchange rates that are offset by a floating exchange system. Foreign exchange interventions to peg nominal exchange rates versus prevent this secular adjustment because money is stored in the long run and thus is powerless to alter relative prices permanently. The emphasis of the 1980s shows, however, that if it is costly to change the price of production in move between sectors of the economy, there is a cost for pegging rates in the face of temporary output market shocks. Unfortunately, this lesson leaves policymakers with the difficult task of determining which disturbances are temporary and which are permanent.

An adjustment of floating exchange rates is sometimes based on the poor economic performance of industrial countries in the 1970s and 1980s compared with the 1950s and 1960s. As noted above, uncompetitive rates in industrial countries rose sharply after the 1950s, in addition to labor productivity and real GDP growth rates dropped. These adverse developments followed the adoption of floating dollar exchange rates, but this coincidence does not prove that floating rates were the cause. Although economies have not yet fully completed the growth slowdown or the rise in unemployment rates, the likely factors are structural changes that had little to do with floating rates. Examples include the oil price shocks, export labor market practices, and worker displacement caused by the emergence of severance pay systems in many countries and the growth of unskilled goods. Much of the international trade of the European Monetary System has taken place at fixed exchange rates, yet the record of ESCU countries in generating jobs and keeping down unemployment has not been superior to that of the United States or Japan.

Discipline

Did countries share the autonomy afforded by floating rates? Did intervention rates destabilize after 1983 and then revalue high through the second oil shock? But the conventional diagnosis of industrial countries after 1979 must prove that central banks could not react to the acceleration of inflation under floating rates. On several occasions, wages in industrial countries showed that they moved a small currency as a sign of economic distress. For this reason, currency depreciation sometimes brought sharp changes in monetary policies, as in the United States in 1979.

The system placed these obvious features on unbalanced fiscal policies, for example, the high U.S. government budget deficits of the 1980s. While some observers felt that
fixed rates would have foreclosed a more robust American fiscal stance, their arguments were not compelling. In the late 1960s, fixed rates that followed the Johnson administration's fiscal expansion, a policy move that contributed to the collapse of the Bretton Woods system, not only the EMS system. Germany in the early 1990s.

Debt-trimming Speculation
Fluctuating exchange rates have exhibited much more day-to-day volatility than the early advocates of floating would have predicted, but we saw in Chapter 13, exchange rates at market prices, and considerable volatility is to be expected. The short price ranges of exchange rates was seen before the 1970s. Even with the benefit of hindsight, however, short-term exchange rate movements can be quite difficult to analyze and may generate large events that affect currency values. Part of the difficulty is that the government officials often try to influence exchange rates by setting or intervening policy changes, thus making expectations about future macroeconomic policies volatile. The question of whether exchange rate volatility has been "desirable" relative to the theoretical determinants of exchange rates is a controversial one and provides an active research area for academic economists (Chapter 21).

Over the longer term, however, exchange rate movements have roughly reflected fundamental changes in monetary and fiscal policies, and that broad movements do not appear to be the result of destabilizing speculation. The decline of the dollar in the late 1970s (Figure 15-2) coincides with loose U.S. monetary policy, while its deep ascent between 1982 and 1985 occurred in the United States embarked on disinflation and a fiscal expansion of a size unprecedented in peacetime. While most economists agree that the direction of these exchange rate movements was appropriate, there is continuing debate about their magnitude.

Some feel the foreign exchange market overemphasized its currency against and that more symmetric foreign exchange movements would have been beneficial. The experience with floating rates has not supported the idea that arbitrary exchange rate movements can lead to "cyclic" cycles of inflation and deflation. Britain, Italy, and, to a lesser extent, France show recent exchange rate trends similar to those predicted by the vector error correction model.

But the currency depreciation that accompanied these spirals was not the only short-term result of destabilizing exchange rate speculation. As Figure 16-10 (page 370) shows, industrial countries with poor inflation performance under floating exchange rates have also had relatively rapid rates of monetary growth.

International Trade and Investment
Critics of floating had predicted that international trade in investment would suffer as a result of increased uncertainty. The prediction was certainly wrong with regard to invest-ment, (financial international interdependence expanded strongly after 1973 as countries toward humans to capital movement (see Chapter 21). There is controversy about the effects of floating rates on international trade. The use of forward margins and other derivative expansions economically, just as advocates of floating had forecast, and innovative financial instruments were developed to help traders avoid exchange rate risk. But some economists contend that the costs of avoiding exchange rate risk have had an effect similar to increased international transport costs in reducing the available gains from trade. They argue that as a result of these costs, international trade has grown more slowly than it would have under an arbitrary fixed exchange rate regime.
CHAPTER 17
Macroeconomic Policy and Coordination

An important lesson of this chapter and the previous one is that no exchange-rate system works well when countries "go it alone" and fellow countries pursue their own self-interest. The Bretton Woods system functioned reasonably well until the United States unilaterally adopted an expansionary policy under President Lyndon B. Johnson. The EMS experiment portrayed in the next chapter provides another example. Similarly, the weak points of the (floating-rates) system occurred when countries failed to take coordinated action on common macroeconomic problems. Globally balanced and stable policies are a prerequisite for the successful performance of any international monetary system.

Current proposals to reform the international monetary system are the result of a more elaborate system of negotations for the adoption of a mechanism of fixed rates on the introduction of a single world currency. Because countries seem unwilling to give up the autonomy of floating rates, these moves give the appearance of a new attempt by the ECSC to introduce a single European currency. It is likely that any of these changes is in the cards. Since the Plaza announcement of September 1985, however, the United States has needed to show a greater awareness of its interdependence with other industrial economies. Although this development was not perceived at the time, the agreement to change policies eventually led to an appreciation of the dollar through a joint statement on monetary cooperation in the early 1990s. This cooperation should be sought as an end in itself and not as the indirect result of exchange-rate moves that eventually are discussed through the repeated revaluation or devaluation.

3 Editorial Note

Summary

1. The weaknesses of the Bretton Woods system led many economists to advocate floating exchange rates, a policy that would be less likely to generate transient macroeconomic policies.

4 Editorial Note
be willing in practice to abandon the exchange rate in formulating their monetary and fiscal policies. The exchange rate, they felt, was an important enough price that it would become a target of macroeconomic policy in its own right.

6. However, (1973 and 1980) floating rates occurred in the world to different extents. In particular, it is unlikely that the domestic economies could have maintained fixed exchange rates in the face of the fluctuations caused by two oil shocks. The dollar suffered a sharp depreciation after 1976, however, as the United States adopted more macroeconomic policies more expansively than those of other industrial countries.

4. A sharp rise toward slower monetary growth in the United States, coupled with rising U.S. government budget deficits, contributed to reduce dollar appreciation between 1980 and early 1982. Other industrial countries intervened to bring their exchange rates downward, and the resulting worldwide monetary slowdown, coming after the second oil shock, led to the deepest recession since the 1930s. As the recovery from the recession started in late 1983 and the United States' current account began to record regular deficits, political pressures for wide-ranging trade restrictions gathered momentum in Washington. The threat for protection was toned (but not diminished) by the September 1985 decision of the Group of Five countries to take concerted action to bring down the dollar. An experiment with a very elaborate exchange rate target area, initiated by the Louvre accord of February 1987, had mixed success in promoting more stable currency values. Exchange rate predictability was downgraded as a prime policy goal in the 1990s. Internat. governments aimed to restrain domestic inflation while maintaining economic growth.

5. The experiment of floating does not fully support the early advocates of the exchange rate system or its critics. One straightforward lesson, however, is that an exchange rate system is all the more successful when international economic cooperation breaks down. Recent limits on exchange rate flexibility are unlikely to be minimized in the near future. But increased consultation among policymakers in the industrial economies should improve the performance of floating rates.

Key Terms

describing motivation, p. 374

materialization, p. 378

assumptions and effective exchange rates, p. 560

Problems

1. Use the D-OA-A model to exercise the effects of a one-time rise in the foreign price level, P^*_. If the expected future exchange rate E^* rises immediately in proportion to P^* in line with 1999.99 (in Table 19.1), the domestic price level will also appreciate immediately in proportion to the rise in P^*_. If the economy is initially in internal and external balance, will its position be disturbed by such a rise in P^*?

2. Analyze a monetary increase in the foreign money rate, R^*. Under which type of exchange rate is there a smaller effect on output—fixed or floating?

3. Suppose now that R^* rises permanently. What happens to the economy, and how does your answer depend on whether the change affects a rise in the foreign real interest rate or in the foreign inflation expectations (the Fisher effect)?

4. If the foreign inflation rate were permanently, you would be aware allowing exchange rate to influence the domestic economy in the short run. What would happen in the long run? In answering the latter question, pay attention to the long-run relationship between domestic and foreign nominal interest rates.

5. Imagine that domestic and foreign currency bonds are imperfect substitutes and that investors suddenly shift their demand toward foreign currency bonds, raising the real premium on domestic assets (Chapter 17). Which exchange rate regime minimizes the effects on output—fixed or floating?

6. How would you analyze the use of monetary and fiscal policy in maintaining internal and external balance under a floating exchange rate?

7. The chapter described how the United States tried after 1985 to combat its current account deficit by encouraging monetary growth and depreciating the dollar. Assume that the United States was in internal balance but external balance called for an expenditure-switching policy (as is in the government budget deficit) as well as the expenditure-switching device by currency depreciation. How would you expect the use of monetary expansion alone to affect the U.S. economy in the short and long run?

8. After 1985 the United States asked Germany and Japan to adopt fiscal and monetary expansion in ways of increasing foreign demand for U.S. exports and reducing the American current account deficit. Would fiscal expansion by Germany and Japan have accomplished these goals? What about monetary expansion? Would you expect the output and unemployment to rise?

9. A high volume of foreign exchange intervention occurred in 1987 in connection with the Louvre accord. What data might allow you to infer whether a large portion of these interventions was motivated? Try to find the relevant data for Germany and Japan in back issues of the IMF's International Financial Statistics.

10. Suppose the U.S. and Japanese governments both want to depreciate their currencies to help their domestic industries but fear the resulting inflation. The two policy choices available to them are (1) expansionary monetary policy and (2) no change in monetary policy. Develop an analytical technique like the one in the appendix. To show the consequences of different policy choices. Can Japan and the United States do better by cooperating than by acting individually?

Further Reading


The case against international macroeconomic policy coordination.


International Policy Coordination Failures

This appendix illustrates the importance of macroeconomic policy coordination by showing how all countries can suffer as a result of self-centered policy decisions. The phenomenon is another example of the Prisoner's Dilemma of game theory (Chapter 19). Governments can achieve macroeconomic outcomes that are better for all if they choose policies cooperatively.

These points are made using an example based on the discussions of the early 1980s. Recall that contractionary monetary policies in the industrialized countries helped throw the world economy into a deep recession in 1981. Countries hoped to avoid inflation by slowing monetary growth, but the situation was complicated by the influence of exchange rates on the price level. A government that adopts a less restrictive monetary policy than its neighbors is likely to face a currency depreciation that partially frustrates its attempts to discipline.

Many observers felt that in their individual attempts to avoid currency depreciation, the industrial countries as a group adopted overly tight monetary policies that depressed the recession. All governments would have been better if everyone had adopted lower monetary policies, but gives the policies that other governments did adopt, it was not in the interest of any individual government to change course.

The segments above can be made more precise with a simple model. There are two countries, Home and Foreign, and each country has two policy options, a very restrictive monetary policy and a somewhat restrictive monetary policy. Figure 19A-1, which is similar to a diagram we used to analyze trade policies, shows the results in Home and Foreign of different policy choices by the two countries. Each row corresponds to a particular monetary policy decision by Home and each column to a decision by Foreign. The boxes contain arrows giving changes in annual inflation rates (a and a') and unemployment rates (u and u'). Within each box, lower-left entries are Home outcomes and upper-right entries are Foreign outcomes.

The hypothetical entries in Figure 19A-1 can be understood in terms of this chapter's two-country model. Under some restrictive policies, for example, inflation rates fall by 1 percent and unemployment rates rise by 1 percent in both countries. If Home suddenly shifts to a more restrictive policy while Foreign maintains its current policy, Home's inflation rate drops, Home's unemployment rate falls, and Home's additional monetary contraction, however, has a two-pronged effect on Foreign. Foreign's unemployment rate falls, but because Home's currency appreciation is a currency depreciation for Foreign, Foreign's inflation rate stays the same. In Foreign, the disinflationary effects of higher unemployment are offset by the inflationary impact of a depreciating currency on import prices and wage demands. Home's steeper monetary shock thereby has a bigger-than-average effect on Foreign, which is faced with "importing" some inflation from Home.

To translate the outcomes in Figure 19A-1 into policy payoffs, we assume each government wishes to get the biggest reduction in inflation at the lowest cost in terms of unemployment. That is, each government wishes to maximize "bilateral" inflation reduction.
per point of increased unemployment. The numbers in Figure 19A-1 lead to the payoff matrix above in Figure 19A-2.

How do Home and Foreign behave faced with the payoffs in this matrix? Assume each government "gives it alone" and picks the policy that maximizes its own payoff given the other player's policy choice. If Foreign adopts a somewhat restrictive policy, Home does better with a very restrictive policy (payoff = 9) than with a somewhat restrictive one (payoff = 1). If Foreign is very restrictive, Home still does better by being very restrictive (payoff = 5) than by being somewhat restrictive (payoff = 2). So no matter what Foreign does, Home's government will always choose a very restrictive monetary policy.

Foreign finds itself in a symmetric position. It, too, is better off with a very restrictive policy regardless of what Home does. The result is that both countries will choose very restrictive monetary policies, and each will get a payoff of 5.

Notice, however, that both countries are actually better off if they simultaneously adopt the somewhat restrictive policy. The resulting payoff for each is 1, which is greater than 5.

Under this last policy configuration, inflation falls less in the two countries, but the rate of unemployment is far less than under very restrictive policies. So both countries are better off with somewhat restrictive policies, why aren't they adopted? The answer is in the cost of the problem of policy coordination. Our analysis assumed that each country "gives it alone" by maximizing its own payoff. Under this assumption, a situation where both countries were somewhat restrictive would not be stable. Each country would want to reduce its monetary growth further and see its exchange rate in practice depreciation at its neighbor's expense.

For the superior outcome in the upper-left corner of the matrix to occur, Home and Foreign must reach an explicit agreement, that is, they must coordinate their policy choices. Both countries must agree to forgo the beggar-thy-neighbor gains offered by very restrictive policies, and each country must abide by the agreement in spite of the incentive to cheat.
Optimum Currency Areas and the European Experience

On January 1, 1999, eleven member countries of the European Union (EU) adopted a common currency, the euro. Two years later they were joined by Greece. The eurozone, which includes fifteen member countries, has a similar GDP to that of the United States and is the second-largest economy in the world. The eurozone is a significant market for global trade and investment.

The European experience raises a host of important questions. How and why did Europe set up a single currency? Will the euro be good for the economies of its members? How will the euro affect currencies outside of EMU, notably the United States? And what lessons does the European experience carry for other potential currency blocs, such as the Mercosur trading group in South America?

Chapter 20 discusses the potential benefits and risks of the euro. It examines the economic, political, and institutional dimensions of the eurozone and its impact on the global economy. It also considers the implications of the euro for international trade and investment, as well as for the future of the European Union.

In summary, the eurozone is an important experiment in currency union and has significant implications for the future of the European Union and the global economy. The challenges it faces are substantial, but the potential benefits are also significant. The eurozone is a model of what can be achieved through cooperation and integration, and it serves as a benchmark for future currency unions.
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Table 20-1  A Brief Glance of Eurozone

| ECB | European Central Bank |
| ECSC | European System of Central Banks |
| ESM | European Monetary System |
| EMU | Economic and Monetary Union |
| EMU | Exchange Rate Mechanism |
| EMU | Stability and Growth Pact |

What prompted the EU to seek closer coordination of monetary policy and greater exchange stability in the late 1990s? Two main motives inspired these moves and have transmitted major reasons for the adoption of the euro.

1. To enhance Europe's role in the world monetary system. The currency crises of 1997 were accompanied by declining European confidence in the solvency of the United States to place its international monetary responsibilities ahead of its national interests (Chapter 18). By speaking with a single voice on monetary issues, EU countries hoped to defend more effectively their economic interests in the face of an increasingly self-interested United States.

2. To turn the European Union into a truly united market. Even though the 1992 Treaty of Rome founding the EU had established a customs union, significant official barriers to the movement of goods and factors within Europe remained. A concerted effort of EU member states to remove such barriers and transform the EU into a huge unified market on the model of the United States, European officials believed, however, that exchange rate uncertainty, like official trade barriers, was a major factor reducing trade within Europe. They also feared that if exchange rate swings caused large changes in intra-European relative prices, political forces hostile to free trade within Europe would be strengthened. In their view, a truly united European market therefore could never be achieved unless exchange rate uncertainty was reduced.

The key to understanding how Europe has come to see both in monetary matters and in monetary union lies in the continent's war-time history. After 1945, many European leaders agreed that economic cooperation and integration among the former belligerents would be the best guarantee against a repetition of the twentieth century's two devastating wars. The

*very important 48th economic reason European countries sought to establish trade relations in Europe instead of trade relations with other countries, often to the detriment of the European economy. Prior to the 1970s, agricultural policies were aimed to the detriment of the European economy. Prior to the 1970s, agricultural policies were aimed to

The European Monetary System (1979-1992)
The European economy was not as strong as in 1972-1992.

The European Monetary System was designed to maintain exchange rate stability within the EMS, while allowing for some flexibility in exchange rates between individual countries. The EMS was based on a fixed exchange rate system, with participating countries pegging their currencies to the deutsche mark or the French franc. This system was intended to reduce currency speculation and provide a stable environment for economic growth.

The EMS was a predecessor to the single euro currency, which was introduced in 1999 as part of the European Union's monetary union, known as the eurozone.

The EMS was also intended to enhance the economic and political integration of the European Union by creating a single European currency. However, the system faced challenges, including the so-called 'dutch disease' and the need for monetary union to address economic and structural issues within the union.

As the EMS evolved, it became clear that a more integrated monetary system was needed to address these challenges. In 1992, the European Union began the process of creating a single currency, the euro, which was adopted by 19 member countries in 1999.

The EMS system was gradually dismantled, with the introduction of the euro. The last member states switched to the euro in 2002, marking a significant step forward in the integration of the European Union.

The EMS was marked by several key events:

- The EMS was established in 1979 as a result of the 1976 EEC Treaty.
- In 1992, the Maastricht Treaty was signed, which laid the foundation for the euro.
- The EMS was suspended in 1992 due to the economic challenges faced by member states.
- The euro was introduced in 1999, replacing the EMS and the national currencies of participating countries.

The ultimate goal of the EMS was to create a single currency for the European Union, which was achieved with the introduction of the euro. The EMS played a significant role in the development of the European Union and its monetary system.
exchange rate mechanism members to choose monetary policies. Similarly, the lira, peseta, Swiss, Portuguese, and Dutch5 desired greater room for manoeuvre during their initial periods and therefore chose to stay out with wide bands. In August 1993 all EMS bands (other than that between the D-mark and Dutch guilder) were widened to ±15 percent under the pressure of speculative attacks.

As another crucial safety valve, the EMS developed a series of provisions for the common redistribution of strong- and weak-currency members. If the French franc depreciated too far against the D-mark, for example, Germany's central bank, the Bundesbank, was expected to lend the Bank of France D-mark that could be sold for francs in the foreign-exchange market.

Finally, during the system's initial years of operation several members (notably France and Italy) reduced the possibility of speculative attack by maintaining exchange controls that directly limited domestic residents' sales of home for foreign currencies. As French, Italian, Dutch, and Belgian controls were dismantled in a series of steps completed in 1990, the prevailing restrictions on payments within the EMS were replaced by 1992.

The EMS was devised during periods of currency realignments. In 1912, 11 realignments occurred between the start of the EMS in March 1979 and January 1987. Exchange controls played an important role in shuffling residents' reserve from speculators during these adjustments.

Starting in 1987, a phased removal of exchange controls by EMS countries increased the possibility of speculative attacks and thus reduced governments' willingness openly to consider devaluing or caving in. At the same time the countries that dismantled controls sharply reduced their power to react negatively to inflation or deflation trends through domestic monetary policy (since the monetary policy interdependence of Chapter 17's choice of payments and capital movements within the EMS had always been a key element of EU countries' plan to move Europe into a united single market. By agreeing to remove exchange controls, EU governments were saying that it was too important to use monetary and exchange rate policy for domestic purposes than to spread it up as a single European market.

For a period of five and a half years after January 1987, no adverse economic event was able to strike the EMS's commitment to a fixed exchange rate. This state of affairs came to an end in 1992, however, as economic shocks caused by the unification of eastern and western Germany in 1990 led to asymmetrical macroeconomic processes in Germany and in its EMS partners. German reunification was accompanied by a massive domestic fiscal expansion as the East German government borrowed to retire debt and transfer income to its relatively poor citizens. At the same time, reunification raised the economic aspirations of east German, who consumed more and demanded higher wages. The result of these changes was a boom in Germany and, therefore, in Germany, the Bundesbank, reduced through sharply higher interest rates.

Other EMS countries such as France, Italy, and the United Kingdom, however, were not simultaneously growing. By raising the high German interest rates to hold their common currency fixed against Germany's, they were unknowingly pushing their own economies into deep recessions. Germany refused to heed its partners' calls for lower interest rates, fearing domestic inflation. At the same time, other EMS countries feared that by devaluing their currencies to stimulate their own economies, they would drive program toward the common currency and thus the policy credibility that they had built up by avoiding exchange rate realignments for 5 years. The policy conflict between Germany and its partners led to a series of force speculative attacks on the EMS exchange rates starting in September 1992. By August 1993, as previously noted, the EMS was forced to revalue to very wide (+15 percent) bands, which kept in force until the introduction of the euro in 1999.6

German Monetary Dominance and the Credibility Theory of the EMS

Earlier we identified two main reasons why the European Union sought to fix its exchange rates: to deters its economic integration more effectively on the world stage and the ambition to achieve greater internal economic stability.

Europe's experience of high inflation in the 1970s suggested an additional purpose that the EMS came to fulfill. By fixing their exchange rates and the D-mark, the EMS countries in office improved the German Bundesbank's credibility as an inflation fighter and thus discouraged the development of inflationary pressures at home—pressures they might otherwise have been tempted to accommodate through monetary expansion. This, the credibility theory of the EMS, is a variant of the "dual-mo" argument against floating exchange rates in Chapter 19). The political costs of violating an international exchange rate agreement can restrain governments from pursuing an expansionary economic boom at the long-term cost of higher inflation.

To evaluate the credibility theory, we need first to understand how the German Bundesbank gained its low-inflation reputation. Germany's experiences with hyperinflation in the 1920s and again after World War II left its economy with a deeply rooted fear of inflation. For this reason, the law establishing the Bundesbank specified the defense of the D-mark's real value in the central bank's primary goal. Consistent with this, the bank's governing council has powers and membership rules that make it unusually independent of pressures from the politicians who run the rest of the German government.7

The way EMS intervention policies evolved after the mid-1980s supports the view that Germany's EMS partners sought to import German credibility. Increasingly, EMS countries other than Germany came to hold D-mark in their reserves and to use them as an intervention medium when their exchange rates got too far from the official EMU parity. (Germany also entered and some interventions in EMS currencies, especially during turbulent periods, but it is uncertain what the outcome of these interventions might have been on Germany's money supply.) The result was a form that functioned very much like the asymmetric way the Bretton Woods system did under U.S. dominance. In practice, the EMS's PHA currency problem (Chapter 17) was solved by having Germany set the EMS's monetary policy while the other countries accepted the result.

Policymakers in inflation-prone EMS countries, such as Italy, clearly gained credibility by placing monetary policy decisions in the hands of the German central bank. Declines

6Chapters the adoption of the single currency in August 1999. In addition to Spain and Portugal, which entered immediately, three countries were admitted in 1998.

7For a more detailed discussion of the central bank independence, see Victoria O'Sullivan, Dwight Macdonald, and Guido Tabellini, Political and Monetary Institutions and Public Prefer-

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was still possible, but only subject to EMS restrictions. Because policymakers also feared they would look incompetent if they deflated, a government’s desire to peg to the DM reflected both a willingness and ability to cope with domestic inflation.6

6 Added support for the credibility thesis comes from the behavior of inflation rates relative to Germany’s, shown in Figure 20-2 for six of the other original EMS members.6 As the figure shows, annual inflation rates gradually converged toward the lower German levels. Even France managed to bring its inflation rate below Germany’s by the early 1990s. Something some observers would have thought impossible a decade earlier.7

The EU “1992” Initiative

The EU countries have tried to achieve greater internal economic unity by not only fixing annual exchange rates, but also through direct measures to encourage the free flow of goods, services, and factors of production. Later in this chapter, we will learn that the concept of producer and factor mobility within Europe helps to accentuate how fixed exchange rates affect Europe’s macroeconomic stability. Europe’s efforts to raise macroeconomic efficiency through direct market liberalization have also increased its preference for fixed exchange rates on macroeconomic grounds. The most recent phase of EU market liberalization, an initiative known as the “1992” initiative because all of its goals were supposed to have been met by January 1, 1993, is therefore an important consideration in our discussion of European exchange rate policy.

The process of market unification that began when the original EU members formed their common union in 1957 was still incomplete 30 years later. As a number of industries, such as automobiles and telecommunications, trade within Europe was discouraged by government-imposed standards and regulations requiring often government licensing or purifying processes that domestic producers favor. New opportunities for domestic markets. Differing national laws on services and health and safety regulations also inhibited trade. For example, countries with high-value-added taxes had to post customs officials at EU borders to prevent their citizens from shopping in neighboring low-tax countries. Similarly, customs checks were needed to enforce national product standards. Significant barriers to free movements within Europe also remained.2

In June 1985 the EEC’s executive body, the European Parliament, issued a White Paper containing 200 proposals for “Completing the Internal Market” by the end of 1992. That is, for removing all restricting internal barriers to trade, capital movements, and labor migra-


4 Figure 20-2 does not include the city of Luxembourg because before 1999 that country had a currency union with Belgium and it included not only in the figure.

5 Those displaced are given the benefits of EMS inflation converge points are the United States. Britain, and Japan also report their inflation’s rank over the 1960s, but they have in fact intensified their exchange rate. After the rate was introduced in 1990 there were some remaining of inflation differentials, as shown before.


7 Shown are the differences between domestic inflation and German inflation for six of the original EMS members: Belgium, Denmark, France, Ireland, Italy, and the Netherlands. As of 1997 all national inflation rates were very close to the German level.


In the Single European Act of 1986 (which amended the Treaty of Rome), EU members took the crucial political steps to translate the White Paper’s 1992 into reality. Its most important, they dropped the Treaty of Rome’s requirement of unanimous consent for treaties relating to market completion, so that one or even no self-interested EU members could defeat trade liberalization measures in the past. The Single European Act then gave the European Union the procedural tools needed to make it work, namely that the internal market shall comprise an area without internal frontiers in which are free movement of goods, persons, services and capital is ensured.

As such, one of 1992’s market integration measures has been implemented. National economic barriers within EU Europe generally are lower than in the mid-1980s, but 1992 has been more effective in some areas than in others. Financial capital, for example, can move quite freely, not only within the Europe Union, but between the Europe Union and outside of it.
European Economic and Monetary Union

Countries can link their currencies together in an easy way. We can imagine that the different needs of each country form a spectrum, with the arrangements at one end requiring little sacrifice of monetary policy independence while those at the other end require independence to be given up entirely.

The early EMS, characterized by frequent currency realignments and widespread government control over capital movements, led significant scope for national monetary policy. In 1991 a committee headed by Jacques Delors, president of the European Commission, recommended a three-stage transition to a goal at the other extreme of the policy spectrum just described. This goal is an economic and monetary union (EMU), a European Union in which national currencies are replaced by a single European currency managed by a euro central bank operating on behalf of all EU members.

In stage 1 of the Delors plan all EU members were to join the EMS exchange rate mechanism (ERM). In stage 2 exchange rate margins were to be narrowed and certain macroeconomic policy decisions placed under the control of the European central bank. Finally, stage 3 of the Delors plan involved the replacement of national currencies by a single European currency and the setting of EMU monetary policy decisions by a European System of Central Banks, similar in structure to the U.S. Federal Reserve System and headed by a European Central Bank.

On December 10, 1991, the leaders of the EU countries met at the ancient Dutch city of Maastricht and agreed to propose for national ratification far-reaching amendments to the Treaty of Rome. These amendments were meant to give the EMU authority on the road to EMU. Included in the 239-page Maastricht Treaty were provisions calling for a start to stage 2 of the Delors plan on January 1, 1994, and a start to stage 3 no later than January 1, 1999. In addition to various other policy provisions, the Maastricht Treaty included steps toward harmonizing social policy within the European Union (such as working safety, consumer protection, and immigration rules) and toward coordinating foreign and defense policy decisions that each EU member country currently makes on its own. By 1993, all twelve countries then belonging to the EU had ratified the Maastricht Treaty. On joining the EU in 1995, Austria, Finland, and Sweden accepted the Treaty's provisions (as well as the rest of the EU's laws)\(^5\).

Why did the EU countries move away from the EMS and toward the more ambitious goal of a single shared currency? They did so for four main reasons:

1. They believed a single European currency would produce a greater degree of European macroeconomic integration and facilitate exchange rate changes by removing the threat of EMS currency realignments and eliminating the costs of trading in one EMU currency into another.

2. The单一货币 was viewed as a necessary pre-condition to the 1992 plan for opening EU markets to a single intra-European trade.

3. Some EU leaders thought Germany's management of EMS monetary policy had placed a one-sided emphasis on German macroeconomic goals at the expense of its EMS partners' interests. The European Central Bank that would replace the German Bundesbank under EMU would have to be more considerate of other countries' problems and would automatically give them more say in its operations, for example Germany to participate in system-wide monetary policy decisions.

4. Given the need to complete freedom of capital movements within the EU, there seemed to be little to gain, and much to lose, from keeping national currencies with fixed (but adjustable) parities rather than irrevocably binding parities through a single currency. Any system of fixed exchange rates among national currencies would be subject to frequent speculative attacks, as in 1992-1993. If Europe wished to continue permanently fixed exchange rates with freedom of capital movements, a single currency was the best solution.

As previously noted, all of the EU countries' leaders hoped the Maastricht Treaty's provisions would guarantee the political viability of EMU. Beyond its purely economic functions, the single European currency was intended as a potent symbol of Europe's desire to place cooperation above the rival nationalistic enthusiasm that often had led to war in the past. Under these circumstances, the new currency would also the economic interests of individual European nations to create an overwhelming political consensus for peace on the continent.

The Maastricht Treaty's critics noted that EMU would have these positive effects and opposed the treaty's provisions for raising social instability and power with the European Union. To these critics, EMU was symptomatic of a tendency for the European Union's control institutions to surpass local needs, masters in local affairs, and dominate perpetual symbols of national identity (including, of course, national currencies).

The Euro and Economic Policy in the Euro Zone

The Maastricht Treaty's limited initiative in the area of social and political integration has not had much effect, but its more substantial blueprint for EMU came to fruition on schedule when the euro was introduced in eleven EU countries at the start of 1999. Interestingly, the Maastricht Treaty does not contain the name "euro" but refers to the single currency as the "ECU" (or European Currency Unit). European leaders picked the name "euro" only in December 2005 (see the box on p. 610-617). Figure 29.2, reproduced from the Financial Times, shows how the market's behavior against other major currencies since its launch. How were the initial members of EMU chosen, how will new members be admitted, and what is the structure of the central bank and financial institutions that govern economic policy in the euro zone? This section provides an overview.

The Maastricht Convergence Criteria and the Stability and Growth Pact

The Maastricht Treaty specifies that EU member countries must satisfy several macroeconomic convergence criteria before they can be admitted to EMU. Among these criteria are:
PART 4 International Macroeconomic Policy

The European Exchange Rates against Major Currencies

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Every Monday the Financial Times summarizes the recent behavior of the euro in the foreign exchange market. After its introduction, the euro depreciated against dollar.


1. The country's inflation rate in the year before admission must be no more than 1.5 percent above the average of the three EU member states with lowest inflation.
2. The country must have maintained a stable exchange rate within the ERM without deviating on its own initiative.
3. The country must have a deficit-to-GDP ratio of 6 percent of GDP (except in exceptional and temporary circumstances).
4. The country must have a public debt that is below or approaching a reference level of 60 percent of its GDP.

The Treaty provides for the ongoing monitoring of criteria 3 and 4 above by the European Commission even after admission to the EMU, and for the levying of penalties on countries that violate these conditions or do not correct situations of "excessive" deficits and debts. The surveillance and monitoring over high deficits and debts plans national governments under conditions in the respect of the "safeguard fiscal powers". For example, highly inflationary economies may be used to expanded monetary policy if the primary balance is not expected to influence the country's macroeconomic policy of an "excessive" deficit. In addition, a regularity Stability and Growth Pact (SGP) negotiated by European leaders in 1997 tightens the fiscal discipline enforced. The SGP sets out "the medium-term budgetary objective of positions close to balance or in surplus". It also sets out a timetable for the imposition of fiscal penalties on countries that fail to meet the criteria of "excessive" deficits and debts promptly enough. Only then will all of the GDP be subject to enforcement in practice.

What explains the macroeconomic convergence criteria, the fear of high public deficits, and the SGP? Before they would sign the Maastricht Treaty, low-inflation countries such as Germany wanted assurance that their EU neighbors had learned to prevent an environment of low inflation and fiscal restraint. They feared that otherwise, the euro might be a weak currency, falling prey to the type of policies that have failed France, Italy, Portugal, Spain, and United Kingdom inflation at various points since the early 1970s. The architects of the Maastricht Treaty also feared that high public deficits and debts would lead to pressure on the real European Central Bank to pursue favorable interest rates and therefore fueling money-supply growth and inflation.

As EMU came closer in 1997, German public opinion remained opposed to the euro because of widespread apprehension that the new currency would be strong as the DM had been. The central governments demanded the SGP in a way of convincing democratic voters that the new monetary union would indeed produce low inflation.

By May 1999, it was clear that almost all countries would meet the convergence criteria on the basis of 1997 data and would be founder members of the EMU: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain. Belgium and Denmark exercised their options to stand apart from monetary union. Sweden failed to satisfy the exchange-rate criteria (criteria 2 above), having not previously been a member of the ERM. Greece failed to qualify on any of the criteria in 1998, although it ultimately passed all of its tests and entered EMU on January 1, 2001.

The European System of Central Banks

The European System of Central Banks, which conducts monetary policy for the euro zone, consists of the European Central Bank in Frankfurt plus the twelve national central banks, which now play a role analogous to the regional Federal Reserve Banks in the United States. Decisions of the ESCB are made by votes of the governing council of the ECB, consisting of a six-member executive board (including the president of the ECB, currently Mario Draghi of the Netherlands) and the heads of six national central banks. In this way, the central ECB management consisting of the executive board structures with national central bank representatives to ensure monetary policy for the entire euro area. Safety, regulatory, or EU national central banks, which in the euro zone are, any part of the ESCB, and their tasks sit on an ESCB "general council." The ESCB general council, however, in contrast to its governing council, has few powers and does not make the decision on euro area interest rates.

The actions of the Maastricht Treaty hope to create an independent central bank free of the political influences that might lead to inflation. The Treaty gives the ESCB an overseeing mandate in pursuit price stability and includes many provisions intended to ensure monetary policy decisions from political influence. In addition, unlike any other central bank in the world, the ESCB operates above and beyond the reach of any single national government. In the United States, for example, Congress could easily pass laws reducing the autonomy of the Federal Reserve. The ESCB is required to brief the European Parliament regularly and its executive board, the European Commission, has no power to alter the ESCB's charter. That would require an amendment to the Maastricht Treaty, approved by parliamentarians or even any member country of the EU. Critics of the Treaty argue that it gave too far to shifting the ESCB from normal democratic processes. The special position

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Among the least of the obstacles to achieving the comprehensive monetary union envisaged in the Maastricht Treaty are the choice of a bank and a name for the new single European currency. Nonetheless, agreement was hard to reach. Some European leaders wanted to retain a national symbol on the euro's coinage and banknotes issued, although the national flags would circulate throughout Europe. U.S. officials were loath to see the logos of the Federal Reserve Bank of Chicago, the example, any time soon appearing in New York's Waldorf-Astoria. Britain, a particu-
larly inviting candidate, appears to have its hands tied by what the rest of Europe did. In the end, a compromise was reached. Europe does not carry national symbols. Even coins, however, do have a "European," side and a "national" side upon which national symbols can appear. A generic euro note superseding the EU flag (a circle of 12 stars on a field of gold/blue) upon a reimagined European architectural masterpiece, The European Union gave a full description of the notes and the materials for their design (see the European Central Bank's web site). There are no metal coins. In the oldest columns and since they are decentralized in 200, 200, 500, 1000, and 2000 Euro notes. The designs are symbolic for Europe's architectural heritage. They may diverge with the existing European Union. Money notes generally draw the front side of such national homes as symbolic of the spirit of co-
operation and cooperation in the EU. The reserve side of each banknote features a bridges from a particular age, a metaphor for communications among the people of Europe and between Europe and the rest of the world. Final designs were announced in December 1995 at the Brussels European Council. All means will carry advanced security features.

There were more issues explicit proposals in the air. Last week, before the euro design was chosen. Among the ideas thrown around was carrying Michelangelo's fresco of the Medici palace and the 1950s Pop Art strategy Europe, who, in Greek mythology, was tricked off to Crete, by the god Zeus (who took the form of a bull for the occasion). The US states regarding general covenants. There are 8 euro coins denominated in 2 and 1 euros, 50, 20, 10, 5, 2 and 1 cents. Every one of these notes will carry a famous European icon. On the obverse, each Member State will deco-
rate the coin with their own mark. No matter which state mint it is the only that each numeraire exists inside the 12 Member States. For example, a French Central bank will be able to give a free dime in Berlin using a one-cent coin carrying the crowned figure of Hipocrates. The common European face of the coins represents a map of the European Union against a background of tuskine lines in which are located the coins of the European Union. The 1, 2, and 5 coins carry emphasis on Europe's place in the world while the 10, 20, and 50 present the Union as a gathering of nations. The 1 and 2 note coins depict Europe without frontier. Final designs were agreed at states general covenants. The new currency's name was another proble-
men until "Euro" was chosen in December 1995. The Maastricht Treaty was previously known in the United States as the American or French or German or British or whatever European currency. The German chancellor, Helmut Kohl, had a previous plan proposal for a Germanic "Eur" or "E." Other proposed names included the Franken and the Silverling. It is a novel term for a novel currency. Euro is a "new creation" that has been compared with the name "£" used in the United States. The British prime min-
ister complained that the euro covenants would not the ideal currency through such states (nullifying pound par value). The French covenants that the name sounds like their word forerror. Nonetheless, euro is in-

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The Theory of Optimum Currency Areas

There is little doubt that the European monetary integration process has helped increase the political goal of its founders by giving the European Union the ability to coordinate policies in areas that previously were beyond its jurisdiction. This is the survival and future development of the European monetary system depend more heavily, however, on its ability to help countries maintain their economic goals. What is less clear however is whether the country's political power to fix its exchange rate is a country to fix its exchange rate is a principle tool in economic success as well as to be successful. We saw in Chapter 19 that by changing their exchange rate, a country may succeed in offsetting the damaging impact of various economic shocks. On the other hand, exchange rate flexibility can have potentially harmful effects, such as making relative price less predictible or undermining the government's ability to keep inflation in check. To weigh the
to make such revaluations and devaluations adequate against the euro by EU members outside

the euro zone and to give would-be EMU entrants a way of satisfying the Maastricht Treaty's exchange rate stability convergence criteria. Under ERM 2, either the ECB or the EC's new central bank take on an euro member with a significant currency, thus improving its international competitiveness.
Economic integration and the benefits of a Fixed Exchange Rate Arrangement: The G3 Schedule

Consider how an individual country, for example, Norway, might approach the decision of whether to join as part of a fixed exchange rate arrangement, or the euro zone. Norway is a good example of European country, which experienced integration through international trade and financial integration.21

In the diagram, we see economic benefits and costs for joining a fixed exchange rate area. The analysis leading to this conclusion, which is known as the optimum currency area theory, suggests that fixed exchange rates are more appropriate for areas closely integrated through international trade and financial integration.22

A major economic benefit of fixed exchange rates is that they simplify economic calculations and provide more predictable costs for decisions that involve international transactions than the floating rates. Imagine the time and resource, both public and private, required every day each of the 50 U.S. states has its own currency that fluctuates in value against the currencies of all the other states. Norway faces a similar disadvantage in a trade with the euro zone when it allows its kroner to float against the euro.

The monetary efficiency gain from joining the fixed exchange rate system offsets the gain of being away from the uncertainty, confusion, and voluntary constraints that arise when exchange rates float.23

In practice, it may be used to attract a precise number to the size of the monetary union. Efficient gains Norway would enjoy as a result of being in the euro zone, but the same trade-off, however, that a gain will be if Norway enters a euro zone, that a gain will be if Norway enters a euro zone, for example, the euro zone accounts for 50 percent of its OEE generation with the European Monetary Union (EMU) countries.

In general, Norway's economic benefit from joining the euro zone is significant that when trade between Norway and the euro zone is extensive than when it is small. The monetary efficiency gain from being in the euro zone will also be higher if the factors of production are not freely between Norway and the euro area. Norwegians who invest in euro zone countries benefit from the return on their investments are more predictable. Similarly, Norwegians who work in euro zone countries may benefit if a fixed exchange rate area sees their wages more stable relative to Norway's cost of living.

Our conclusion is that a high degree of economic integration between a country and a fixed exchange rate area suggests the monetary efficiency gain from being in a currency union outweighs the losses from being in a floating exchange rate regime against the area's currency. The main reasons are close trade links and factor movements, the purpose of the euro zone is to achieve monetary efficiency gain in Norway from being in the euro zone. The euro zone's position reflects the conclusion that the monetary efficiency gain is a country's gain by joining a fixed exchange rate area that is its economic integration with the area increases.

In our example, we have implicitly assumed the level of the exchange rate. In the euro zone, there is a stable and predictably low level. If it is true, the greater stability in Norway's price level that would follow a decision to join the euro zone would likely offset any monetary efficiency gain a fixed exchange rate relationship might provide. A difficult problem area is Norway's commitment to fix the kroner's exchange rate is not fully believed by economic actors. In this situation, some exchange rate uncertainty would remain and Norway would therefore enjoy a smaller monetary efficiency gain. If the euro zone's price level is stable and Norway's exchange rate commitment is firm, however, the euro zone benefits.23

The green line shows the relative gains in the euro zone. The green line shows the relative gains in the euro zone.
CHAPTER 20 Optimum Currency Areas and the European Experience

Economic Integration and the Costs of a Fixed Exchange Rate Area: The UL Schedule

In Chapter 19 the discussion of the relative merits of fixed and floating exchange rates centered on the case where the economy is disturbed by a change in the output market (that is, by a shift in the IS schedule). A floating exchange rate has an advantage over a fixed rate: It automatically adjusts the economy’s output and employment by allowing an immediate change in the relative price of domestic and foreign goods. Furthermore, you will recall from Chapter 17 that when the exchange rate is fixed, purveyors of substitution are more difficult because monetary policy has no power at all to affect domestic output. Given these two conclusions, we expect changes in the DD schedule to have more severe effects on the economy to which the monetary authority is required to respond as the exchange rate rises against foreign currencies. The zero instability caused by the fixed exchange rate is the economy’s stability bonus.

To derive the UL schedule we must understand the extent of Norway’s economic integration with the euro area and the flow of this flow in economic stability. Imagine that Norway is pegging to the euro and there is a fall in the aggregate demand for Norway’s output—either through a shift of Norway’s DD schedule. If the DD schedule of the euro area...
be analogous to an increase in the size of movements in Norway's DD curve and would push Norway's economic stability loss from pegging to the euro. In any case, these arguments do not change our earlier conclusion that Norway's stability loss from fixing the kroner exchange rate falls as the extent of its economic integration with the euro zone rises.

An additional consideration that we have not yet discussed is the argument that the economic stability loss to Norway from pegging to the euro is lower when Norway and the euro zone engage in a large volume of trade. Large imports from the euro zone make up a large fraction of Norwegian workers' consumption. Thus, changes in the kroner exchange rate may rapidly affect nominal Norwegian wages, reducing any impact on employment. A depreciation of the kroner, however, increases, for example, creates a sharp fall in Norwegian living standards when imports from the euro zone are substantial. Workers are likely to demand higher nominal wages from their employers to compensate for the loss. In this situation, the nominal overvaluation, stability loss, may gain fame from floating exchange rate is small, so the country has little to lose by fixing the kroner exchange rate.

We conclude that a high degree of economic integration between a country and the fixed exchange rate area that it joins reduces the resulting economic stability loss due to output market disturbances. The LS schedule shown in Figure 20.5 illustrates the conciliation. The figure's horizontal axis measures the joining country's economic stability loss. As we have seen, LL has a negative slope because the economic stability loss from pegging to the area's currencies falls as the degree of economic interdependence rises.

The Decision to Join a Currency Area: Putting the GG and LL Schedules Together

Figure 20.6 combines the GG and LL schedules to show how Norway should decide whether to fix its kroner's exchange rate against the euro. The figure implies that Norway should fix its kroner if it chooses a degree of economic integration between Norwegian workers and those of the euro zone that is at least equal to $B$, the integration level determined by the intersection of GG and LL at point $B$.

Let's not why Norway should peg to the euro if its degree of economic integration between its workers and those of the euro zone is at least $B$. Figure 20.6 shows that for levels of economic integration below $B$, the GG schedule lies below the LL schedule. Thus, the loss Norway would suffer from greater output and employment instability after joining exceeds the monetary efficiency gain, and the country would do better to stay free.

When the degree of integration is $B$ or higher, however, the monetary efficiency gain measured by GG is greater than the instability sacrifice measured by LL, and pegging the kroner's exchange rate against the euro results in a net gain for Norway. Thus the intersection of GG and LL determines the minimum integration level (here, $B$) at which Norway should choose to peg its currency to the euro.

The GG-LL framework has important implications about how changes in a country's economic environment affect its willingness to peg its currency to an outside currency area. Consider, for example, an increase in the size and frequency of sudden shifts in the demand for the country's exports. As shown in Figure 20.7, such a change pushes LL upward to $L'$. As any level of economic integration with the currency area, the extra...
CHAPTER 28 Optimum Currency Areas and the European Experience

CASE STUDY

Is Europe an Optimum Currency Area?

The theory of optimum currency areas gives us a useful framework for thinking about the consequences that determine whether a group of countries will gain or lose by fixing their nominal exchange rates. A nation’s gains and losses from pegging its currency to an exchange rate are not hard to measure economically, but by combining our theory with information on actual economic performance we can evaluate the claim that Europe, most of which is likely to adopt or peg to the euro, is an optimum currency area.

The Extent of Intra-European Trade

Our earlier discussion suggested that a country is more likely to benefit from joining a currency area if the area’s economy is closely integrated with its own. The overall degree of economic integration can be judged by looking at the integration of product markets, that is, the extent of trade between the joining country and the currency area, and at the integration of factor markets, that is, the ease with which labor and capital can migrate between the joining country and the currency area.

Most EU members export from 10 to 20 percent of their output to other EU members. These numbers are larger than those for the EU-U.S. trade, which is only around 2 percent of U.S. GDP and an even smaller percentage of EU GDP, but much smaller than the amount of trade between regions of the United States. If we take trade relative to GDP as a measure of economic integration, the GG-LE model is the best option since it has a joint fluid exchange rate area and allows for the risk of output shocks after 1973 made countries unwilling to revert the Brunei Woods system of fixed exchange rates (Chapter 17).

What is an Optimum Currency Area?

The GG-LE model we have developed suggests the theory of the optimum currency area. Optimum currency areas are groups of nations with economies closely linked by trade in goods and services and by factor mobility. This trade failure flows from one finding that a fixed exchange rate area will best serve the economic interests of each of its members if the degree of output and factor trade among the included economies is high.

This perspective helps us understand, for example, why it may make sense for the United States, Japan, and Europe to allow their mutual exchange rates to float. Even though these regions trade with each other, the extent of trade is not much compared with regions like OPEC and interregional labor mobility is low. In 1997, for example, U.S. merchandise trade with Western Europe (measured as the average of imports and exports) amounted to only about 3 percent of U.S. GDP. Merchandise trade with Japan was even smaller.

The more interesting question, and the critical one for judging the economic success of EMU, is whether Europe itself makes up an optimum currency area. We take up this topic next.
making price comparisons more transparent, will foster greater integration in EMU product mar-
ket. Even if a marked tendency toward price convergence does not in, however, as cause may be
a factor unrelated to the 1992 measures or the euro. Internet marketing.
On balance, it seems doubtful that the 1992 measures have yet produced Europe dramatically closer to being an optimum currency area. It may happen, however, that the single currency itself 
forces greater trade among member of the euro zone. The box on p. 458 discusses some new evidence on that prospect.

How Mobile Is Europe’s Labor Force?
Earlier we mentioned that the European Union did not succeed in removing internal passport
checks by the original deadline of Jan. 1, 1993. The main barriers so labor mobility within
Europe are probably not due to border controls, however. Differences in language and culture
discourage labor movement between European countries to a great extent that is true. For
example, between regions of the United States. In one economic study comparing emigra-
emotion patterns in U.S. regions with those in EU countries, Barry Eichengreen of the Uni-
versity of California, Berkeley, found that differences in regional unemployment rates are small-
ess and less pervasive in the United States than are differences between national unemployment rates in the European Union.20
Even within European countries labor mobility appears limited, partly because of government regulations. For example, the requirement in some countries that workers establish evidence before receiving unemployment benefits makes it harder for unemployed workers to seek jobs in regions that are far from their current homes. Table 3D-1 presents evidence on the frequency of regional labor movement in the largest EU countries, as compared with Japan and the United States. Although these data must be interpreted with caution because its definition of "regions" differs from country to country, they do suggest that in typical Japan and Americans were significantly more mobile than Europeans.21

Other Considerations
While the GG-LL model is useful for organizing our thinking about optimum currency areas, it is not the whole story. At least two other elements affect our evaluation of the euro currency area's past and prospective performance.

Similarity of Economic Structures. The GG-LL model tells us that extensive trade with the rest of the euro zone makes it easier for a member to adjust to output market disturbances that affect it and in currency terms differently, but it does not tell in what factors will reduce the frequency and size of member-specific product market shocks.

A key element in minimizing such disturbances is similarity in economic structures, especially in the types of products produced. Euro zone countries are not entirely dissimilar in manufactur-
ing structure, as evidenced by the very high volume of intra-EU trade—three to four times greater trade than member of the euro zone. The box on p. 458 discusses some new evidence on that prospect.

PART 4 International Macroeconomic Policy

CHAPTER 38 Optimum Currency Areas and the European Experience

How Much Trade Does Currency Unions Create?

Economic studies seeking to estimate the effect of exchange rate stability on trade have generally proved unilluminating. EMUs are much more, however, than a fixed exchange rate system. It is a true currency union in which all members share a single money in the broader sense. Thus, it cannot be said that all the real effects of the EMU on international trade are that of a full, fully integrated single currency area.

Andrew Rose of the University of California, Berkeley, set out to test this hypothesis, using 1970-1990 data on 149 countries, 50 currencies, 23 industries, and 428 output time-series. One main limitation in the approach was to study the effect of currency unions on output by country and not on the country as a whole.

The findings were not as straightforward as the hypothesis that currency unions protected countries that trade with one another. Of the total union, two countries that are unions of two countries have trade agreements.


The trouble is that the effect of the EMU on trade will be determined by the trade policies of the member countries.

The empirical evidence on the impact of EMU on trade is mixed. Some studies find a positive effect, while others find no effect. However, the evidence suggests that the effect of EMU on trade is likely to be small and may not be statistically significant.

Many economists argue that the EMU has made trade within the eurozone easier and more efficient. Others believe that the EMU has had little impact on trade. The evidence is not conclusive, and more research is needed to understand the impact of the EMU on trade.

Nevertheless, the EMU has had some positive effects on trade. For example, the elimination of exchange rate risk has made trade within the eurozone more attractive. In addition, the removal of tariffs and other trade barriers has made trade easier.

The EMU has also had some negative effects on trade. For example, the introduction of a common currency has made it more difficult for countries to adjust their economies in response to shocks. In addition, the EMU has made it more difficult for countries to conduct independent monetary policies.

In summary, the EMU has had both positive and negative effects on trade. The evidence suggests that the effect of the EMU on trade is likely to be small and may not be statistically significant.

Write a short essay on the impact of the EMU on trade and the factors that have contributed to the mixed evidence on the impact of the EMU on trade.
In 1997 Ireland and the Netherlands both had inflation rates no more than 1.5 percent above the average of the three lowest EU inflation rates. Subsequently, however, both countries violated that norm, which is one of the Maastricht Treaty's tests for admission to the euro club.

The Future of EMU

Europe's single currency experiment is the boldest attempt ever to map the efficiency gains from using a single currency over a large and diverse group of sovereign states. EMU succeeds, it will presage European political as well as economic integration, focusing prize and prosperity in a region that could normally include centrist Europe. If EMU fails, however, its driving force, the goal of European political unification, will be set back.

1. Europe is not a homogenous currency area. Therefore, asymmetric economic developments within different countries of the euro zone—developments that might well call for different national interest rates under a regime of individual national currencies—will be hard to handle through monetary policy. Even in the event’s launch was being prepared at the end of 1998, for example, Germany’s economy was experiencing negative growth rates while those of Spain, Portugal, and Ireland were growing at healthy ones. Since the national governments within the EU already recently have been accustomed to having full sovereignty over national economic policies, such macroeconomic asymmetries are likely to lead to political pressures on the ECB much stronger than the ones that typically emerge in long-standing political unions such as the United States.

2. A related potential problem is that the single currency project has taken economic risks to a level far beyond when the EU perhaps could (or will) do in the area of political union. European economic uniion has a centralized power (the ECB) and a comparable expression in the euro; the political counterparts are much weaker. Many Europeans hope that economic union will lead to closer political union, but it is also possible that countries over economic politics will sabotage that aim. Furthermore, the lack of a strong EU political center may limit the ECB’s political legitimacy in the eyes of the European public. There is a danger that votes throughout Europe will come to view the ECB as a distant and politically unaccountable group of technocrats irresponsible to people’s needs. The Bundesbank became a venerable and powerful institution within Germany because of its track record in delivering price stability and its constant efforts to remind the German public about the dangers of inflation. The ECB begins its life with no such record at all—and facing a European public less concerned than the Germans by inflationary past.

3. In view of the larger EU countries, labor markets remain highly oriented and subject to high government employment taxes and other regulations that impede labor flexibility within industries and regions. The result has been persistently high levels of unemployment. Unlike labor markets become much more flexible, as in the United States; a currency union, individual eastern European countries will have a different timeframe adjusting to economic shocks. Advocates of the euro have argued that the single currency, by removing the possibility of intra-EMU currency realignments, will improve discipline or workers’ wages demands and speed the stabilization of labor within national governments. It is equally plausible, however, that workers in different euro zone countries will press for wage harmonization to reduce the very high incentives of capital to migrate to the EMU countries with lowest wages.

4. Countries on national fiscal policy due to the Stability and Growth Pact (SGP) are likely to be especially parlous due to the absence of substantial fiscal federalism within the EU. It remains to be seen if the SGP will be strictly enforced, and if the EU will develop more aggressive strategies for carrying out fiscal transfers from country to country within the euro zone. As the run-up to 1998, EU countries made heroic efforts to separate both government budget deficits within the 3 percent GDP limit set by the Maastricht Treaty. Some euro zone countries may still run afoul of the SGP, however, because their apparent fiscal risk in many cases involved one-time measures or "creative accounting." All of these countries must carry out further fiscal restructuring, in any
ever, to avoid losing government deficits in the future. Unfortunately the G7, while it is keenly enforced, may require the most severe measures during recessions, when the counter-cyclical effects would not be most desired.  
5. The EU is considering a larger-scale expansion of its membership into Eastern Europe and the Mediterranean. That plan raises numerous far-reaching challenges for the EU, but some of these remain implicit implications for the EMU project. For example, the ESCB's governing council, which every euro-zone member country has a representative on, would become very unwieldy without a stronger national government presence. Moreover, the central bank would have a role in managing common euro-zone interest rates. In all, such changes are crucial for any real success of the EMU project, are likely to be emotional challenges as well, and may be seen as even more difficult to delineate in the near future.

Thus, EMU faces significant challenges in the years ahead. The experience of the United States shows that a large monetary union comprising diverse economic zones can work quite well. If EMU is to achieve even more success, however, it will have to maintain stable exchange rates, a flexible and stable external trade, a strong and stable currency, and in short-term politics. European nationalisation itself will be impeded unless EMU can make its inflation targets, the ECB, succeed in delivering prosperity as well as price stability.

Summary

1. European Union countries have had two main reasons for favoring monetary union: steady exchange rates. They believe monetary cooperation will give them a larger voice in international economic endeavors, and they view fixed exchange rates as a component of EU initiative aimed at building a common European market.

2. The European Monetary System of fixed euro-zone exchange rates was inaugurated in March 1979 and originally included Belgium, Denmark, France, Germany, Ireland, Italy, Luxembourg, and the Netherlands, Austria, Britain, Portugal, and Spain given their own terms. Capital controls and frequent changes were essential ingredients in maintaining the system until the mid-1980s, but since then countries have been allowed to participate in its workings. In August 1993 most EMS currency bonds were widened to ±15 percent in the face of continuously increasing demands.

3. To prevent all EMS currencies were pegged to the D-mark. As a result Germany was able to set monetary policy for the EMS, just as the United States did in the Bretton Woods system. This credibility of the EMS holds that participating governments pledged to support any United States which they pegged their currencies to the D-mark. In fact, inflation rates in EMS countries ultimately tended to converge around Germany's generally low inflation rate. Critics of Germany charge, however, that on occasion a abused its dominant position by negotiating the effects policies had on other EMS countries.

4. On January 1, 1999, eleven EU countries initiated the economic and monetary union (EMU) by adopting a common currency, the euro, issued by the Euro-system of Central Banks (ESCB). The initial eleven members were joined by Greece as of 2001. The ESCB consists of eleven national central banks and a European Central Bank, headquartered in Frankfurt, whose governing council sets monetary policy at the ECB. The transition process from the EMS fixed exchange rate system to the EMU was initiated in the Maastricht Treaty, signed by European leaders in December 1997.

5. The Maastricht Treaty specified a set of macroeconomic convergence criteria that EU countries would need to meet to qualify for EMU membership. A major purpose of the convergence criteria was to control votes in low-inflation countries such as Germany that the new, jointly managed European currency would be as resistant to inflation as the DM had been. A Stability and Growth Pact (SGP), devised by EU leaders in 1997 and at Germany's insistence, aims to maintain the flexibility of EMU members to carry out fiscal policy at the national level. The SGP and EMU together could therefore divest individual countries in the euro zone of fiscal policy at all as well as monetary policy.

6. The theory of optimum currency areas implies that countries will seek to join fixed exchange rate zones closely linked to their own economies through trade and tourism. Mobility, a country's decision to join an exchange rate area is determined by the difference between the anchor inflation rate from joining the optimal solution. The G-U diagram displays both of these factors in the degrees of economic integration between joining country and the larger fixed exchange rate zone. Only when economic integration reaches a critical level will benefit from joining. The European Union does not appear to satisfy all of the criteria for an optimum currency area. Although 1992 removal many barriers to market integration within the European Union, even EMU itself is not very extensive. In addition, labor mobility between and within EU countries appears more limited than within other large currency areas such as the United States. Finally, the level of job destruction in the European Union is too small to cushion smaller countries from adverse economic events.

Key Terms

credibility theory, p. 669

Maastricht Treaty, p. 612
economic and monetary union (EMU), p. 669
monetary efficiency gains, p. 618
economic stability lines, p. 630
European Monetary System (EMS), p. 677
optimum currency areas, p. 648

Problems

1. Why might EMU provisions for the extension of central bank credits from strong- to weak-currency members have increased the stability of EMS exchange rates?

2. In the EMS before September 1992 the lender/Garency exchange rate could fluctuate by up to ±15 percent up or down. Assume that the inside EMU currency parity and bond value are set arbitrarily and would not be changed. Would there have been the maximum possible...
differences between the interest rates on two-year and DM deposits? What would have been the maximum positive difference between the interest rates on two-year bonds and DM deposits? Or three-month deposits? Do these interest rates surprise you? Give an economic explanation.

2. Compare the last question. Imagine that in May the interest rate on five-year government bonds was 11 percent per annum. In Germany the rate on ten-year government bonds was 8 percent per annum. What would have been the implications for the creditworthiness of the current Eurodollar exchange policy?

3. Do your answers to the last two questions require an assumption that interest rates and expected exchange rate changes are linked by interest parity? Why or why not?

4. Why do we not see that the cost, but once again, DMU benefits from a favorable shift in the worst demands for near-Norwegian EMU exports. What happens to the exchange rate of the Norwegian krone against the Euro? How does that change the picture of the volume of trade between Norway and the euro zone economics?

5. Use the GO-LE diagram to show how an increase in the size and frequency of interwoven shifts in a country's currency market function affects the level of economic integration with a currency area at which the country will wish to join.

6. During the speculative pressure on the EMS exchange rate mechanism (ERM) shortly before Britain allowed the pound to float in September 1992, the Economist, a London weekly news magazine, opined as follows:

The British government's critics were lower interest rates, and that would help be if Britain developed stronger, leaving the ERM if necessary. They say no go. Quitting the ERM would soon lead to higher, not lower, interest rates, as Britain's economic management has been able to show. One estimate points more than German rates. Today, the gap is half a point, narrowing investors' belief that British inflation is on its way down—permanently. (See "Crises! What Crises?") Economist, August 29, 1992, p. 51.)

a. Why might the British government's critics have thought it possible to lower interest rates after hurting sterling out of the ERM? (chicka was in a deep recession at this time the article was written.)

b. Why did the Economist think the opposite would occur soon after Britain stayed the ERM?

7. Is this way might ERM membership have gained credibility for British policies? (It was entered into ERM in October 1995.)

8. Why would a high level of British nominal interest rates relative to German rates have suggested an appreciation of high future British inflation? Can you think of other explanations?

9. Suppose two countries why British interest rates might have become simultaneously higher than German rates at the time of writing, despite the alleged "belief" that British inflation is on its way down—permanently.

10. Compare the ERM to a team of currency unions with a single currency but that entered no European Central Bank to manage this currency. Instead, imagine that the team was left to the various national central banks, each of which was allowed to issue
CHAPTER 21
The Global Capital Market: Performance and Policy Problems

The International Capital Market and the Gains from Trade

In earlier chapters, the discussion of gains from international trade centered on exchanges involving goods and services. By providing a world-wide payments system that amortized trans-


onal transactions, banks active in the international capital market enlarge the trade gaps that result from such activities. But most deals that take place in the international capital market result in exchanges of assets between residents of different countries, for example, the exchange of a share of IBSC stock for some British government bonds. Although such asset trades are sometimes described as imitative "speculation," they do, in fact, lead to gains from trade that can make consumers everywhere better off.

These Three Gains from Trade

All transactions between the residents of different countries fall into one of three categories: trades of goods or services for goods or services, trades of goods or services for assets, and trades of assets for assets. As any moment, a country is generally carrying out trades in each of these categories. Figure 21-1 (which assumes that there are two countries, Home and Foreign) illustrates the three types of international transaction, each of which involves a different set of possible gains from trade.

So far in this book we have discussed two types of trade gain. Chapters 2 through 6 showed that countries can gain by concentrating on the production activities in which they are more efficient and using some of their surplus to pay for imports of other products from abroad. This type of trade gain involves the exchange of goods or services for other goods or services. The top horizontal arrow in Figure 21-1 shows exchanges of goods and services between Home and Foreign.

A second set of trade gains comes from intranational trade, which is the exchange of goods and services within a single country, such as the exchange of goods and services for other goods and services. Figure 21-1 (Chapters 7 and 11). When a developing country borrows abroad (that is, with a bond in foreigner's) so that it can import materials for a domestic investment project, it is engaging in intranational trade. The borrowing country gains from this trade because it can carry out a project that it could not easily finance out of its domestic savings alone; the lending country gains because it gets assets that yield a higher return than is available at home. The diagonal arrows in Figure 21-1 indicate trades of goods and services for assets. If Home has a current account deficit with Foreign, for example, it is not exporter of assets to Foreign and is a net importer of goods and services from Foreign.

The horizontal arrow in Figure 21-1 represents the last category of international transactions, trades of assets for assets, such as the exchange of capital located in France for U.S. Treasury bonds. In Table 12.2, which shows the year 2000 U.S. balance of payments accounts, you can see the international capital account both $533.3 billion purchase of foreign assets by U.S. residents (a financial inflow) and a $452.6 billion purchase of U.S. assets by foreign residents (a financial outflow). While the United States could have financed its $453.4 billion current account deficit for 2000 simply by selling in foreigners $453.4 billion worth of assets, U.S. and foreign residents who engaged in the large volume of pure asset swapping. Such a large volume of trade in assets between countries occurs because international asset trades, like sales involving goods and services, can yield benefits in all the countries involved.
Portfolio Diversification as a Motive for International Asset Trade

International trade in assets can make both parties on the trade better off by allowing them to reduce the riskiness of the resources on their balance sheets. Instead of hedging their bets on a single source of revenue, they can hedge against that revenue in various industries and/or from different countries. This diversification reduces the riskiness of their entire portfolio and increases the overall profitability of the trade.

In general, a portfolio where assets fluctuate widely from year to year is less desirable than one that shows more average returns with only mild year-to-year variations. This realization is useful in understanding why countries exchange assets.

Risk Aversion

When individuals select assets, an important factor in their decision is the riskiness of each asset's return (Chapter 13). Even if things happen as planned, people dislike risk. Economists call this property of peoples' preferences risk aversion. Chapter 13 showed that risk-averse investors in foreign-currency assets bear their losses in a particular asset on its return (as measured by a risk premium) in addition to its exposed resources. An example will make the meaning of risk aversion clear. Suppose you are offered a gamble in which you win $1000 half the time but lose $2000 half the time. Since you are as likely to win as to lose, the average payoff on this gamble—its expected value—is $(1/2) \times (1000) + (1/2) \times (-2000) = -500$. If you are an risk-averse, you will not take the gamble because, for you, the possibility of losing $1000 outweighs the possibility that you will win, even though both outcomes are equally likely. Although some people (called risk lovers) enjoy taking risks and would take the gamble, there is much evidence that risk-averse behavior is the norm. For example, risk aversion helps explain the profitability of insurance companies, which sell policies that allow people to protect themselves or their families from the financial risks of death, illness, and other mishaps.

If people are risk averse, a value of a collection (or portfolio) of assets not only on the basis of its expected returns but also on the basis of the riskiness of that return. Under risk aversion, for example, people may be willing to hold bonds denominated in several different currencies, even if the interest rates they offer are not linked by the interest parity condition, if the resulting portfolio of assets offers a desirable combination of returns and risk.
The above example is oversimplified because countries can never really eliminate all risk through international trade. (Unlike the real world, the real world is a risky place even in the aggregate.) The example does demonstrate that countries can nonetheless reduce the real estate of their abilities by diversifying their asset portfolios internationally. A major function of the international capital market is to make this diversification possible.2

The Scope of International Asset Debt Versus Equity

Long-term international activity can be exchange of many different types of assets. Among the many assets traded in the international capital market are bonds and deposits denominated in different currencies, shares of stock, and more complicated financial instruments such as mortgage-backed securities, foreign real estate, and the direct acquisition of a factory in another country. The many ways of diversifying abroad:

In choosing how to allocate their savings, it is frequently useful to make a distinction between debt instruments and equity instruments. Bonds and stock deposits are debt instruments, since they specify that the owner of the instrument is owed a fixed value (the sum of principal plus interest) at a specific time. In contrast, a share of stock is an equity instrument. It is a claim to a firm's profits, rather than to a fixed payment, and its owners can participate in the profits of the firm.

The dividing line between debt and equity is not a neat one in practice. Even if an investor's current money pays off is the same in alternative one, it pays on a stock's time, it pays in the time, it pays in the the time. The same is true for most developing countries, as we will see in Chapter 22.

International Banking and the International Capital Market

The Foreign-Foreign flows across borders constitute an international market with only two assets. Since the number of assets available in the real world is enormous, specialized institution have sprung up to bring together buy and sell assets of different countries.

The International Capital Market is a complex world with only two assets. Since the number of assets available in the real world is enormous, specialized institutions have sprung up to bring together buy and sell assets of different countries.

1. Commercial banks. Commercial banks are the center of the international capital market, not only because they are the international payments mechanism but because of the broad range of financial activities they undertake. Bank activities consist chiefly of dealing in deposits of various maturities, while their assets consist largely of loans (to corporations and governments), deposits at other banks (interbank deposits), and bonds. Multinational banks are also heavily involved in foreign currency transactions. As an example, banks may sell or issue corporate stocks and bonds by foreign corporations in a foreign currency. The proceeds may then be used to finance international trade.

2. Corporations. Corporations are also important in the international capital market. Corporations frequently buy and sell foreign currency, and they often sell corporate bonds in foreign countries. Corporations also finance international trade.

3. The international capital market has been called the "international capital market." The term is used to designate a market in which financial assets are traded. The market includes international banks, corporations, and other institutions.

4. Central banks and other government agencies. Central banks are routinely involved in the international financial markets through foreign exchange intervention. In addition, other government agencies often participate in foreign exchange markets. However, the majority of foreign exchange trading is done by commercial banks.

5. The structure of the international capital market is a complex world with only two assets. Since the number of assets available in the real world is enormous, specialized institutions have sprung up to bring together buy and sell assets of different countries.
BRITISH AMERICAN TOBACCO
B.A.T. International Finance n.v.
£1.7 billion
4pen Eurobonds due 2009
Guaranteed by British American Tobacco p.l.c.
Issued under US$200,000,000 Euro Medium Term Note Programme
Settlement in sterling
London Stock Exchange
Board of Directors
Dudley Kinghorn Deasoo
Andrew Hughes
Banque Nationale de Paris
HSBC Markets
Lead Managers
Baresi & Partners
Crédit Lyonnais
Société Générale de Banque
J.P. Morgan
Morgan Stanley Dean Witter
National斯g Short Sale International
Barclays Peinary International

In 1991, conversion of international underwriters helped a tobacco company issue euro-denominated bonds.


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Polted and Hungary, which once had closed economies, are now heavily indebted to Western capital markets.

Growth of the International Capital Market

On any measure, the scale of transactions in the international capital market has grown more quickly than world GDP since the mid-1970s. One major factor in this development is that countries, starting with deutschmark in the industrial world, have progressively dismantled barriers to private capital flows across their borders.

An important cause for this development is related to exchange rate systems. We saw in Chapter 17 that a currency's value in terms of exchange rates can vary according to international capital movements and independent financial policy. This variation allows the imposition of a country's having more than two heads for the following list:

1. Floating exchange rate.
2. Monetary policy oriented toward domestic goals.
3. Precedent of international capital movements.

The result is a "silence" for policy-makers rather than alternative because the available options are 1 and 2, 1 and 3, or 2 and 3. Under the gold standard (Chapter 13), for example, countries gave up monetary policy as some of gold exchange rates and locations of international payments, causing the monetary system to either 1 and 3 from the preceding text.

When industrialized countries gave up fixed exchange rates at the end of the Bretton Woods period, they chose a system that allowed to combine international capital mobility with a domestically oriented monetary policy. As a result, they had to develop in a supportive monetary system to international money market. The exchange of the European monetary union and European monetary union have followed an effort to focus on its multinational exchange rates and commitments at a common central bank. However, the euro fixed exchange rates against foreign currencies and the cost not as a single entity in an effort to bring monetary policy toward European monetary union goals while providing freedom of interest rate

Offshore Banking and Offshore Currency Trading

One of the most pervasive features of the international banking industry in the 1960s was that banking services have become globalized as banks have branched out from their home countries into foreign financial centers. In 1980 only eight American banks had branch offices in foreign countries, but now hundreds have such branches. Similarly, the number of foreign bank offices in the United States has risen steadily.

The term offshore banking is used to describe the business that banks' foreign offices conduct outside their home countries. Banks may conduct foreign business through any of these types of institution:

1. An agency office located abroad, which arranges loans and transfers funds but does not accept deposits.
2. A subsidiary bank branch abroad. A subsidiary of a foreign bank differs from a local bank only in that the foreign bank is the controlling owner. Subsidiaries are subject to

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The growth of offshore currency trading has been far less land based than that of offshore banking. An offshore bank is simply a bank deposit denominated in a currency other than that of the country in which the bank resides—for example, yen deposits in a London bank or dollar deposits in Moscow. Many of the deposits traded in the foreign exchange market are offshore deposits. Offshore currency deposits are usually referred to as Eurocurrency deposits, something of a misnomer since much Eurocurrency trading occurs in such non-European centers as Singapore and Hong Kong. Dollar deposits located outside the United States are called Eurodollars. But the source acronym denominated in Eurocurrencies (Eurodollars) are called Eurodollars. The advent of the new European currency, the Ecu, has made this terminology even more confusing.

One realization for the rapid growth of offshore banking and currency trading has been the growth of international trade and the increasingly multinational nature of corporate activity. American firms engaged in international trade, for example, require overseas financial services, and American banks have substantially expanded their domestic businesses with these firms into foreign areas. By offering these new, rapid-credit channels of finance and the flexibility and speed established in previous dealings, American banks compete with the foreign banks that could also serve American customers. Eurocurrency trading is another natural outgrowth of expanding world trade in goods and services. It is important of American goods frequently need to hold dollar deposits, for example, and it is natural for banks based in London to want their clients’ money.

World trade growth, however, cannot explain the growth of international banking since the 1950s. Several other factors have driven the rapid expansion of international banking and lending which would not be required by the growth of world trade. One factor is the banks’ desire to escape domestic government regulations on financial activity and (sometimes taxes) by shifting some of their operations abroad and into foreign currencies. Another factor is that the banks were able to take advantage of the many operations open to financial institutions in foreign countries to assemble Eurocurrency deposits to screen globally for new business.

The Growth of Eurocurrency Trading

The growth of Eurocurrency trading underscores the importance of all these factors in the internationalization of banking. Eurodollar deposits were born in the late 1950s, a response to the seeds generated by a growing volume of international trade. European firms involved in trade frequently asked to hold dollar balances or to borrow dollars. In many cases, banks located in the United States could have served these needs, but Europeans often found it cheaper and more convenient to deal with local banks familiar with their circumstances. As a result, the banks less than the dollar became increasingly convertible after the late 1950s, offshore markets for them sprang up. While the convenience of dealing with local banks was a key factor in spurring the investment of Eurodollars, the growth of Eurodollar trading was encouraged at an early stage by both of the two other factors we have mentioned: official regulations and political concerns.

In 1957, the height of the devaluation crisis, the British government prohibited British banks from lending pesos or other non-sterling currencies. This lending had been a highly profitable business, and in no losing to British banks began financing the same trade by steering dollar-deposited and lending dollars instead of pounds. Because stronger financial regulations prevented the British banks from transmitting transactions from allowing Britain’s domestic asset markets, the government was willing to take a limited fixe attitude toward foreign currency activities. As a result, London became—and has remained—the leading center of Eurocurrency trading. The political factor stimulating the Eurodollar market’s early growth was an surprising one—the Cold War between the United States and the U.S.S.R. During the 1950s the Soviet Union acquired dollars (largely through sales of gold and other raw materials) as that is credit purchased goods such as grains from the West. The Soviet Union’s dollar deposits might eventually be dollars placed in American banks if the Cold War were to be up. So instead, Soviet dollars were placed in American banks, which had the advantage of hedging out for the value of dollars. Indeed, the follow-ups of international banking has had the term “Eurodollar” substituted for the title code of a Soviet-controlled bank.

The Eurodollar system rationalized in the 1950s as a result of new U.S. restrictions on capital outflows and U.S. banking regulations. As American balances of payments repressed in the 1950s, the Kennedy and Johnson administrations imposed a series of restrictions on the American money market to allow American dollars to circulate in Europe and to take advantage of foreign dollar deposits. The first of these was the Interest Equalization Tax of 1963, which discouraged Americans from buying foreign assets by imposing those assets’ returns. Next, in 1965, came “voluntary” guidelines on the amount Americans could borrow abroad, followed three years later by act of voliticc-carrying monetary controls. All these measures increased the demand for Eurodollar loans by making it safer for American borrowers to borrow in dollars. Official controls on dollar deposits and lending abroad were recognized in 1980 by the creation of Eurodollars—now Eurodollars and Eurobonds. The Eurodollar market grew rapidly in the 1970s and 1980s, as a response to the volatile oil market and the increasing use of Eurodollars for speculative purposes.

The Growth of Eurocurrency Trading

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The history of Euroclear shows how the growth of world trade, financial regulations, and political considerations all helped to propel the system. The major factor behind the continued success of Euroclear is, however, regulation: in formulating bank regulations, governments in the main Euroclear centers discriminate between deposits denominated in the home currency and those denominated in others and between transactions with domestic and foreign banks and those with foreign currencies. Domestic currency deposits are heavily regulated in a way of maintaining control over the domestic money supply, while banks are given much more freedom in their dealings in foreign currencies. Domestic currency deposits held by foreign customers may receive special treatment, however, if regulations facilitate their conversion to domestic financial systems from shifts in foreigners' asset demands.

The example of U.S. reserve requirements shows how regulatory asymmetries can operate to enhance the profitability of Euroclear trading. Every time a U.S. bank opens an account with a euroclear bank, it must opened some portion of that deposit in a non-member banking area at the Fed or in one of its regulated branches. The British regulatory authorities require reserve requirements on dollar-denominated deposits within its borders, but it does not impose reserve requirements on dollar-denominated deposits within its borders. Nor are the London branches of U.S. banks subject to U.S. reserve requirements on dollar-denominated deposits outside the United States. A London bank therefore has a competitive advantage over a New York bank in earning dollar deposits. It can pay more interest in its deposits than the New York bank while still covering its operating costs. The London bank's competitive edge is also its ability to avoid a "hit" (the reserve requirement) that the Fed imposes on domestic banks' dollar deposits.

Freedom from reserve requirements is probably the most important regulatory factor that makes Euroclear uneconomic to banks and their customers, but there are others. For example, Euroclear deposits are available in smaller amounts than the corresponding cash deposits of a member bank in the United States. Regulatory asymmetries like these explain why foreign financial centers whose governments impose the fewest restrictions on foreign currency banking have become the main Euroclear centers. London's lead in this respect is not just limited to Luxembourg, Bonn, Hong Kong, and other centers that have competed for international banking business by lowering transaction and taxes on bank operation within their borders.

Neither the United States nor Germany has an advantage in a significant share of the world's Euroclear business. U.S. banks apply fairly uniform regulations to all domestic deposits, regardless of their currency of denomination. Recently, however, the U.S. government has tried to help the American banking industry get a share of the action. In 1981, the Fed allowed American banks to use international banking facilities (IBFs) in the United States for the purpose of accepting time deposits and making loans to foreign customers. IBFs are not subject to reserve requirements or a margin call, and they are exempt from state and local taxes. But an IBF is prohibited from accepting deposits from or

4Alternatively, the bank could add the same amount in its holdings of cash, which also pay no interest. The discussion assumes the bank holds reserves in the Fed.


Many observers believe the largely unregulated nature of global banking activity leaves the world financial system vulnerable to bank failures on a massive scale. Is this a real threat? Is so, what measures must governnments take to mitigate it? The Problem of Bank Failure: A bank fails when it is unable to meet its obligations. Before one depositors' funds to make cash and to purchase assets, but some of a bank's borrowers may find themselves unable to repay their loans, or the bank's assets may decline in value for some other reason. In these circumstances the bank could find itself unable to pay off its deposits. A peculiar feature of banking is that a bank's financial health depends on the confidence of depositors, which is measured by the value of its assets. If depositors believe many of the bank's assets have declined in value, each has an incentive to withdraw his or her funds and place them in another bank. A bank faced with the whole loss of deposits (likely to close in decades, however, even if the asset side of its balance sheet is fundamentally sound. The reason is that many bank assets are illiquid and cannot be sold quickly to meet deposit obligations without substantial loss in the bank. If all the assets of financial panic develop. Therefore, bank failure may be limited to banks that have encouraged their asset. It is in the interest of each depositor to withdraw his or her money from a bank if all other depositors are doing the same, even when the bank's assets are sound.

Basic failures often result when financial harm on individual disciplines who lose their money. But beyond these individual losses, bank failure can harm the economy's macroeconomic stability. One bank's problems may easily spread to sound banks if they are suspected of having lost the bank to that is insoluble. Such a general loss of confidence in banks undermines the payments system on which the economy runs. And a rash of bank failures can bring a drastic reduction in the banking system's ability to finance investment and consumer-debt expenditure, thus reducing aggregate demand and throwing the economy into a recession. There is evidence that the surge of U.S. bank closings in the early 1930s helped start and sustain the Great Depression.
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5. Lender of last resort facilities. U.S. banks can become from the Fed’s discount window. While dissenting is a matter of monetary management, the Fed can also use discounting to prevent bank panics. Since the Fed has the ability to exert control, it can lead to banks facing excessive deposit outflows as much as they rely on the Fed’s discount policies’ claims. When the Fed acts in this way, it acts as a lender of last resort (LRR) to the banks. When deposits known to be strong in the LRR, it are therefore less likely to lose if financial trouble-looms. The aim of the LRR facility is to ensure that the banks will not lose money, since the LRR will always bail them out; they will take excessive risks. In the normal case, the Fed will not be able to drain through excessive risk-taking, the LRR must be involved in the bank examination process.

The banking safeguards listed above are important. Laxity in any area may cause other safeguards to fail. Deposit insurance, for example, may encourage banks to make risky loans because deposits no longer have any reason to withhold their funds even from extremely managed banks. The moral U.S. S&L crisis is a case in point. In the early 1980s, the U.S. deregulated the S&Ls. Before deregulation, S&Ls had largely been reorganized as mortgage conduits; after, they were allowed to make much riskier loans, for example, loans on commercial real estate. At the same time, the deregulation was occurring, bank examinations were inappropriate for the new situation, and deposits, held by government-provided insurance, had no reason to be vigilant about the possibility that S&Ls might finance foolish ventures. The result was a waste of S&Ls’ funds that left taxpayers holding the bag for the insured deposits.

The U.S. commercial bank safety net worked reasonably well until the late 1980s, but as a result of deregulation, the 1980–1991 recession, and a sharp fall in commercial property values, bank closings rose dramatically and the FDIC insurance fund was depleted. Like the United States, other countries that deregulated domestic banking in the 1980s—

including Japan, the Scandinavian countries, the United Kingdom, and Switzerland—

faced serious problems a decade later. Many have overhauled their systems of banking safeguards as a result.

Difficulties in Regulating International Banking

Banking regulations of the type used in the United States and other countries become even less effective in an international environment where banks can shift their business across national boundaries. A good way of seeing why an international banking system is harder to regulate than a national one is to look at how the effectiveness of the U.S. regulations has reduced in a series of international banking activities.

1. Deposit insurance is essentially absent in international banking. National deposit insurance systems may prevent domestic and foreign depositors from being caught in a bank’s bankruptcy; they encourage banks to ensure compliance with bank capital standards and other regulations. Banks may be freed to lend as much as the examiner deems too risky or to adjust their balance sheets by writing off loans where the examiner thinks will not be repaid.
The collapse of Italy’s most important private banking giant in June 1982 was a vivid illustration of how the intricate cross-border links between foreign financial institutions and local banks in Italy caused financial crises. The Banco Ambrosiano’s largest shareholders were often unconnected to any single country, their ownership and management of a vast international network of financial institutions were complex, and the Bank’s financial stability was often uncertain. The Banco Ambrosiano’s finance minister, and the revenue minister responsible for banking regulations, had responsibility for monitoring the bank’s assets. Suppose the London subsidiary of an Italian bank is an important factor in the economy. If the subsidiary’s assets are part of British, Italian, or American regulations?

5. There is uncertainty over which central bank, if any, is responsible for providing international banking. If there is no central bank that is responsible for authorizing lending authority for the bank, let’s examine the example of the London subsidiary of an Italian bank. Should the Bank of England step in to ensure that the Banco Ambrosiano’s decisions are in line with the rules of the subsidiary’s assets?

International Regulatory Cooperation

The internationalization of banking has weakened national safeguards against banking collapse, but at the same time, it has made the need for effective safeguards more urgent. Offshore banking areas are becoming vehicle for international money laundering, and there is an increasing risk of money laundering in offshore banking areas, where banks are controlled by private banks. A high level of money laundering and tax evasion by individual banks could be hidden if the banks are controlled by private banks. This phenomenon has been the focus of recent government attention. In 1976, the Committee recommended the creation of a working group to examine the effectiveness of international banking regulations.

*For a detailed account of the Banco Ambrosiano scandal and its consequences, see Robert Corsetti, "God’s Banker" (New York: Dodd, Mead & Company, 1984). The 1981-83 Bank/Crédit Lyonnais affair led to the creation of the International Monetary Fund (IMF) and the International Bank for Reconstruction and Development (IBRD), which were established to monitor the financial stability of member countries and provide financial assistance to countries experiencing balance of payments difficulties. The IMF and the IBRD have played a critical role in the global financial system, working to promote international monetary cooperation and facilitate the expansion of cross-border lending.

The Banco Ambrosiano collapse marked a significant turning point in the international banking system. The collapse showed that international banks were not immune to local economic problems, and that the international financial system was vulnerable to the failure of even the largest and most well-regarded banks.

The collapse of the Banco Ambrosiano had far-reaching consequences for the international banking system. The bankruptcy of the bank led to a major crisis in the international financial market, as investors lost confidence in the stability of the bank and the broader European banking system. This crisis highlighted the need for stronger international regulatory cooperation and the establishment of more robust oversight mechanisms to prevent future financial crises. The collapse of the Banco Ambrosiano was a reminder of the importance of international cooperation in regulating the global financial system.
CHAPTER 21 The Global Capital Market: Performance and Policy Problems

The Day the World Almost Ended

Pursued in 1984, Long Term Capital Management (LTCM) was a well-known and successful investment fund monitoring two winners of the economics Nobel Prize among its partners. Readers of the financial press therefore were shocked to learn on September 22, 1998, that LTCM was at the brink of failure and had been taken over by a consortium of major financial institutions. The reasons LTCM ran into problems, and the lessons that led the Federal Reserve Bank of New York to organize its takeover, illustrate how the activities of international money market financial institutions can make the entire international financial system more fragile, and even vulnerable to collapse.

Long Term Capital Management specialized in trading involving similar securities that differed slightly in yields due to their liquidity or risk characteristics. In a typical trade, LTCM would obtain money by promising to pay with a slightly higher payment than the Treasury bonds, which have a similar maturity than the newly issued ones, are harder to sell (less liquid), and therefore must offer a slightly higher yield. Long Term Capital Management would make the trade when the liquidity yield spread between the old and new bonds was unusually high, but since even unusually high spreads generally amount to only a small fraction of a percentage point, the trade would have to be very, very large to generate much profit. What did the necessary money come from?

The LTCM repurchase for financial whiz-kids and its initially favorable track record gave it access to many big lenders willing to provide huge sums for this trade. Given the resources available to it and a desire to diversify, LTCM traded across countries and currencies. The firm assembled a huge global portfolio of assets and liabilities, the difference between the two representing capital invested by the firm's partners and customers. LTCM's capital at the start of 1998 was $4.8 billion; but at the same time, it was involved in financial contracts totaling almost $1.3 trillion, roughly 1.5 percent of a year's United States trade (see note 1 for a discussion on major financial institutions.) Its massive positions generated high profits when things went right for LTCM, the possibility of correspondingly huge losses was also there; pre- vented that extent of LTCM's assets $50 is in value while the assets they had promised to deliver rose. An analysis of historical data by LTCM suggested that an event such as an extreme improbable event happened. A $60 billion default by Russia in August (to be discussed in Chapter 22) sparked what the International
Monetary Fund has called "a period of turmoil in mature markets that is virtually without precedent in the absence of a major inflation or economic shock." The current state of liquidity, valued at $1.5 billion, in many countries and a strong desire for reform and additional financial institution to its credit.

With the "golden" 500 billion, the Federal Reserve of New York organized a rescue. Five major American and European financial institutions, among them, appeared, to provide the $1.5 billion in new capital to allow a claim of about 99 percent of LTCM's profits and control over all of its operations. Most of the institutions participating in the consortium would have made large intermediate losses if LTCM had failed, as it usually would have in the absence of a coordinated rescue effort. From the privates the new bank had been saved from disaster, however, was too small to speak markets further. Only much later did a semblance of calm return to world asset markets.

Why did the New York Fed step in to organize a rescue for LTCM, rather than simply letting the troubled fund fail? The Fed framed its LTCM failure could provide financial panic in a private view, that of a concurrent of bank failures around the world as a stress test now and Latin America were already facing a steep economic slowdown. If LTCM had failed, financial panic could have started through several channels. Banks in Latin America could have become costs for their banks. Moreover, a rapid move by LTCM to sell its relatively illiquid investments (in meet purchases) to reduce its exposures would have driven their prices down steeply, possibly global interest rates up and call ing questions of the solvency of the many other financial institutions with position similar to LTCM's. In contrast, the rescue analogy for the Fed gave LTCM time to unwind its positions without creating selling pressure.

Was the Fed's action necessary or advisable? Critics claim that international investors will take more risk in future markets if they again believe the government will always save them from the results of their own imprudence. The possibility that you will take less care to prevent an accident if you are insured against it is called moral hazard. Domestic bank supervision is necessary to limit the moral hazard resulting from deposit insurance and access to the lender of last resort, which otherwise would lead banks to become excessively risky.

The Fed's reply to its critics is that it did use its LSL abilities to bail out LTCM. No public funds were injected into the ailing fund. Instead, major creditors were "bailed in" by being asked to put more of their money at risk to keep LTCM alive. The additional risks they were forced to take as well as the costs to the LTCM partners, who lost their wealth and their control over the fund—should be adequate deterrence to moral hazard, in the Fed's view. Nonetheless, in the wake of the incident there were government calls for the official supervision of large financial funds such as LTCM.

Not surprisingly, the debate rages on because the tradeoff between financial stability and moral hazard is inevitable. Any action by government to reduce the systemic risk inherent in financial markets will also reduce the risks that private operators perceive, and therefore encourage excessive gambling. In the LTCM case, the Fed clearly judged that the risk of a global financial meltdown was too serious to allow.

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the late 1970s, Britain removed restrictions limiting its public from international asset trade in 1979, and the European Union embarked in the late 1980s on a broad program of market unification meant to integrate its financial markets more fully into the global capital market.

The seemingly low extent of international portfolio diversification attained so far is a strong indication of the world capital market. The market has certainly contributed to a rise in diversification since the early 1990s, despite some remaining impediments to international capital movements. Further, there is no hard proof that the socially optimal extent of diversification; in particular, the existence of underdiversified products can cut down significantly the gains from international asset trade. What seems certain is that asset returns will continue to expand as barriers to the international flow of capital are progressively dismantled.

The Extent of Intertemporal Trade

An alternative way of evaluating the performance of the world capital market has been suggested by Martin Feldstein and Charles Horioka. Feldstein and Horioka pointed out that a smoothly working international capital market allows countries' domestic investment rates to diverge widely from their saving rates. In such an idealized world, saving rates out its most productive use worldwide, regardless of their location; at the same time, domestic investment is not limited by national saving because a global pool of funds is available to finance it.

For many countries, however, differences between national saving and domestic investment rates (i.e., current account balances) have not been close since World War II. countries with high saving rates over long periods also have high investment rates, as in Figure 21-3 illustrates. Feldstein and Horioka concluded from this evidence that cross-border capital mobility is low, in the sense that most of any sustained increase in national saving will lead to increased capital accumulation at home. The world capital market, according to this view, does not do a good job of helping countries snap the long-run gaps from intertemporal trade.

The main problem with the Feldstein-Horioka argument is that it is impossible to gauge whether the extent of intertemporal trade is deficient without knowing if there are over- or underpriced trade goods, and knowing that requires more knowledge about actual economies than we generally have. For example, a country's saving and investment may casually move together simply because the factors that generate a high saving rate (such as rapid economic growth) also generate a high investment rate. In such cases, the country's gain from intertemporal trade may simply be small. An alternative explanation of high saving-investment correlations is that governments have tried to manage macroeconomic policy to avoid large current account imbalances. In any case, events appear to be outpacing this particular debate. For industrialized countries, the empirical regularity noted by Feldstein and Horioka seems to have weakened recently in the face of the historically high external imbalances of the United States, Germany, and Japan.

The table on offshore interest differentials shows how different categories of international capital account liberalization in December 1989. Prime and Italy maintained capital controls until the late 1980s, but offshore and foreign assets, which had tended to move...
The difference between the European* interest rate and the domestic United States certificate of deposit rate has approached zero as international capital mobility has grown.

Studies Based on Interest Parity. The interest parity condition that was the basis of the doctrine of exchange rate determination in Chapter 13 has also been used to test whether market exchange rates incorporate all available information. Recall that interest parity holds when the interest differential between deposit opportunities in different countries is the market's forecast of the currency by which the exchange rate between these two countries will change. More formally, if \( R_t \) is the time- \( t \) interest rate on home currency deposits, \( D_t \) the interest rate on foreign currency deposits, \( E_t \) the exchange rate (defined as the home-currency price of foreign currency), and \( R_t^* \) the exchange rate market participants expect when the deposits paying interest \( R_t \) and \( D_t \) mature, the interest parity condition is:

\[
R_t - D_t = E_t^* (R_t^* - E_t) \quad (21-1)
\]

Equation (21-1) implies a simple way to see whether the foreign exchange market is doing a good job of using current information to forecast exchange rates. Since the interest rate difference, \( R_t - D_t \), is the market's forecast, a comparison of this predicted exchange rate change with the actual exchange rate change tells subsequently occurs indicates the market's skill in forecasting.

Statistical studies of the relationship between interest rate differentials and future depreciation rates show that the interest rate differential has been a very bad predictor, in the sense that it has failed to catch any of the large swings in exchange rates. Even worse, the differential doesn't, on average, fail to predict correctly the direction in which the spot exchange rate would change. If the interest rate differential were a poor but unbiased predictor, we could argue that the market is setting the exchange rate according to interest parity and doing the best job possible in a rapidly changing world where predictions is inherently difficult. The finding of bias, however, serves as a reminder of the interpretation of these data.

The interest parity condition also furnishes a test of a second implication of the hypothesis that the market uses all available information in setting exchange rates. Suppose that \( E_t^* \), is the actual future exchange rate people are trying to forecast, then the forecast error they make in predicting future depreciations, \( u_t = E_t - E_t^* \), can be expressed as actual exchange rate depreciation:

\[
u_t = (E_t^* - E_t) + (R_t - D_t) R_t^* - E_t \quad (21-2)
\]

If the market is making use of all available information, its forecast error, \( u_t \), should be statistically unrelated to data known to the market on data \( t \), when expectations were formed. In other words, there should be no opportunity for the market to exploit known data to reduce its forecast errors.

\*These studies of exchange market efficiency study how the forward exchange market prices data in the market for exchange rate information. If the market prices data correctly, then the interest rate differential is a good predictor of future exchange rate changes. Therefore, the interest rate differential is a good predictor of future exchange rate changes. Therefore, the interest rate differential is a good predictor of future exchange rate changes.
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cured theories show, however, that sterilized intervention may be powerless even under imperfect-exchange-substitutability. Thus, a finding that sterilized intervention is ineffective does not necessarily imply that risk premia are absent.

Tests for Excessive Volatility. One of the most interesting findings in this statistical forecasting model of exchange rates is that estimated "fundamentals" variables like money supplies, government deficits, and output performance heavily weigh even when actual (rather than predicted) forms of the fundamentals are used in assessing future exchange rates. Indeed, in a recent study, Richard A. Musgrave of the University of Berkeley, and Kenneth Rogoff of Harvard University showed that a naive "random walk" model, which simply takes today's exchange rate as the best guess of tomorrow's, does better. Some have viewed this finding as evidence that exchange rates have a life of their own, unrelated to the macroeconomic foundations we have emphasized. In another recent paper, however, it is found, however, that while the random walk counterformers were multiplied and forecasts for up to a year away, the models were in no better at forecasting than a year and have explosive power for long-range exchange rate movement.

An additional line of research in this foreign exchange market examines whether exchange rates have been excessively volatile, perhaps because the foreign exchange market "overreacts" to events. A finding of excessive volatility would prove that the foreign exchange market is sending confusing signals to traders and investors who base their decisions on exchange rates. But how volatile must an exchange rate be before its volatility becomes excessive? As we saw in Chapter 17, exchange rates should be volatile, because to send the correct price signals they must move sufficiently in response to economic news. Exchange rates are generally less volatile than stock prices. It is still possible, though, that exchange rates are systematically more volatile than the underlying fundamentals that move them—such as money supplies, national output, and fiscal variables. Attempts to compare exchange rates' volatility with those of other variable prices and interest rates provide the most suggestive empirical results. A basic finding is that excessive volatility is the impossibility of quantifying exactly all the variables that convey relevant news about the economic future. For example, how does one attach a number in political assassinations attempt or a major bank failure?

The Bottom Line. The ambiguous evidence on the foreign exchange market's performance varieties an open-minded view. Such a view is particularly advisable because the statistical methods that have been used to study exchange-rate signs are very important. A judgment that the market is doing its job well would support a laissez-faire attitude by governments.


and a continuation of the present trend toward increased cross-border financial integration in the industrial world. A judgment of market failure, on the other hand, might imply a need for increased foreign exchange intervention by central banks and a reversal of the trend toward capital account liberalization. The stakes are high, and more research and experience are needed before a firm conclusion can be reached.

Summary

1. When people see risk aversion, countries can gain through the exchange of risky assets. The gains from trade take the form of a reduction in the riskiness of each country's consumption. International portfolio diversification can be carried out through the exchange of debt instruments or equity instruments.

2. The international capital market is the market in which residents of different countries trade assets. One of its important components is the foreign exchange market. Banks are at the center of the international capital market, and many operate offshore. That is, outside the countries where their home offices are based.

3. Regulatory and political factors have encouraged offshore banking. The same factors have encouraged offshore currency markets, that is, trades in bank deposits denominated in currencies of countries other than the one in which the bank is located. Such foreign exchange trading has received a major stimulus from the absence of reserve requirements on deposits in Switzerland.

4. Creation of a European currency deposit does not occur because that currency leaves its country of origin. All that is required is that a Eurobank accept a deposit liability denominated in the currency. Eurocurrency deposits therefore pose no threat for central banks' control over their domestic monetary bases. Points that Eurodollars, for example, will soon come "Hurting us" to the United States are misplaced. Eurocurrency creation can add significantly to the broader monetary aggregates. However, it may complicate central bank monetary management by shifting monetary multipliers unexpectedly.

5. Offshore banking is largely unregulated by the safeguards national governments have imposed to prevent domestic abuses. In addition, the opportunities that have so far operations offshore have undermined the effectiveness of national bank supervision. Since 1974, the Bank for International Settlements has assisted in enhancing regulatory cooperation in the international area. That group's 1975 Concorde allocated management bank institutions and provided information exchange. There is still uncertainty. However, drawing a central bank's obligations as an international lender of last resort. This uncertainty may not reflect an attempt by international authorities to induce moral hazard. The trend toward securitization has increased for the international cooperation in monitoring and regulating merchant financial institutions. So too the rise of emerging vectors.

6. The international capital market has contributed to an increase in international portfolio diversification since 1970, but the extent of diversification still appears small compared with what economic theory would predict. Similarly, some observers have claimed that the losses of international trade, as measured by "written" current account balances, have been too small. Such claims are bad or evidence, without more final.

Key Terms

Bund crosses, p. 659
Cooperating countries, p. 652
Credit worth, p. 640
Equity, p. 640
Eurobanks, p. 660
Eurocurrency, p. 659
Eurodollars, p. 660
Eurocurrency, p. 659
International banking facilities, p. 660
Problems

1. Which portfolio is better diversified, one that contains stock in a domestic retail company and a candy company or one that contains stock in a domestic supply company and a dairy product company?

2. Imagine a world of two countries in which the only cause of transactions in bank deposits is perceived debt in monetary policies. Under which exchange rates would you expect the gains from international asset trade to be greatest, feed, or flowing?

3. The text notes that "realized interest parity within quite clearly for deposits of different currency denomination. Many financial centers. Why might expected interest parity fail to hold when deposits issued in different financial centers are compared?

4. When a U.S. bank accepts a deposit from one of its foreign branches, or from one of its IBD, that deposit is subject to Fed reserve requirements. Similarly, reserve requirements are imposed on any loan from a U.S. bank's foreign branch to a U.S. resident, or on any asset purchase by the branch bank from the U.S. parent. What do you think is the rationale for these regulations?

5. Some observers have claimed that the Eurodollar market's early growth was fueled by the desire of banks outside the United States to appropriate some of the revenue the United States was collecting in lieu of the principal 

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reserve currency. (This perspective is made in The Euro-Dollar Market: An Interpretation, Princeton Essays in International Finance 64, International Finance Section, Department of Economics, Princeton University, February 1961). Do you agree with Snell's interpretation?

4. After the developing country debt crisis began in 1982 and the next chapter, U.S. bank regulators imposed tighter supervisory measures on the lending policies of American banks and their subsidiaries. Over the 1980s, the share of U.S. banks in London banking activity declined. Can you suggest a connection between these two developments?

5. Why might growing securitization make it harder for banks to monitor the risks of the financial system?

Further Reading


CHAPTER 22

Developing Countries: Growth, Crisis, and Reform

Until now, we have studied macroeconomic interactions between industrialized market economies and those of the United States and western Europe. Richly endowed with capital and skilled labor, these politically stable countries generate high levels of GNP (or their residents). And their market compared to those of some poorer countries have long been relatively free of direct government control. Several times since the early 1980s, however, the macroeconomic problems of the world's developing countries have been at the forefront of concern about the stability of the entire international economy. Over a period of more than four decades following World War II, while both developing and industrializing nations expanded as did developing countries borrowing from richer lands, to turn, the more extensive links between the two groups of economies made each group more dependent than before on the economic health of the other. Developing countries have increased their reliance on foreign capital and policies and in more advanced countries, that interdependence was brought home again recently as numerous developing countries suffered financial crises starting in 1997 and world economic growth slowed.

This chapter studies the macroeconomic problems of developing countries and the representations of these problems on the developed world. Although the insights from international macroeconomics gained in previous chapters also apply to developing countries, the distinctive problems countries face in their quest to catch up to the rich economies warrant separate discussion. In addition, the lower incomes levels of developing areas mean macroeconomic changes there may have more positive or negative consequences for the entire economy, than those that can occur in rich countries within political and social cohesion. •

Income, Wealth, and Growth in the World Economy

Poverty is the basic problem of developing countries and escaping from poverty is their overarching economic and political challenge. Compared with industrialized economies, most developing countries are poor in the forces of production essential to modern industrial capital and skilled labor. The relative scarcity of these factors contributes to low levels of per capita income and often prevents developing countries from realizing economies of
scale from which many richer nations benefit. Political turnover, insecure property rights, and misguided economic policies frequently have discouraged investment in capital and skills, while also reducing economic efficiency in other ways.

The gap between rich and poor

The world's economies can be divided into four main categories according to their per capita income levels: low-income economies (including India, Pakistan, and their neighbors, along with much of sub-Saharan Africa); lower-middle-income economies (including China, the smaller Latin American and Caribbean countries, many former Soviet Bloc countries, and most of the remaining African countries); upper-middle-income economies (including the largest Latin American countries, Saudi Arabia, Malaysia, Turkey, South Africa, Poland, Hungary, and the Czech and Slovak Republics); and high-income economies (including the rich industrial market economies and a handful of exceptionally fortunate "developing" economies such as Israel, oil-rich Kuwait, and Singapore). The first three categories consist mainly of countries at a backward stage of development relative to industrial countries. Table 22-1 shows 1999 average per-capita annual income levels (measured in dollars) for three country groups, together with another indicator of "historic well-being," average life expectancy at birth.

Table 22-1 illustrates the sharp disparities in international income levels close to the end of the twentieth century. Average per-capita GNP in the richest economies is 63 times that of the average in the poorest countries. From the upper-middle-income countries, one can expect to see substantial convergence in the coming decades. Life expectancy figures generally reflect international differences in income levels. Average life spans fall as average poverty increases.

Has the World Income Gap Narrowed over Time?

Explaining the income differences between countries is one of the oldest puzzles of economics. It is no accident that Adam Smith's classic 1776 book was entitled Wealth of Nations! Since at least the days of the mercantilists, economists have sought not only to explain why countries' incomes differ at a given point in time, but also to reveal the most promising policies for promoting economic growth and raising living standards. Despite the best efforts of economists, most of these policies have failed to close the income gap.

Despite the appeal of simple theory, no clear consensus on the causes of growth has emerged. Table 22-2 shows six measures of economic growth rates for six countries, and the percentage changes in GDP per capita. These measures do not capture all the factors that lead to economic growth, nor can we be sure that the factors we do measure are the most important ones. Nonetheless, these measures do provide a useful guide to the relative success of different economic policies. For example, it is clear that Japan has had the highest average growth rate of the six countries, with a rate of 8.3% per year. In contrast, the United States has been right at the top of the list, with an average growth rate of 4.6% per year. These differences in growth rates have led to significant changes in the relative economic power of these countries over time.

The most important determinant of economic growth is the rate of investment in physical capital and human capital. Countries that invest heavily in education and infrastructure tend to have higher growth rates than those that do not. In addition, institutions such as strong property rights, rule of law, and sound monetary and fiscal policies also play a crucial role in promoting economic growth. Conversely, countries with weak institutions and poor governance tend to experience slower growth.

In summary, there is a clear consensus that economic growth is a result of investment in physical and human capital. Countries that invest in these areas tend to have higher growth rates than those that do not. Institutions and governance also play a crucial role in determining economic growth.
CHAPTER 22 Developing Countries: Growth, Crisis, and Reform

I macroeconomic policy, and other government interventions in the economy. As things begin to change, East Asian countries abandoned import-substituting industrialization, embracing an export-oriented development strategy instead. Latin America also saw trade barriers reduced, while simultaneously attempting to rein in government’s role in the economy, to reduce chronically high inflation, and to gain access to open capital markets to private enterprises.

While many developing countries have reformed their economies to some degree, the introduction of industrial policies and distortions, the process remains incomplete and most developing countries tend to be characterized by some of the following features:

1. There is a history of external debt; government control of the economy, including restrictions on international trade, government ownership or control of large industrial firms, direct control government over internal financial transactions, and a high level of government consumption as a share of GDP. Developing countries differ widely among themselves in the extent to which the role of the government in the economy has been reduced in these various areas over the past decade or so.

2. There is a hierarchy of high inflation. In many countries, the government was unable or unwilling to pay for its heavy expenditure and the losses of state-owned enterprises through raised taxes. The evasion was rampant, and much economic activity was driven underground, so it proved easier simply to print money. Stagflation is the name economists give to the combination of a lack of government revenues while it prints money that it spends on goods and services. When their governments were expanding supply, that usually or in Latin America.

3. Where domestic financial markets have been liberalized, weak credit institutions often abound. Banks frequently lend funds they have borrowed in foreign currency to risky projects. Loans may be made on the basis of personal connections rather than prospective returns, and governments often lend against financial fragility, such as bank supervision (Chapter 2), to the detriment of these countries.

Structural Features of Developing Countries

Developing countries differ widely among themselves and in the extent to which they have completed their transition to market economies. In the early 1990s, these countries were much more similar to each other in their approaches to trade policy.
5. Natural resources or agricultural commodites make up an important share of exports for many developing countries—for example, Russian petroleum, Malagasy timber, South African gold, and Colombian coffee (and coca).

6. Attempts to decrease government controls, taxes, and regulations have helped to make trade practices such as bribery and exactions a way of life in many. If not most, developing countries. The development of worldwide economic activity has in some instances added economic efficiency by bringing a degree of market-based economic allocation, but on balance it is clear from the data that corruption and poverty go hand in hand.

For a large sample of developing and industrial countries, Figure 22-1 shows the strong positive relationship between annual real per-capita GDP and an inverse index of corruption ranging from 0 (little corruption) to 10 (extreme)—published by the organization Transparency International. Several factors underlie this strong positive relationship. Government regulations that promote corruption also harm economic progress. Statistical studies have found the corruption index itself to have a net negative economic efficiency and growth. Finally, poorer countries lack the resources to police corruption effectively, and poverty itself breeds a greater willingness to go around the rules.

Many of the broad features that still characterize developing countries today took shape in the 1930s and can be traced in the Gross Depression (Chapter 18). Most developing countries experienced with direct controls over trade and payments to conserve foreign exchange reserves and safeguard domestic employment. Paired with a massive breakdown of the world market system, industrial and developing countries alike allowed their governments to assume increasingly direct roles in employment and production. Often, governments reorganized financial institutions, established internal control over financial markets, nationalized key industries. The trend toward government control of the economy proved much more pervasive in developing countries, however. Their political institutions allowed these with vested financial interests in the status quo to perpetuate it. Car off from traditional suppliers of manufactures during World War II, developing countries encountered new manufacturing industries of their own. Political purposes to pro-

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According to Transparency International’s 2009 rankings, the cleanest country in the world was Iceland and scoring a record perfect 100 and the most corrupt was Nigeria scoring a dismal 9.6. The same for the United States: out of 7.6. For detailed data on a general overview of the movements of corruption, see Vejle, "Corruption around the World." (International Monetary Fund, Washington, D.C., 1996). There is, of course, tremendous variation across the economic inefficiencies associated with corruption. Consider the following chart showing trade barriers of various countries in the world, which had 2000 Transparency International ranking of 0.5. 1990-2000 was characterised by the World Bank to be a severe crisis of economic development country by country.

Corruption goes well beyond making trade more difficult. Almost every measurable economic activity is subject to some form of official exaction. By Brazilian companies generally agree to pay tributes, but with variations widely ranging and prefer to pay fines. The money goes to, respectively, state and federal levels; it earmarked for business inefficiencies and plans political violence. They note that it is impossible to quantify fully all of Brazil’s single line, logistics, underway, and discrepancies.

The theme and forces make up a part of a broad problem, identified for the broad extent of countries that influence the ease of doing business in Brazil.


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*Notes:* The figure gives 2000 views of an (inverse) index of corruption and 1999 values of IFD-adjusted real per-capita output, measured in 1999 United States dollars (the amount a dollar could buy in the US in 1999). The straight line represents a correlation line at a country’s corruption level based on its real per-capita income.

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**Source:** Transparency International, "Corruption data," World Development Report, 2009-2010. For output distortions, this industry was one factor helping the expansion of import substituting industrialization in the first postwar decades. In addition, foreign-owned corporations liberalized the war believed they could attain the income levels of their foreign former only through rapid, government-directed industrialization and urbanization. Finally, developing country leaders learned that their efforts to escape poverty would be doomed if they continued to specialize in primary commodity exports such as rubber, copper, and wheat. In the 1950s, some influential economists argued that developing countries should suffer continually declining terms of trade unless they used commercial policy to move resources out of primary exports and into import substitutes.

**Developing Country Borrowing and Debt**

One further feature of developing countries is crucial to understanding their macroeconomic problems: They rely heavily on capital inflows from abroad to finance domestic investment. Before World War I, and up to the Great Depression, developing countries (including the United States for much of the nineteenth century) possessed large capital inflows from rather liberal. In the decades after World War II, developing economies again
tapped the savings of richer countries and built up a substantial debt to the rest of the world (around $2.1 trillion at the end of 1996). This debt was in the center of several international lending crises that precipitated economic policymakers throughout the world in the last two decades of the twentieth century.

The Economics of Capital Flows to Developing Countries

Many developing countries have received excess capital inflows from abroad and now carry substantial debts to foreigners. Table 22.3 shows the major patterns of borrowing by such developing countries. The same are substantial since net conceptually flows to the economy of the developing world is relative to that of the industrial world. When focus is behind capital inflows to the developing world?

Recall the identity (analyzed in Chapter 12) that links national saving, G, domestic investment, I, and the current account balance, CA. C = I + CA. If national saving falls short of domestic investment, the difference equals the current account deficit. Because of poverty and poor financial institutions, national saving is low in developing countries. Hence, these same countries are relatively poor in capital, however, the opportunities for profitable international or expanding plant and equipment can be substantial. Such opportunities are a high level of investment. By making a deficit in its current account, a country can obtain resources from abroad to increase its own domestic saving level is low. A deficit in the current account implies, however, that the country is borrowing abroad. It seems for being able to import more foreign goods today than its current export can pay for, the country must generate in the future, either the export and or capital inflows or increase in income to foreigners.

Thus, this developing country borrowing could potentially be exploited by the incentives for international trade identified in Chapter 7. Low-income countries generate too little saving of their own to take advantage of all their profitable investment opportunities, so they must borrow abroad. In capital-rich countries, on the other hand, the most productive investment opportunities have been exploited already but saving levels are relatively high. Savers in developed countries can earn higher rates of return, however, by lending to borrowers in the developing world.

Notice that when developing countries borrow to undertake productive investments that they could not otherwise carry out, but they and lenders may gain from trade. Borrowers gain because they can build up their capital stocks despite limited national savings. Lenders simultaneously gain by moving higher returns to their savings than they could earn at home. While the reasoning above provides an incentive for developing country external deficits and debt, it does not imply that all loans from developed to developing countries are justified. Loans for financed unprofitable investments—for example, huge shopping malls that are never occupied—or imports of consumer goods may result in debts that borrowers cannot repay. In addition, faulty governments that artificially depress national saving rates may lead to excessive foreign borrowing.

The Problem of Default

Potential gains from international borrowing and lending will not be realized unless lenders are confident they will be repaid. A loan is set in default when the borrower fails to repay on schedule according to the loan contract, without the agreement of the lender. Both social and political instability in developing countries, as well as frequent weakens of their public financial and financial institutions, make it much more likely to lead to developing than industrial countries. And indeed, the history of capital flows to developing countries is marked with the woe of financial crises and defaulted loans:

1. In the early nineteenth century, a number of American states defaulted on Euro- pean loans they had taken out to finance the building of canals.
2. Latin American countries ran into repayment problems throughout the nineteenth century, notably Argentina, which sparked a global financial crisis in 1808 (the Baring Crisis) when it proved unable to meet its obligations.

<table>
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<tr>
<th>Year</th>
<th>Major oil exporters</th>
<th>Other developing countries</th>
<th>Industrial countries</th>
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<tr>
<td>1970</td>
<td>9.86</td>
<td>11.51</td>
<td>14.43</td>
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<td>1974</td>
<td>71.90</td>
<td>23.86</td>
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Source: International Monetary Fund. Global economic indicators: key indicators of trade, development, and the evolution of trade balances (for example, estimates of the loan market.)

TABLE 22.3 Current Account Balance of Major Oil Exporters, Other Developing Countries, and Industrial Countries: 1972-2000 (billions of dollars)
3. In 1973, the new government of Russia responded to the foreign debt crisis
by issuing new foreign currency bonds to Russia's own domestic investors, which
resulted in a domestic currency overvaluation and a significant inflow of foreign
capital. The central bank was forced to intervene in the foreign exchange market
in order to stabilize the ruble, leading to a significant devaluation of the
ruble. This led to a significant increase in the country's foreign debt, and a
subsequent increase in the country's foreign exchange reserves.

4. During the Great Depression of the 1930s, world economic activity collapsed
and many countries, including Russia, found themselves unable to pay back
their foreign exchange debt. The result was a significant devaluation of the
country's currency and a significant increase in the country's foreign debts.

5. Sharp corrections in a country's output and employment initially result from a crisis
in which the country is unable to access new foreign sources of funds. At a very basic
level, the severity and depth of recessions can be seen from the current account
situation. If a country is running a current account deficit and its borrowing
from abroad is 5% of its GDP, it is likely to experience a significant downturn in
its economy. If the country is running a current account surplus and its borrowing
from abroad is 5% of its GDP, it is likely to experience a significant upturn in
its economy. Therefore, the current account situation is a good indicator of a
country's economic health.

6. The effects of the Great Depression on the Russian economy were significant. The
country experienced a significant decrease in its GDP, which led to a significant
decrease in its foreign exchange reserves. This led to a significant increase in
the country's foreign debt, and a subsequent increase in the country's foreign exchange
reserves. The country was forced to intervene in the foreign exchange market
in order to stabilize the ruble, leading to a significant devaluation of the
ruble. This led to a significant increase in the country's foreign debt, and a
subsequent increase in the country's foreign exchange reserves.
Republic of Senegal

The Government of Senegal has been making a concerted effort to reduce its current account deficit by liberalizing trade, reducing government spending, and attracting foreign investment. Despite these efforts, the country remains heavily dependent on imports, particularly for food and fuel. However, the government has taken steps to increase domestic production and diversify its economy. One notable initiative is the development of a gas-to-liquids (GTL) plant, which aims to convert natural gas into synthetic oil and other products. This project is expected to reduce the country's dependence on imported oil and create new jobs in the energy sector.

Since 1999, the government of Senegal has announced plans to develop a large private investment—aiming to buy a majority stake in a state-owned manufacturer of vegetable oil products.
The SIMPLE ALGEBRA OF MORAL HAZARD

The moral hazard that results from a combination of provident government guarantees and weak regulation of the guaranteed institution has helped fuel excessively competitive investment decisions in many economies. To see how it works, imagine that in a potential investment—a large new real estate development—that will cost $100 million up front. If it goes well, the project will yield a return of $100 million; but it is only a 50 percent chance of success, and a two-thirds chance that the investment will yield only $25 million. The expected payoff, thus, is only ($100 million − 0.5 ($25 million)) = $37.5 million, which is below the $70 million up-front cost. Ordinarily, this opportunity simply would never be made.

Governments have been known to guarantee the result, however. Suppose that a real estate developer is able to borrow the entire $70 million, because he can convince investors that the government will protect them if his project fails and he cannot repay. Thus, from his point of view, he has found a way to show a 50 percent chance of a $100 million − $70 million = $30 million profit. Obviously he simply walks away from the project. It's his bad luck, not his taxpayers' fault.

The preceding example may seem extreme, but in a broad sense it is the financial practice in many countries, including the United States. In the 1980s the U.S. savings and loan industry was granted what amounted to a privilege against responsible government guarantees on deposits. A lack of close regulation of thrifts. The eventual cost to U.S. taxpayers was $100 billion. Similar kinds of guarantees of financial institutions led to large bank losses in the 1980s in industrial countries as a whole. In developing countries, the failure from the existing financial systems has usually been much worse, and it is devastating in the developed world.

Inflation did not fall in line with the authorities' declining discount rates, however. In Chile, for example, inflation was still running at 2.5 percent per month when the country's rulers decided to fix its exchange rate against the dollar in June 1973. With domestic inflation may have asked that in the United States and Canada (see earlier in the paper) the exchange rates have all been held to prevent competition in the prices of the non-inflation

Theoretical Analysis of Inflation: The Theories of the 1970s. In 1978 Argentina, Chile, and Uruguay all turned to a new exchange-inflation strategy in the hope of treating inflation. In Spainish the approach was called the "timbro" or "decalage" policy, which reduced the effective exchange rate by lowering the rate of appreciation of the currency. The latter was a type of exchange rate regime known as a crawling peg. Earlier uses of crawling pegs by Latin American countries had been aimed at preventing domestic inflation from making domestic goods too expensive relative to foreign goods, that is, at avoiding real appreciation of the currency. The timbro strategy was different in avoiding a climate of price depression against the dollar by reducing the rate of increase in the prices of internationally competitive goods, would force overall inflation downward. All three "Southern Cone" countries simultaneously undertook trade liberalization, allowed more freedom to banks and other financial institutions, and opened up their economies to private capital flows.

*This basic principle is illustrated by the following example of the European Monetary System and the pegged exchange rate (Chapter 10).

*Theoretical and empirical analysis of the implications of inflation and weak regulation of the guaranteed institution has helped fuel excessively competitive investment decisions in many economies. To see how it works, imagine that in a potential investment—a large new real estate development—that will cost $100 million up front. If it goes well, the project will yield a return of $100 million; but it is only a 50 percent chance of success, and a two-thirds chance that the investment will yield only $25 million. The expected payoff, thus, is only ($100 million − 0.5 ($25 million)) = $37.5 million, which is below the $70 million up-front cost. Ordinarily, this opportunity simply would never be made.

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*This basic principle is illustrated by the following example of the European Monetary System and the pegged exchange rate (Chapter 10).
had been before the introduction of the ruble. In one of the speculative attack models discussed in Chapter 17, a country that pegs its exchange rate while running a large government deficit will eventually run out of foreign reserves and suffer a speculative attack on its currency. These scenarios were present in the Southern Cone experiences, but were initially marked by the large reserve buffers that accompanied the starting phases of the speculative programs.

Over the course of 1981-1982, with reserve rates at historic highs in the industrial world, the appreciated currencies and large current account deficits in Latin America's Southern Cone neighbors proved impossible to sustain. All these stabilization programs were abandoned in the midst of speculative attacks on exchange rates and runs on the countries' fragile financial institutions.

As analysis of the countries' financial fragility carries lessons about the importance of training in developing countries that will recur throughout this chapter, Chile offers a particularly vivid example. Prior to the 1981-1982 crisis, Chile's financial institutions borrowed externally abroad and then the proceeds suddenly in the belief that they would be fully bailed out by the government if their loans went sour. Government guarantees, combined with the weak bank regulations then prevailing, led to an excess form of the moral hazard problem we discussed in the last chapter. The box on p. 659 presents a concrete example of how moral hazard of the type Chile fostered Lewis borrowers to undertake imprudent investments. The country's daily banks quickly became insolvent whenever trouble arrived in the early 1980s. The resulting official bailouts increased the fiscal burden on Chile's government tremendously, and magnified the country's crisis.8

Chronic inflation rooted in the Southern Cone was exacerbated after the salvoes programs fell apart. But the magnitudes of the accompanying collapse reflected more than purely domestic problems. The year 1982 marked the beginning of a much broader developing country debt crisis that was to slow lending to Latin America for the rest of the decade.

**CASE STUDY**

**Argentina's Economic Stagnation**

Despite being one of the world's richest countries at the start of the twentieth century, Argentina has become progressively poorer relative to the industrial countries with which it is compared on a per-earnings basis. A low point came in the early 1990s when the World Bank deemed Argentina to be the status of a lower middle-income developing country. The table below tells the story, one that continues to fascinate economists and economic historians:

*"A classic account of these events is given by Carlos F. Diaz Alejandro, "Goodbye Financial Repression, Hello Financial Crisis," Journal of Development Economics 19 (September 1985), pp. 1-29. Chile's financial institutions had experienced in 1981 the "full financial operation of the hedging system as well as the SAVs and Later Associations are guaranteed by the Central Bank, which has been freezing the SAVs and Loss deficits and still continues to do so whatever the should be required." Trichardson points out the attempts to take various measures, with little success to keep inflation at bay, always lost in the end."*
In 1987, Argentina's output grew by only 1.5 percent since 1980—far less than any other country in the world. In fact, the World Bank estimated that with Argentina's 1987 growth rate, its GDP per capita would have declined by 1990. This was a significant departure from the country's past economic performance, which had averaged growth rates of 5 percent or more for most of the 20th century. The decline in growth was due to a combination of factors, including fiscal policy, debt servicing, and the impact of the global economic downturn.

Argentina's fiscal policy was a major contributor to the country's economic problems. The government had accumulated large budget deficits, which were financed by printing money, leading to hyperinflation. This, in turn, reduced the value of the currency, making it more difficult for the government to repay its foreign debts. The government also relied heavily on foreign aid and loans, which further increased its debt burden.

Debt servicing became a major problem for Argentina. The country had borrowed heavily to finance its economic growth in the past, but the high interest rates on its foreign debt made it difficult to service the debt. This, in turn, led to a downward spiral of economic growth and increased debt servicing requirements.

The government also implemented policies that were not conducive to economic growth. The country had a reputation for political instability and corruption, which discouraged foreign investment and made it difficult for the private sector to thrive.

Argentina's economic problems were not limited to its own borders. The global economic downturn also affected Argentina, as the country was heavily dependent on exports. The decrease in global demand for exports led to a decline in foreign exchange earnings, which further worsened the country's fiscal position.

In conclusion, Argentina's economic problems were the result of a combination of factors, including fiscal policy, debt servicing, global economic conditions, and political instability. The country's economic performance since 1987 has been lackluster, with growth rates remaining low and inflation persisting. The country has made some progress in reducing its debt burden and improving its fiscal position, but significant challenges remain. Argentina's future economic prospects depend on its ability to implement effective policies that promote growth and reduce poverty.
American banks give some form of debt relief to indebted developing countries. In 1990 banks agreed to reduce Mexico's debt by 12 percent, and within a year debt reduction agreements had also been negotiated by the Philippines, Costa Rica, Venezuela, Uruguay, and Nicaragua. When Argentina and Brazil reached preliminary agreements with their creditors in 1992, it looked as if the debt crisis would finally be resolved.

Reforms, Capital Inflows, and the Return of Crisis

The early 1990s saw a renewal of private capital flows into developing countries, including some of the highly indebted Latin American countries at the center of the previous decade’s debt crisis. As Table 22.3 shows, the foreign borrowing of on-off developing countries as a group expanded sharply after 1992. Low interest rates in the U.S. in the early 1990s caused many to shift their investing from the relatively safer capital flows. Perhaps more important, however, were serious efforts in the recipient economies to stabilize inflation, a move requiring that governments limit their role in the economy and reduce tax evasion. At the same time, governments sought to lower trade barriers, to deregulate labor and product markets, and to improve the efficiency of financial markets. Widespread privatization has served both the macroeconomic goals of fostering efficiency and competition and the macroeconomic goals of eliminating the government’s need to cover the losses of subsidized and inefficient state-owned firms.

What finally pushed countries to undertake serious reform, despite the vested political interests favoring the status quo? One factor was the 1980s debt crisis itself, which enabled it in what many commentators have called a “lost decade” of Latin American growth. Many of the relatively young policymakers who came to power in Latin America in the debt crisis ended were well-educated economists who believed that misguided economic policies and institutions had brought on the crisis and wanted to change its effects. Another factor was the example of East Asia, which had survived the 1980s debt crisis largely unscathed. Despite having been poorer than Latin America as recently as 1950, East Asia now stood richer.

Recent economic reforms have taken different shapes in different Latin American countries, and some have made little progress. Here we contrast the macroeconomic aspects of the approaches taken in four large countries that have made wide-ranging (though not equally successful) reforms:

Argentine

As has been seen, Argentina tried unsuccessfully to stabilize inflation in the 1970s through a crawling peg. An Aché’s heel of its failed policy was a failure to progressively reduce the government budget deficit. Despite the cuts outlined in the 1980s, Argentina governments implemented insufficient inflation stabilization plans involving currency reforms, price controls, and other measures. The fundamental problem of government deficits was not decisively reduced and the new programs, typically after a short initial period of promise, failed. Pervasive economic instability spilled over to affect domestic financial institutions, which suffered runs and collapse. Argentina slipped into hyperinflation. In July 1989 alone, the month the Peronist president Carlos Menem was inaugurated after almost two years and the virtual breakdown of Argentina’s payment system, the price level increased by 197 percent.

Argentina finally turned to radical institutional reforms in 1991 to end its long history of inflation. In January 1991, President Menem appointed Domingo Cavallo, a Harvard-trained economist, as his economic minister. Under his leadership, import tariffs were

shocked, government expenditures were cut, major state companies including the national airline were privatized, and tax reform led to increased government revenues.

The most important aspect of Cavallo’s program, however, was the new Convertibility Law of April 1991 making Argentina’s currency, the peso, the same, fully convertible as U.S. dollars at a fixed rate of 10 pesos per dollar, changeable only by an act of the Argentine congress. At the end of the following year the currency was revalued, with new Argentine pesos replacing every 10,000 old pesos and then trading in the very conversion fixed exchange rate of exactly one peso per dollar.

The Convertibility Law also required that the monetary base be backed entirely by gold or foreign currency, so in one stroke it sharply curtailed the central bank’s ability to finance government deficits through maintaining money creation. Argentina’s Convertibility Law represented an extreme version of the exchange rate-based approach to reducing inflation that had been tested in many forms in the past.

This type of approach worked. Backed as it was by genuine economic and political reforms, the Cavallo plan had a dramatic effect on inflation, which remained very low after dropping from 800 percent in 1990 to well under 5 percent by 1995. Continuing inflation in the first years of the convertibility plan, despite a fixed exchange rate, implied a sharp real appreciation of the peso. From 1990 to 1995 the currency appreciated to real terms by about 30 percent. (See panel (a) of Figure 22.2.)

The peso’s real appreciation led to unemployment and a growing current account deficit. After a Mexican financial crisis erupted in the wake of 1994-1995, speculators attacked Argentina’s currency and domestic interest rates rose sharply. Unexpectedly higher borrowing costs plunged Argentina’s bonds under severe pressure. The central bank could do little to help because the Convertibility Law made it hard to print more to lend local banks the backing system as a stimulus of last resort. Instead, the government arranged for credits from official foreign agencies such as the World Bank. Nonetheless, output stagnated and unemployment jumped, in 1996 Mexico first callable.

Scared by hyperinflation, Argentina continued to support their new monetary system despite Cavallo’s departures. The peso’s real appreciation enabled Argentina’s government strengthened the banking system to reduce the weaknesses that had been revealed in the 1991 crisis. By 1995 the economy was growing rapidly even once again, although growth slowed somewhat in the developing country crisis. Growth turned negative subsequently as the world economy slipped into recession in 2001. Argentina’s foreign credit dried up. The country defaulted on its debts in December 2001 and administered the peso-dollar peg in February 2002.

Brazil

Like Argentina, Brazil suffered runaway inflation in the 1980s, as well as multiple failed attempts at stabilization accompanied by currency reforms. The exchange rate barrier to get inflation under control, however, and its approach thus differentiated less systematically than the Argentine did.19

In 1994 the Brazilian government introduced a new currency, the real (renounced in May 2010), pegged to the dollar. At the cost of widespread bank failures, Brazil defended the new exchange rate with high interest rates in 1995, then shifted to a fixed, upwardly crawling

Chile. Having learned the lessons of its deep unemployment and financial collapse at the start of the 1980s, Chile implemented a more consistent reformist program later in the decade. Very importantly, the country instituted a tough regulatory environment for domestic financial institutions. A crawling peg to the exchange rate regime was used to bring inflation down gradually, but the system was operated flexibly to avoid the overvalued real appreciation that had emerged in the late 1980s. (See Figure 22.3, panel b.) The Chilean central bank was made independent of the fiscal authorities in 1990 (the same year a democratic government replaced the former military regime). That measure further reduced the temptation to engage in monetarist policies.17

Another new policy required all capital inflows (other than equity purchases) to be accompanied by a 1-year non-interest-bearing deposit equal to as much as 30 percent of the transaction. Because the duration of the deposit requirement was limited, the penalty fell disproportionately on short-term inflows, which made sense to be withdrawn by foreign investors in the event of a capital flight motive in the event of real currency appreciation; the other way to offset the risk of a sudden withdrawal of foreign short-term funds was to limit the size of inflows. There is considerable controversy among economists as to whether the Chilean capital inflow barriers succeeded in their aims, although it is doubtful that they did much harm.18

Chile’s policies have paid off handsomely. Between 1991 and 1997 the country enjoyed GDP growth rates averaging better than 8 percent per year. At the same time, inflation declined from 36 percent per year in 1990 to only 5 percent in 1997. Chile has come and gone not only from the leaden currency of Latin America, but as being cleaner than several European Union members.

Mexico introduced a broad stabilization and inflation program in 1987, combining an aggressive reduction of public-sector deficits and dele with exchange rate targeting and wage-price guidelines negotiated with representatives of industry and labor unions.19


18. For a discussion, see Chapter 1 of the book by Kenen titled In the Shadow of Regime Rading.

19. The data underlying the Mexican approach are explained by use of six of these authors, Pedro A. G. Arellano, an equipment manager in the Mexican Institute of Technology and Telecommunications, Mexico City, Mexico, in 1995.

The East Asian Economic Miracle

As we saw in Table 22.2, South Korea was a display of higher savings in the 1960s, with little industry and apparently with few economic prospects. In 1963, however, the country

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CHAPTER 21 Developing Countries: Growth, Crisis, and Reform

WHAT DID ASIA DO RIGHT?

The growth of Asian economies between the 1960s and the 1990s demonstrated that it is possible for a country to move rapidly up the development ladder. But what are the ingredients for such success?

One important ingredient was a high saving rate. In 1990s' terms, many of these economies were saving at unprecedented rates. Annual average inflation rates were generally below 5%.

Another important ingredient was a strong emphasis on education. Even in 1960s' terms, when the HPAIs were still quite poor, they had high enrollment rates in basic education, especially for chil-
dren receiving basic schooling in Hong Kong, Singapore, and South Korea, and even more so in Indonesia.

Table 21.1

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Indonesia had a 70 percent unemployment rate in 1987. Rates of unemployment in secondary school in Asia were all below 5% (in Latin America rates are also below 5%).

Finally, two other characteristics of the HPAIs were relatively stable macroeconomics, free from high inflation or severe economic shocks, and a high rate of trade in GDP. The accompanying table shows annual average infla-
tion rates from 1960 to 1990 and the share in GDP of exports plus imports as a share of GDP for selected Asian countries, comparing them with developing countries. The table is in stability and openness with Latin America in particularly

These countries played an important role in the "convergence" of many industrial in Latin America and otherwise to the idea of economic reform, both in terms of a confrontation to price stability and opening markets to the world.

Asian Weaknesses

As it turned out, in 1997 Asian economies did indeed experience a severe financial crisis. And with the benefit of hindsight, several weaknesses in their economic structures—some shared by Latin American countries that had gone through crises—became apparent. These issues in particular stood out.

Precedent. Although the rapid growth of Asian economies was not in any sense an illusion, even before the crisis a number of studies had suggested that some limits to expansion were apparent. The most surprising result of many studies was that the bulk of
Of course, every economy has weaknesses, but the performance of the East Asian economies has been so spectacular that few people think there is a problem. Even those who were aware that the "miracle" economies had problems could hardly have anticipated the economic troubles that overtook them in 1997.

The Asian Financial Crisis

The Asian financial crisis is generally considered to have started on July 2, 1997, with the devaluation of the Thai baht. Thailand had been showing signs of financial stress for more than a year. During 1996 it became apparent that too many office workers had been buying Thai real estate, thus driving the stock market's value to unrealistic levels. In the first half of 1997 speculation about a possible devaluation of the baht led to an accelerating loss of foreign-exchange reserves, and on July 2 the country attempted to control its 15 percent devaluation. As in the case of Mexico in 1994, however, the attempt to moderate devaluation opened up capital control, sparking massive speculation and a far deeper plunge.

Thailand itself is a small economy. However, the deep drop in the Thai currency was followed by speculation against the currencies first of its immediate neighbor, Malaysia, then of Indonesia, and eventually of the much larger and more developed economy of South Korea. All of these economies seemed to be vulnerable to shocks that泰国的 weaker currencies previously listed; all were facing the effects of 1997's record-setting economic slowdowns in their larger, industrial neighbors. Japan. In turns, governments were faced with difficult decisions, balancing fear of devaluation with a desire to maintain the economy's growth. As a result, the currency value of dollars might push many potentially viable banks and companies into bankruptcy. On the other hand, in order to defend the currencies would require a large temporary high interest rates to provide incentives to keep money in the country, and those high interest rates would themselves produce an economic slump and cause banks to fail.

All of the afflicted countries except Malaysia turned to the IMF for assistance, and received loans in return for implementation of economic packages that were supposed to contain the damage. Higher interest rates to limit the exchange rate devaluation, efforts to reduce large budget deficits, and "structural" reforms that were supposed to deal with the weaknesses that the currency crisis had brought on the currencies in the first place. Despite the IMF's aid, however, the result of the currency crisis was a severe economic downturn. As Table 22.5 illustrates, all of the troubled countries were from growth in excess of 6 percent in 1996 to a severe contraction in 1998, with some governments expecting further decline in 1999.

Most of all was the case of Indonesia, where economic crisis and political instability destabilized each other in a deadly spiral, all made much worse by a collapse of confidence by domestic residents in the nation's banks. By the summer of 1998 the Indonesian currency had lost 85 percent of its original value, and few if any major companies were solvent. The Indonesian population was faced with mass unemployment, and in some cases with inability to afford even basic foodstuffs. Ethnic violence broke out.

As a consequence of the collapse of confidence, the troubled Asian economies were also forced into a domestic reversal of their current account positions. As Table 22.6 shows, they moved from large deficits in 1996 to huge surpluses only 2 years later. Most of this reversal
comes not through increased exports but through a huge boost in imports, as the economies contracted. Countries embittered throughout the crisis against Asia and interest rates decreased, but the direct exporters from the region's slump caused slowdowns or recessions in several neighboring countries, including Hong Kong, Singapore, and New Zealand. South and some parts of Europe and Latin America were feeling the effects. Most governments continued to take IMF-encouraged medicine, but in September 1998 Malaysia—which had never accepted an IMF program—broke ranks and imprimirmean checks on capital movements, hoping that the controls would allow it to ease monetary and fiscal policy without sending its currency tumbling. Probably, the2.0 variation in Asia was "Y-shaped": after the sharp output contraction in 1998, growth resumed in 1999 (see Table 22-3) as depressed currencies spurred higher exports. Not all of the region's economies faced equally well, and country whether one speaks (1876-226) of the effectiveness of Malaysia's experience with capital controls. As the United States economy entered recession early in 2001, however, Asia's growth slowed sharply.

Countries in Other Developing Regions

Asia's woes sparked a general flight by investors from emerging markets, putting severe pressure on the economic policies of developing nations. Two countries, Russia and Brazil, were affected anew after a third, Argentina, held on to its fixed exchange rate for three agonizing years before yielding to market pressure and devaluing in January 2002.

Russia's Crisis. Starting in 1988, the countries of the Soviet bloc, and ultimately the Soviet Union itself, shook off the iron curtain and embarked on transition from centrally-planned economic allocations to one market.

These transitions were uniformly traumatic, involving rapid inflation, steep output declines, and a phenomenon that became known as "plundered economics." Some traumatic beginnings were inevitable. In most of the formerly communist countries more than the majority was to be privatized. Financial markets and banking practices were largely unknown, there was no legal framework for private economic relations, corporate governance, and property rights were ambiguous. States lacked the modern fiscal machinery through which industrial countries design and collect taxes, and given the continued attitude of foreign investors and the absence of domestic capital markets, the monetary policy-making area was the only way to finance needed social expenditures.

### Table 22-4: Real Output Growth and Inflation Russia and Poland, 1991-2000

<table>
<thead>
<tr>
<th>Year</th>
<th>Real Output Growth</th>
<th>Inflation Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>-7.0</td>
<td>6.8</td>
</tr>
<tr>
<td>1992</td>
<td>-7.6</td>
<td>7.5</td>
</tr>
<tr>
<td>1993</td>
<td>-10.4</td>
<td>7.8</td>
</tr>
<tr>
<td>1994</td>
<td>-14.0</td>
<td>8.3</td>
</tr>
<tr>
<td>1995</td>
<td>-19.6</td>
<td>8.5</td>
</tr>
<tr>
<td>1996</td>
<td>-11.0</td>
<td>8.7</td>
</tr>
<tr>
<td>1997</td>
<td>-4.6</td>
<td>9.0</td>
</tr>
<tr>
<td>1998</td>
<td>-1.3</td>
<td>9.3</td>
</tr>
<tr>
<td>1999</td>
<td>0.9</td>
<td>9.9</td>
</tr>
<tr>
<td>2000</td>
<td>2.3</td>
<td>10.4</td>
</tr>
</tbody>
</table>

Sources: EBRD, World Economic Outlook texture.
PART 4 International Macroeconomic Policy

(Continued)

Brazil's 1999 Crisis. Brazil was particularly hard hit by the yen-off following the Russian crisis. Like Russia, Brazil had a public debt problem. Continuing speculation against the real had raised domestic interest rates and swollen government deficits, to a level of 1998 speculative pressure intensified and Brazil's foreign exchange reserves began bleeding away very quickly.

Concealed that a Brazilian crisis would destabilize world capital markets even further and threaten the hard-won stability of neighboring countries such as Argentina, Chile, and Mexico, the IMF helped put together a stabilization fund of over $40 billion to help Brazil defend the real. Efforts to double Brazil's foreign exchange reserves, the term facility was meant to calm investors' fears while Brazil's government put its fiscal house in order. The plan failed. In January 1999 Brazil devalued the real by 8 percent, then allowed it to float. Very quickly the real lost 40 percent of its value against the dollar. Recession followed as the government struggled to prevent the real from going into a free fall. But the measures proved short-lived, inflation did not take off, and (because Brazil's balance of payments, unlike East Asia's, had involved heavy borrowing in dollars), financial-sector collapse was avoided.

Argentina's 2001–2002 Crisis. In contrast to Brazil's devaluation, outlook to crises in its big regional neighbors, notably Argentina, proved sound, although not necessarily Argentina, Chile, and Mexico are all experienced dollar-growth countries. While the flexible exchange rate system is an important stabilizing factor against the effects of economic change, however, Argentina's real-debt position means the dollar has diversified in a more dangerous way. In fact, Argentina's foreign debt is now almost completely in dollars, while Brazil's real exchange rate remained quite high despite high domestic unemployment, and the country's current account deficit remained high. A new government took office in 1999, but the slowdown in U.S. growth starting in 2000, coupled with worsening fiscal deficits, led to the on-going in mid-2001. In the same period, the country's external balance of payments has moved into a significant surplus.

Can Currency Booms Make Fixed Exchange Rates Sustainable?

Argentina's monetary policy has been a matter of debate in recent years. Since the early 1990s, the country has been undergoing a period of rapid economic growth, fueled by strong exports and a surge in foreign investment. However, this rapid growth has been accompanied by high inflation and a large current account deficit. The government has responded by implementing an exchange rate regime that combines a flexible exchange rate with capital controls, and has been successful in keeping inflation low. However, this approach has also been criticized for its potential to create moral hazard, as the government may be tempted to continue running large current account deficits without facing the consequences.

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While a currency board has the advantage of lowering monetary policylatitude away from the hands of politicians who might abuse it, it also has disadvantages, even compared to the alternative of a conventional fixed exchange rate. Since the currency board does not require domestic assets, it cannot lend currency freely to domestic banks, as is often the case with a fixed exchange rate, and in this sense the board is more like a federal fund than a monetary policy instrument. As an institution, however, the board is also more like a federal fund, and thus the risk of losing credibility is higher. The public's desire for a level of inflation lower than the underlying inflation rate and the potential for losing credibility is therefore much higher. The board's ability to maintain a fixed exchange rate is determined by the ability of the country to maintain a fixed exchange rate. In this sense, the board is more like a federal fund than a monetary policy instrument.

Another advantage of the conventional fixed exchange rate is its use in stabilizing economies. For a country that is completely open to international capital movements, monetary policy is ineffective unless a fixed rate, as the sacrifice of open-market operations in domestic assets is rendered trivial (Chap. 17). This is not true, however, for the many developing countries that maintain some effective capital-account restrictions—for them, monetary policy can have effects, even with a fixed exchange rate, because domestic interest rates are not tightly linked to world rates. As we saw in Chapter 17, moreover, a devolution of surprise and uncertainty on market participants can help to induce an unemployment premium, even when capital is fully mobile. The devolution of surprise becomes a problem, though, when people expect it to be used. In that case, expectations of devaluation, by themselves, raise real interest rates and slow the economy. By fostering the devolution of uncertainty, countries that adopt currency boards hope to have a long-term stabilizing effect on expectations that outweighs the occasional inconvenience of being unable to respond to changes in the market.

In the wake of the 1981-1982 crisis, most of the countries' policies suggested it would be far more in their currency board. The subsequent crisis in Asia generated risks for currency boards in Indonesia, Brazil, and even Russia. A currency board could not enhance the credibility of fixed exchange rates and low-inflation policies. Since a currency board typically does not have currency reserves, some argue that it can only impose a disinflationary shock. If market participants expect the disinflation, some of the potential benefits of a currency board will be lost, as Argentina's experience shows. For the same reason, some Argentine policymakers suggested that their country adopt a policy of devaluation, under which they would freeze a domestic currency rate and open up the U.S. dollar instead. The only way they argued, would have been the removal of capital restraints to the United States. But the possibility of devaluation would still have been limited, leading to a fall in economic interest rates.

For a country with a legacy of high inflation, the cost of committing to a currency board is to raise inflationary pressure from speculation. Even Hong Kong's long-standing link to the dollar was eventually subject to speculation during the Asian crisis, leading to very high interest rates and a steep recession. Currency boards can bring credibility only if they have the political will to resist the economic weaknesses—such as rigid labor markets, fragile banking systems, and public sector deficits—that could make them vulnerable to speculative attack. In this context, Indonesia and Brazil probably do not qualify and Brazil certainly does not. With its lack of wage flexibility and substantial public finances, Argentina ultimately failed the test. Developing countries that do not have a flexible exchange rate successfully are best advised to dispense with a national currency altogether and adopt a widely used and stable foreign currency. Even then, they will remain vulnerable to credit crises if there were to be some political override of default.

Lessons of Developing Country Crises

The emerging market crisis that started with Thailand's 1997 devaluation produced what might be called a new era of liquidity. Some Westerners criticized the policies of the Asian countries, especially for "uncoordinated" policy measures, which resulted in an overreliance on and proliferation of policies that traditionally have been the mainstay of trade policies. Some Asian leaders, on the other hand, blamed the crisis on the manipulation of Western financial systems, even Hong Kong, normally a bastion of free-market sentiments, began rethinking what was at stake as a long-term by specialists to drive down its stock market and undermine its currency. And almost everyone criticized the IMF, although some said it was wrong in the crisis, and that the development of capital controls, even if it was wrong in the context, for the reason that the economic instability could be severe at all.

These conclusions come from a careful study of the recent crisis and earlier developing country crises in Latin America and elsewhere.

1. Choosing the right exchange rate regime is perilous for a small country to fix its exchange rate unless it has the reserves and political will to do so. Some way, any East Asian countries found that confidence in official exchange rate targets is essential. The new problem of lowering in foreign currencies. The situation occasionally reaches a point where the financial sector and many expectations became nonexistent. The developing countries that have successfully avoided inflation have adopted a more flexible exchange rate system or moved to a greater flexibility slightly faster an initial period of pegging aimed at reducing inflation expectations. When they have not done this, they have tended to experience mild appreciations and current account deficits that leave them vulnerable to speculative attack.

Even in Argentina, where the public's fear of reversion to the hyperinflationary past is suddenly a widespread and severe. In Japan, falling in the currency regime. The Mexican economy since 1995 shows that larger developing countries can manage quite well with a floating exchange rate, and it is hard to believe that, if Mexico had been fixing, it would have survived 1998 without a currency crisis.

2. The central importance of banking. A large part of what made the Asian crisis so devastating was that it was not just a currency crisis, but rather a currency crisis.
 Necity mixed with a banking and financial crisis. In the most immediate sense, governments were Face With the country and the need to print large quantities of money to deal with bank runs. More gener- ally, the credit system as a whole was affected by cuts in supply of credit, making it difficult for even profitable companies to continue. The shock would have a multiplier effect, with further effects on bank deposits and loan terms. The crisis rapidly affected the economies of the Southern Cone countries in the 1980s and of Mexico in 1994-1995. The case of Mexico underscores the point that systemic risks can spill over and cause financial crises even if their presence is masked by macroeconomic stability. The Mexican crisis illustrates the importance of macroeconomic stability in preventing crises.

3. The pre-emptive response of reformers. Economic reformers in developing countries have learned the hard way the price of which financial liberalization has been their good intentions. The principle of the second arrow of the (recall Chapter 9) that when a situation is about to stabilize, it is often better to control it than to risk losing control. Developing countries generally suffer from many, many, many problems, the point is especially important for them. The need for reforms of capital account liberalization and financial sector reform is as evident in Southeast Asia as it is evident in other emerging markets. For example, the ability to borrow freely will simplify reconstruction in developing countries. When the economy shows signs of turning to capital flight may be more damaging. Developing countries should delay moving to a capital account liberalization. Capital account liberalization is a tool to be used when the economy is ready, not to rush into it.

4. The experience of contagion. A final lesson of the striking experience is the vulnerability of even seemingly healthy economies to crises of confidence generated by events elsewhere in the world—events that may have come to be known as contagion. Contagion was at work when the crisis in Thailand, a small economy in Southeast Asia, provided another crisis in South Korea, which was a much larger economy some 7,000 miles away. An even more spectacular example emerged in August 1998, when a plurality in the Russian ruble took an unexpectedly reactive position against Brazil's real. The collapse of Brazil, and the events that were an essential part of the whole system of financial systems, to which we now turn.

Reforming the World's Financial "Architecture"

Economic diffusion leads, inevitably, to proposals for economic reform. The Asian economic crisis and its repercussions suggested to many people that the international monetary system, or at least a part of it, was applied to developing countries, was in need of an overhauling. Proposals for an overhaul have been proposed under the impression of vague title of plans for a new financial "architecture." Why did the Asian crisis occur? The Asian crisis of the 1990s was different from the crises of the 1980s. One reason is that the Asian countries problems seemed to stem primarily from their connection with the world capital markets. The crisis clearly demonstrated that a country can be financially vulnerable even if it is not tied too closely to financial systems. The world financial system has retained its dominance in the absence of any meaningful currency realignments. The second reason for avoiding international financial crisis was the strength of contagion through the institutional capital markets. The spread and force with which market disruptions could be spread between disequilibrium economies suggested that prevent measures taken to limit what economies might not work. In a word, the Asian crisis had shown that the world financial system is not strong enough to withstand the impact of financial shocks.

CAPITOL MOMATILITY AND THE TELESCOPING OF THE EXCHANGE RATE MECHANISM

One effect of the Asian crisis is to deprived many of us here about the market in the problem of international macroeconomics and finance. The crisis and its aftermath made it clear that for some well-known policy tools for managing economies to work in such an environment. Policy, therefore, the crisis may have accelerated the process of exchange rate management in the crisis-prone regions. The exchange rate mechanism is more important for the typical developed countries than for the typical developing country. Developing countries have less ability to influence their terms of trade and to do the things that developing countries, and exchange rate stabilization can be more important for learning inflation expectations in check in developing countries. The differences in the types of financial architecture can be summarized as follows. Because of the threat of the kind of currency crises that hit Mexico in 1994 and Asia in 1997, it seems to be hard if not impossible to achieve all three objectives at the same time. To achieve one, one must give up one of the others. Subsequently, one must choose one of the roles of the triangle. Until the late 1970s most developing countries maintained exchange controls and limited private capital movements in particular, so we have seen. Some major developing coun- tries, usually China and India, still maintain such controls. Where there was considerable expe- rience of the controls, they did close up the movement of capital. As a result, countries could peg their exchange rate for extended periods—providing exchange rate stability—yet
The vertices of the triangle show three ways that policymakers in open economies would like to achieve. Unfortunately, at most two corners can be connected at the same time: the triangle’s three sides must be chosen with the three policy stringencies (floating exchange rates, currency control, capital controls) that are consistent with the two goals that lie between in the diagram.

devalue their currencies on occasion, offering considerable monetary autonomy. This "adjustable peg" system is shown along one of the sides of the triangle in Figure 22.4. The main problem with it was that it imposed severe restrictions on international transactions, exchange efficiency, and economic growth. In the late 1920s, the heaven of democracy was not free, but also because of imposed communications technology. No one is left standing on the adjustable peg regime, which is extremely vulnerable to speculation, once capital would flow a currency in the strongest kit that it might be devalued. (The same phenomenon occurred among developing countries in the 1960s, as we see in Chapter 18.) The result has been a wide variety of currency arrangements among the other sides of the triangle: either rigidly fixed exchange rates and a low degree of monetary autonomy; the currency board system described on pp. 69-67 or toward flexible exchange rates and a higher degree of monetary autonomy. But despite the lessons of experience that this presented, the lesson of Kojima’s experience often remains the case of each country’s need to accommodate. Meanwhile, as we have seen, a rigid system like a currency board can deprive a country of within-country flexibility, especially when dealing with financial crises where the country could be cut off from the world economy.

Some empirical economists, including Columbia University’s Jagdish Bhagwati and Harvard University’s Dani Rodrik, have argued that developing countries should keep or remove restrictions on capital mobility to be able to exercise monetary autonomy while avoiding speculative capital flight.1 In the face of the crisis, China and India, for example.

1 For example, L. Bhagwati and D. Rodrik, "The Capital Myth," Foreign Affairs 77 (May-June, 1998); and D. Rodrik, "Why Need Capital Account Convertibility?" The Economist, 84 (May 9, 1998).

CHAPTER 22
Developing Countries: Growth, Crisis, and Reform

have put plans to liberalize their capital accounts on hold, some countries that had liberalized capital movements considered the possibility of reintroducing restrictions (as Malaysia actually did). However, most policymakers, both in the developing world and in the West, continued to resist capital controls at either impossible to enforce or too disruptive of normal business relationships (as well as a source of corruption). The most dangerous of financial archeologists focused instead on macroeconomic policies—ways to make the remaining choices less painful.

"Phylactery" Measures

Since the risk of financial crisis is what makes the choices surrounding the choice of exchange rate regime so difficult, some recent proposals focus on ways to reduce that risk. Typical proposals include the following:

- More "liquidity." At least part of what went wrong in Asia was that foreign banks and other investors lost money in Asian emerging markets without any idea of what the risks were, and then pulled their money out equally blindly when they became clear that those risks were larger than they imagined. There have therefore been many proposals for greater "liquidity"—that is, better provision of financial information, in the same way that corporations in the United States are required to provide accurate reports of their financial positions. The hope is that increased transparency will reduce both the tendency to too much money in the wrong country when things are going well, and the rush for the exits when the truth (as it turns out) is more like the image.

- Stronger banking systems. As we have seen, one factor that made the Asian crisis so severe was the way that currency crises coincided with bank crises. It is at least possible that these measures would be useful if banks themselves were stronger. So there have also been many proposals for strengthening banks, both through stricter regulation of the risk they take and through increased capital requirements, which ensure that sufficient amount of the owner’s own money is at risk.

- Enhanced credit lines. Some reformers also want to establish special credit lines that businesses can draw on in the event of a currency crisis, in effect adding to their foreign exchange reserves. The idea would be that the more existence of these credit lines would usually make them less costly as long as the country's credit rating is high and countries have the capacity to service the debt. But they would not be too high or so that their access would be sufficient, and each credit line could be provided by private banks, or by public bodies such as the IMF.

- Increased equity capital inflows relative to foreign debt. If developing countries financed a greater proportion of private foreign capital through equity portfolio investment or direct foreign investment rather than through debt instruments, the probability of default would be much lower. The country’s payments to foreigners would then be more closely linked to its economic fortunes, falling automatically when times were bad.

How effective these various measures might be remains a matter of debate. Critics suggest that there was plenty of negative information about Asian economies before the crisis, if investors had only been willing to listen, and that the size of the capital flight that actually took place would have exceeded any bank capital and any credit line. Nonetheless, it is likely that at the time of writing that some of these measures will be put into effect.
Coping with Crises

Even with the proposed prophylactic measures, crises would still likely happen. These here have been: proposed for modifying the way the world responds to such crises.

Many of these proposals relate to the rise and policies of the IMF. Here opinion is hitherto divided. Some conservative critics believe that the IMF should simply be abolished, arguing that its very existence encourages irresponsible behavior by making leaders believe that they will always be saved from the consequences of their actions—a version of the moral hazard argument previously discussed. Other critics argue that the IMF is necessary, but that it has misconceived its role—for example, by trying to insist on structural reform when it should instead seek to remove financial stresses. Virtually, defenders of the IMF—and also some of its critics—argue that the agency is simply misunderstood for its task, that in a world of high capital mobility it needs the ability to provide much larger loans than much more quickly.

Another set of proposals is based on the proposition that sometimes a country simply cannot pay its debts, and therefore needs the equivalent of bankruptcy proceedings for a company. Proposals for an international "Chapter 11" mechanism (named after the similar clause in U.S. bankruptcy law) envision a formal procedure whereby a country can seek international legal authorization to temporarily stop piling up its debt, and negotiate a settlement that gives it more time to repay, or in extreme circumstances unilaterally writes off part of its obligations. As we noted in our discussion of the Latin American debt crisis of the 1980s, limited debt writeoffs did bring that crisis to an end. Fathers of an international "Chapter 11" argue that such a procedure would be either ineffective or counterproductive (because it would encourage countries to borrow too much, in the knowledge that they can easily repay their debts on mandated terms again).

A Confused Future

If this brief discussion seems to suggest a high degree of confusion about the future finan-
cial "architecture," you have the right idea. As this point the one real clear thing is that while large advanced countries may be susceptible to fluctuating exchange rates and interna-
tional capital mobility, developing countries do not seem to have any easily satisfac-
tory alternative. A good guess is that the next five years will be characterized experimen-
tal, with many different schemes for global reform, and with developing individual countries trying a variety of approaches—fluctuating exchange rates (as in Mexico and Brazil), capital controls (as in Thailand and Malaysia), currency boards (as in Estonia and Hong Kong), and perhaps even abolition of national currencies and adoption of the dollar or some other common currency. Whether or not when a coherent architecture will emerge from this free-for-all is anyone's guess.

Summary

1. There are vast differences in per-capita income and in wellbeing between countries at different stages of economic development. Furthermore, developing countries have not shown a uniform tendency of convergence to the income levels of industrial

countries. Some developing countries, however, notably certain in East Asia, have seen some dramatic increases in living standards since the 1960s. Explaining why some countries remain poor and which policies can promote economic growth remains one of the most important challenges in economics.

2. Developing countries form a heterogeneous group, especially since many have embarked on wide-ranging economic reforms in recent years. Most have at least some of the following features: heavy government involvement in the economy, including a large share of public spending, in O&G, a weak record of high inflation, usually reflecting government attempts to maintain stimulus from the economy in the face of ineffective tax collections; weak credit institutions and unregulated capital markets; pegged exchange rates and exchange or capital controls, including ones that peg exchange rates against a basket of either current or historical average appreciation; a heavy reliance on primary commodity exports. Corruption seems to increase as a country's relative poverty rises. Many of the preceding developing country features date from the Great Depression of the 1930s, when industrialized countries turned inward and world markets collapsed.

3. Because many developing economies offer potentially rich opportunities for invest-
ment, it is natural that they have current account deficits and borrow from richer countries. In principle, developing country borrowing can lead to gains from trade that make both borrowers and lenders better off. In practice, however, borrowing by developing countries has sometimes led to deflation crises that generally result in monetary and banking crises. Like currency and banking crises, default crises can erode a self-filling element, even though their occurrence depends on fundamental weaknesses in the borrowing country.

4. In the 1970s, as the Brent Wood system collapsed, countries in Latin America created an era of drastically inferior macroeconomic performance with respect to growth and inflation. In the 1970s countries in Latin America's Southern Cone made unsuccessful attempts to exchange rate-based inflation reduction which inevitably produced mixed results and exacerbation and trade collapse. Unconstrained external bor-
rowing led in the 1980s to a general of developing country debt crisis, with its gen-
cral impact in Latin America and in Africa. Starting with Chile in the mid-1980s, some

large Latin American countries started to undertake thorough microeconomic reforms, including tax and structural tax, and also control the government budget, vigorous pri-

vatisation, deregulation, and trade policy reform. Argentina adopts a currency board program in 1991. Not all the Latin American reformers succeeded in strengthening their banks, and this was evident in Mexico and Argentina in the mid-1990s.

5. Despite their extremely good record of high output growth are low inflation and budget deficits, several key developing countries in East Asia over hit by severe

macro- and disturbing monetary devaluation in 1997. In retrospect, the affected countries had several vulnerabilities, most related to widespread moral hazard in domestic banking and finance. The effects of the crisis spilled over to countries as distant as Russia and Brazil, illustrating the element of contagion in modern-day international financial crises. This factor, plus the fact that the East Asian countries had the apparent problems before their crisis struck, has given rise to demands for rethinking the international financial "architecture."

6. Proposals to reform the international architecture can be grouped as preventive mea-
sures or as ex-post measures, with the latter applied once safeguards have failed to
CHAPTER 22 Developing Countries: Growth, Crisis, and Reform

By selling state companies to private owners. Would the economies have

1. Over 200 percent per year in both 1980 and 1990, but that inflation was falling in the first year and rising in the second. Other things equal, in which year was the government more active? (Assume that a country's monetary policy is the same in both years.)
2. The exchange rate is not fully flexible in the short run. Can you think of differences in financial structure that might partially explain this contrast? (Hint: In many countries the exchange rate is not fully flexible.)
3. The external debt burden of many developing countries (such as Argentina) in the 1970s that in part due in part due to illegal capital flights at the time of expected currency devaluation

4. The exchange rate is not fully flexible in the short run. Can you think of differences in financial structure that might partially explain this contrast? (Hint: In many countries the exchange rate is not fully flexible.)
5. The external debt burden of many developing countries (such as Argentina) in the 1970s that in part due in part due to illegal capital flights at the time of expected currency devaluation

6. Much developing country borrowing during the 1970s was carried out by state-owned companies. In some of these countries there have been moves to privatize the

Further Reading


Guglielmo A. Ciaian and Carmine M. Ruicco. "The East of Planning," Quarterly Journal of Economics 119 (May 2002). This paper argues for a new development strategy based on "brutal" exchange rate targeting among these countries


The Specific Factors Model

In this chapter, we focus on a formal mathematical treatment for the specific factors model of production explained in Chapter 3. The mathematical treatment is useful in deepening understanding of the model itself, and also provides an opportunity to develop concepts and techniques that apply to subsequent models. In particular, it is a good place to introduce an extremely useful tool of analysis, the so-called bar algebra.

Factor Prices, Costs, and Factor Demand

The specific factors model has two sectors: manufacturing and food. In each sector, two factors of production are employed: capital and labor in manufacturing, and land and labor in food. Before turning to the full model, let us examine in general how costs and the demand for factors of production are related to the prices at which producers employ two factors.

Consider the production of some good that requires capital and labor as factors of production. Provided the good is produced with constant returns to scale, the technology of production may be summarized in terms of the unit isoquant (or isobar in Figure 3P-1), a curve showing all the combinations of capital and labor that can be used to produce one unit of the good. Curve 1 shows that there is a trade-off between the quantity of capital used per unit of output, \( k \), and the quantity of labor per unit of output, \( l \). The distance of the unit isoquant above the origin is the maximum amount of labor that can be used for a given amount of capital, for the capital-labor ratio increases, and conversely.

In a competitive market economy, producers will choose the capital-labor ratio in production that maximizes their cost. Such a cost-minimizing production choice is shown in Figure 3P-1 at point B. It is the point at which the unit isoquant I is tangent to a line whose slope is equal to the ratio of the price of labor to the price of capital, \( P_L / P_K \).

The actual cost of production is equal to the sum of the cost of capital and labor inputs,

\[
C = wL + rk
\]  
(3P-1)

where the input coefficients, \( w \) and \( r \), have been chosen to minimize \( C \).

Because the capital-labor ratio has been chosen to minimize costs, it follows that a change in this ratio cannot reduce costs. Costs cannot be reduced by increasing \( w \) or \( r \) by a given percentage. It follows that a change in the capital-labor ratio from the cost-minimizing choice must have no effect on cost. Let \( \delta w \) and \( \delta r \) be small changes from the optimal input choices. Then

\[
\delta C = \delta wL + \delta rk = 0
\]  
(3P-2)

for any movement along the input isoquant.

Consider next what happens if the factor prices \( P_L \) and \( P_K \) change. This alteration will have two effects: It will change the choice of \( k \) and \( l \), and it will change the cost of production.

The cost-minimizing capital-labor ratio depends on factor prices.

First, consider the effect on the relative quantities of capital and labor used to produce one unit of output. The cost-minimizing labor-capital ratio depends on the ratio of the price of labor to that of capital:

\[
\frac{L}{K} = \frac{P_K}{P_L}
\]  
(3P-3)

The cost of production will also change. For small changes in factor prices \( \delta P_L \) and \( \delta P_K \), the change in production cost is

\[
\delta C = \delta wL + \delta rk = \delta wL + \delta rk
\]  
(3P-4)

From equation (3P-3), however, we already know that the last two terms in equation (3P-4) sum to zero. Hence the effect of factor prices on cost may be written

\[
\delta C = \delta wL = \delta k
\]  
(3P-5)

It turns out to be very convenient to derive a somewhat different equation from equation (3P-5). Dividing and multiplying some of the terms of the equation, a new equation can be derived that looks as follows:

\[
\frac{\delta C}{C} = \left( \frac{\delta w}{w} \right) \frac{L}{K} + \left( \frac{\delta P_K}{P_K} \right) \frac{C}{L}
\]  
(3P-6)

The term \( \delta C/C \) may be interpreted as the percentage change in \( C \) and may conveniently be identified as \( \delta \). Similarly, for \( \delta w = 1 \) and \( \delta k = 0 \). The term \( \delta w/C \) may be
Interpreted as the price of capital in total production costs, it may be conveniently designated \( \psi \). Thus equation (3P-5) can be compactly written

\[ c = \phi_z + \psi \zeta. \] (3P-8)

where

\[ \phi_z = \phi_1 = 1. \]

This is an example of "hot algebra," an extremely useful way to express mathematical relationships in interrelated economics.

The relationship between factor prices and the capital-labor ratio can also be expressed in hot algebra. A rise in the price of labor relative to the price of capital lowers the ratio of labor to capital; this statement may be written

\[ \zeta - \bar{\zeta} = -\psi (\bar{c} - c) \] (3P-9)

where \( \psi \) is the percentage change in the labor-capital ratio that results from a 1 percent change in the ratio of factor prices, and is known as the elasticity of substitution.

**Factor Price Determination in the Specific Factors Model**

The specific factors model has two sectors, each of which is like the just described. Manufacturers produce using capital (the specific factor) and labor:

\[ Q_a = Q_a(K, L_a) \] (3P-10)

Food is produced using the specific factor land and labor:

\[ Q_f = Q_f(L, L_f) \] (3P-11)

The supplies of capital and land to each sector are simply whatever they are. Labor, however, can be allocated to either sector:

\[ L_a = L_f = L \] (3P-12)

where \( L \) is the economy's total supply of labor.

In a perfectly competitive economy, the price of each good must just equal its cost of production. In manufacturers, then,

\[ P_a = \phi_a \psi + \phi_3 \psi \zeta. \] (3P-13)

where \( P_a \) is the price of capital, \( \psi \) the wage rate of labor, and \( \phi_a x \) and \( \phi_3 y \) the input coefficients. Using the notation introduced in equation (3P-6), it follows that

\[ \bar{P}_a = \phi_2 \psi + \phi_3 \psi \zeta. \] (3P-14)
less than $P_f$. Thus the overall description of the relation of goods price and factor price changes is

$$\gamma > P_g \geq \frac{\omega}{P_f} \geq \frac{w}{P_g} > \ell_g.$$  

(3P-24)

Because the price of capital rises in terms of both goods, someone who derives his or her income entirely from capital would be unambiguously better off. Because the price of land falls relative to both goods, someone deriving his or her income entirely from land would be unambiguously worse off. Someone deriving income from labor would find that the purchase power of that income had risen in terms of food and fallen in terms of manufactures.

Effects of a Change in Relative Prices

Suppose the price of manufactures rises relative to that of food; that is, $P_g \geq P_f$. Then, because the change in the wage rate is a weighted average of the changes in the two goods prices,

$$P_g \geq \frac{\omega}{P_f} \geq P_f.$$  

(3P-23)

The effect on the allocation of labor is apparent from equations (3P-23) and (3P-24): Because $P_g \geq \frac{\omega}{P_f}$, $\ell_g \geq 0$ since $P_g \geq \omega$, $\ell_g \geq 0$. Employment in manufactures rises and employment in food falls.

The effects on the prices of capital and land may be seen from equations (3P-32) and (3P-33). Again, because $P_g \geq \frac{\omega}{P_f}$, $\ell_g$ must rise by more than $P_g$, while conversely $\gamma$ falls by
The Factor Proportions Model

The factor proportions model with fixed coefficients is very similar to the specific factors model. It has two sectors, each of which uses two factors of production. The only difference is that there are the same factors of production, so that both labor and the other factor (land in this example) can be allocated across sectors.

The Basic Equations in the Factor Proportions Model

Suppose a country produces two goods, X and Y, using two factors of production, land and labor. Assume that X is land intensive. The price of each good must equal its production cost:

\[ P_X = \delta_{XY} r + \delta_{XY} L \]  
\[ P_Y = \delta_{XY} r + \delta_{XY} L \]  

where \( \delta_{XY} \), \( \delta_{XY} \), \( \delta_{XY} \), \( \delta_{XY} \) are the cost-minimizing input choices given the price of land, r, and labor, L.

Also, the economy's factors of production must be fully employed:

\[ \delta_{XY} Q_X + \delta_{XY} Q_Y = T \]  
\[ \delta_{XY} Q_X + \delta_{XY} Q_Y = L \]  

where \( T, L \) are the total supplies of land and labor.

The factor price equations (4P-1) and (4P-2) imply equations for the rate of change for factor prices, just as in the specific factors model:

\[ \frac{\delta_{XY}}{\delta_{XY}} P_X = \frac{\delta_{XY}}{\delta_{XY}} P_Y \]  
\[ \frac{\delta_{XY}}{\delta_{XY}} P_X = \frac{\delta_{XY}}{\delta_{XY}} P_Y \]  

where \( \theta_{XY} \) is the share of land in production cost of X, i.e., \( \theta_{XY} > \theta_{XY} \) and \( \theta_{XY} < \theta_{XY} \), because X is more labor intensive than Y.

The quantity equations (4P-3) and (4P-4) must be treated more carefully. The unit inputs \( \delta_{XY}, \delta_{XY} \) can change if factor prices change. If goods prices are held constant, however, then factor prices will not change. Thus, for given prices of X and Y it is also possible to write the equations in terms of factor supplies and outputs:

\[ \delta_{XY} Q_X + \delta_{XY} Q_Y = L \]  
\[ \delta_{XY} Q_X + \delta_{XY} Q_Y = L \]  

where \( \delta_{XY} \) is the share of the economy's land supply that is used in production of X, i.e., \( \delta_{XY} \), \( \delta_{XY} \), and \( \delta_{XY} \), are the shares of the greater land intensity of X production.

Goods Prices and Factor Prices

The factor price equations (4P-5) and (4P-6) may be solved together in express factor prices as the outcome of goods prices (these solutions make use of the fact that \( \theta_{XY} = 1 - \theta_{XY} \) and \( \theta_{XY} = 1 - \theta_{XY} \)).

\[ \begin{align*}  
\ell &= \left( \frac{\delta_{XY}}{\delta_{XY}} \right) \left( 1 - \theta_{XY} \right) \delta_{XY} \delta_{XY} r + \delta_{XY} \delta_{XY} r \\
\ell &= \left( \frac{\delta_{XY}}{\delta_{XY}} \right) \left( 1 - \theta_{XY} \right) \delta_{XY} \delta_{XY} r + \delta_{XY} \delta_{XY} r \\
\end{align*}  

(4P-9)

(4P-10)

where \( D = \theta_{XY} - \theta_{XY} \) (implying that \( D > 0 \)). These may be arranged in the form:

\[ \begin{align*}  
\ell &= \delta_{XY} + \left( \frac{\delta_{XY}}{D} \right) \delta_{XY} \delta_{XY} r + \delta_{XY} \delta_{XY} r \\
\ell &= \delta_{XY} + \left( \frac{\delta_{XY}}{D} \right) \delta_{XY} \delta_{XY} r + \delta_{XY} \delta_{XY} r \\
\end{align*}  

(4P-9')

(4P-10')

Suppose that the price of X rises relative to the price of Y, so that \( \delta_{XY} > \delta_{XY} \). Then it follows that:

\[ \begin{align*}  
\ell &= \delta_{XY} + \left( \frac{\delta_{XY}}{D} \right) \delta_{XY} \delta_{XY} r + \delta_{XY} \delta_{XY} r \\
\ell &= \delta_{XY} + \left( \frac{\delta_{XY}}{D} \right) \delta_{XY} \delta_{XY} r + \delta_{XY} \delta_{XY} r \\
\end{align*}  

(4P-11)

Thus, the real price of land rises in terms of both goods, while the real price of labor falls in terms of both goods. In particular, if the price of X were to rise with no change in the price of Y, the wage rate would actually fall.

Factor Supplies and Outputs

As long as goods prices may be taken as given, equations (4P-7) and (4P-8) can be solved, using the fact that \( \delta_{XY} = 1 - \delta_{XY} \) and \( \delta_{XY} = 1 - \delta_{XY} \), to express the change in terms of each good as the outcome of changes in factor supplies:

\[ \begin{align*}  
\ell &= \left( \frac{\delta_{XY}}{D} \right) \delta_{XY} \delta_{XY} r + \delta_{XY} \delta_{XY} r \\
\ell &= \left( \frac{\delta_{XY}}{D} \right) \delta_{XY} \delta_{XY} r + \delta_{XY} \delta_{XY} r \\
\end{align*}  

(4P-12)

(4P-13)

where \( \Delta = \delta_{XY} - \delta_{XY} > 0 \).

These equations may be rewritten:

\[ \begin{align*}  
\ell &= \delta_{XY} \left( \frac{\delta_{XY}}{D} \right) \delta_{XY} \delta_{XY} r + \delta_{XY} \delta_{XY} r \\
\ell &= \delta_{XY} \left( \frac{\delta_{XY}}{D} \right) \delta_{XY} \delta_{XY} r + \delta_{XY} \delta_{XY} r \\
\end{align*}  

(4P-12')

(4P-13')
The Trading World Economy

Supply, Demand, and Equilibrium

World Equilibrium

Although graphical purposes it is easier to express world equilibrium as an equality between relative supply and relative demand, for a mathematical treatment it is preferable to use an alternative formulation. This approach is to focus on the conditions of equality between supply and demand of either one of the two goods, cloth and food. It does not matter which good is chosen because equilibrium in the cloth market implies equilibrium in the food market vice versa.

To see this condition, let $Q_X, Q_Y$ be the output of cloth in Home and Foreign, respectively, $D_X, D_Y$ the quantity demanded in each country, and corresponding variables with an $F$ subscript refer to the food market. Also, let $p$ be the price of cloth relative to that of food.

In all cases world equilibrium will be equal to world income. World income is the sum of income earned from sales of cloth and sales of food, world expenditure is the sum of purchases of cloth and food. Thus the equality of income and expenditure may be written:

$$p(Q_X + Q_Y) = D_X + D_Y$$  \hfill (FP-1)

Now suppose that the world market for cloth is in equilibrium; that is,

$$Q_X + Q_Y = D_X + D_Y$$  \hfill (FP-2)

Then from equation (FP-1) it follows that

$$Q_Y = D_Y$$  \hfill (FP-3)

That is, the market for food must be in equilibrium as well. Clearly the converse is also true.

The market for food is in equilibrium, so too is the market for cloth.

It is therefore sufficient to focus on the market for cloth to determine the equilibrium relative price.

Production and Income

Each country has a production possibility frontier along which it can trade off between producing cloth and food. The economy chooses the point on that frontier which maximizes the value of output at the given relative price of cloth. This value may be written

$$V = pQ_X + Q_Y$$  \hfill (FP-4)
As in the cost-minimization cases described in earlier postscripts, the fact that the output mix chosen maximizes value implies that a small shift in production along the production possibility frontier away from the optimal mix has no effect on the value of output:

\[ p_1Q_1 + p_2Q_2 = 0. \]  
(S1-P1)

A change in the relative price of cloth will lead to both a change in the output mix and a change in the value of output. The change in the value of output is

\[ dV = Q_1 dp_1 + Q_2 dp_2. \]  
(S1-P6)

However, because the two terms are, by equation (S1-P5), equal to zero, this expression reduces to

\[ dV = Q_2 dp_2. \]  
(S1-P6')

Similarly, in foreign

\[ dV^* = Q_2^* dp_2. \]  
(S1-P7)

Income, Prices, and Utility

Each country is assumed as if it were one individual. The tastes of the country can be represented by a utility function depending on consumption of cloth and food:

\[ U = U(Q_1, D_2). \]  
(S1-P8)

Suppose a country has an income \( V \) in terms of food. Its total expenditure must be equal to the income, so that

\[ p_1Q_1 + D_2 = V. \]  
(S1-P9)

Consumers will maximize utility given their income and the prices they face. Let \( MU_{Q_1}/MU_2 \) be the marginal utility that consumers derive from cloth and food; then the change in utility that results from any change in consumption is

\[ dU = MU_{Q_1} dQ_1 + MU_2 dD_2. \]  
(S1-P10)

Because consumers are maximizing utility given income and prices, there cannot be any affordable change in consumption that makes them better off. This condition implies that at the optimum,

\[ MU_{Q_1}/MU_2 = p. \]  
(S1-P11)

Now consider the effect on utility of changing income and prices. Differentiating equation (S1-P9) yields

\[ p_1dQ_1 + dD_2 = dV - D_2 dp_2. \]  
(S1-P12)

But from equations (S1-P10) and (S1-P11),

\[ dU = MU_{Q_1} (p_1dQ_1 + dD_2). \]  
(S1-P13)

Thus

\[ dU = MU_{Q_1} (p_1 - D_2 dp_2). \]  
(S1-P14)

It is convenient to introduce now a new definition: The change in utility divided by the marginal utility of food, which is the commodity in which income is measured, may be defined as the change in real income, and indicated by the symbol \( dy \):

\[ dy = \frac{dU}{MU_2}. \]  
(S1-P15)

For the economy as a whole, income equals the value of output \( V \). Thus the effect of a change in the relative price of cloth on the economy’s real income is

\[ dy = Q_2 - D_2 dp_2. \]  
(S1-P16)

The quantity \( Q_2 - D_2 \) is the country’s exports of cloth. A rise in the relative price of cloth, then, will benefit an economy that exports cloth; it is an improvement in that economy’s terms of trade. It is instructive to examine this idea in a slightly different way:

\[ dy = \frac{p(Q_2 - D_2)}{p_2}. \]  
(S1-P17)

The term \( p(Q_2 - D_2) \) is the value of exports; the term is percentage in the percentage change in the terms of trade. The expression therefore says that the real income gain from a given percentage in terms of trade change is equal to the percentage change in the terms of trade multiplied by the initial value of exports. If a country is initially exporting $100 billion and its terms of trade improve by 10 percent, the gain is equivalent to a gain in national income of $10 billion.

Supply, Demand, and the Stability of Equilibrium

In the market for cloth, a change in the relative price will induce change in both supply and demand. On the supply side, a rise in \( p \) will lead both Home and Foreign to produce more cloth. We will discuss this supply response as \( dQ_1 = dQ_1^* \) to Home and Foreign, respectively, so that

\[ dQ_1 = a dp_1. \]  
(S1-P18)

\[ dQ_1^* = a dp_2. \]  
(S1-P19)

The demand side is more complex. A change in \( p \) will lead to both income and substitution effects. These effects are illustrated in Figure S1-1. The figure shows an economy that
The effect on Foreign's demand similarly is

$$dQ_F = -\epsilon^T + \alpha^T Q^F - \omega^T \delta^F.$$  

(SP-21)

Because $Q^F > 0$, $Q^F$ is negative, the income effect in Foreign is negative.

The demand and supply effect can now be put together to get the overall effect of a change in $p$ on the market for cloth. The excess supply of cloth is the difference between domestic world production and consumption:

$$dS^F = dQ^F - dQ^T = d\rho - d\rho.$$  

(SP-22)

The effect of a change in $p$ on world excess supply is

$$dS^F = (\alpha^T + \epsilon^T + \delta^T - \alpha^T - \epsilon^T)Q^F - (\omega^T - \omega^T)\delta^F.$$  

(SP-23)

If the market is initially in equilibrium, however, Home's exports equal Foreign's imports, so that $Q^F = Q^T = Q^F - Q^T = Q^F - Q^T$, the effect of $p$ on excess supply may therefore be written

$$dS^F = (\alpha^T + \epsilon^T + \delta^T - (\omega^T - \omega^T)\delta^F.$$  

(SP-23')

Suppose the relative price of cloth were initially a little higher than its equilibrium level. If the world were an excess supply of cloth, market forces would push the relative price of cloth down and thus lead to movements of equilibrium. On the other hand, if it was excessively low, the relative price of cloth leads to an excess demand for cloth, the price will rise further, leading the economy away from equilibrium. Thus equilibrium will be stable only if a small increase in the relative price of cloth leads to an excess supply of cloth. This is,

$$dS^F > 0.$$  

(SP-24)

Inspection of equations (SP-23') reveals the factors determining whether or not equilibrium is stable. Both supply effects and substitution effects in demand work toward stability. The only possible source of instability lies in income effects. The net income effect is of ambiguous sign. It depends on whether $\alpha^T > \omega^T$, that is, whether Home has a higher marginal propensity to consume cloth when its real income increases than Foreign does. If $\alpha^T > \omega^T$, the income effect works against stability, whereas if $\alpha^T < \omega^T$, it reinforces the other reasons for stability.

In what follows we will assume that equation (SP-24) holds, so that the equilibrium of the world economy is in fact stable.

Effects of Changes in Supply and Demand

The Method of Comparative Statics

To evaluate the effects of changes in the world economy, a method known as comparative statics is applied. In each of the cases considered in the text, the world economy is...
subjected to some change, which will lead to a change in the world relative price of cloth. The first step in the method of comparative statics is to calculate the effect of the change in the world economy on the cestus supply of cloth as the original p. This change is obtained by \( \Delta E_1 \). Then the change in the relative price needed to restore equilibrium is calculated by

\[
dp = -\frac{\Delta E_2}{\Delta E_1} (\text{SP-25})
\]

where \( \Delta E_1 \) reflects the supply, income, and substitution effects described earlier. The effect of a given change on national welfare can be estimated in two stages. First there is a relative price effect; this change has an effect on income, which we can denote by \( \Delta y_1 \). Then there is the indirect effect of the change in the terms of trade, which can be calculated using equation (SP-16). Then the total effect on welfare is

\[
dp = \Delta y_1 + (Q_r - Q_1)\Delta y.
\]

(Economic Growth)

Consider the effect of growth in the home economy. As pointed out in the text, by growth we mean an outward shift in the production possibility frontier. This change will lead to changes in both cloth and food output at the initial relative price \( p_0 \). Let \( Q_2, Q_0 \) be these changes in output. If growth is strongly based, one or the other of these changes may be negligible, but because production possibilities have expanded, the value of output in the initial p must rise:

\[
dp' = p\Delta Q_0 + \Delta Q_1 = \Delta y_2 > 0. \quad \text{(SP-27)}
\]

At the initial p the supply of cloth will rise by the amount \( \Delta Q_1 \). The demand for cloth will also rise by an amount \( \Delta y_2 \). The net effect on world supply and demand of cloth will therefore be

\[
\Delta E_1 = \Delta Q_1 - \Delta y_2 p_0 = \Delta y_2. \quad \text{(SP-28)}
\]

This expression can have either sign. Suppose first that growth is based on food output, so that \( Q_2 > 0, \Delta Q_1 = 0 \). Then demand for cloth will rise by

\[
\Delta q_2 = a p_0 \Delta Q_2 + \Delta Q_1 = a p_0 \Delta Q_2 > 0.
\]

(See footnote 1.)

Thus the overall effect on surplus supply will be

\[
\Delta E_2 = \Delta Q_1 - \Delta q_2 > 0.
\]

As a result, \( dp = \frac{-\Delta E_2}{\Delta E_1} dp_0 < 0 \). Hence the curve of the cestus is downward-sloping.

On the other hand, suppose that growth is strongly based toward food, so that \( Q_2 < 0, \Delta Q_1 > 0 \). Then the effect on the supply of cloth at the initial p is negative, but the effect on the demand for cloth remains positive. It follows that

\[
\Delta E_2 = \Delta Q_1 - \Delta q_2 < 0.
\]

so that \( dp > 0 \). Hence the curve of trade improves.

Growth that is less strongly based can move p in either way, depending on the strength of the bias compared with the way income divides its income at the margin.

Turning next to the welfare effects, the effect on foreign depends only on the terms of trade. The effect on home, however, depends on the combination of the initial income change and the subsequent change in the terms of trade, as shown in equation (SP-26).

If growth turns the terms of trade against home, this condition will impose the incorrect, favorable effect of growth.

But can growth worsen the terms of trade sufficiently to make the growing country actually worse off? To see that it can, consider a rise in the price of a country that experiences a balanced shift in its production possibilities. Then change \( Q_1, Q_0 \) while leaving the value of its output unchanged at initial relative prices. (This change would not necessarily be considered growth, because it violates the assumption of equation (SP-27), but it is a useful reference point.) Then there would be no change in demand at the initial p, while the supply of cloth rises; hence p must fall. The change in real income is \( \Delta E_1 = \Delta Q_1 - \Delta q_2 \Delta y_1 \) by construction; however, it is a rise in which \( \Delta y_1 = 0 \), so dp is necessarily negative.

Now this country did not grow, in the usual sense, because the value of output at initial prices did not rise. By allowing the output of other good to rise slightly more, however, we would have a rise in which the definition of growth is satisfied. If the growth is insufficiently small, however, it will not necessarily the welfare has been the fall off. Therefore, sufficiently balanced growth can have the growing country worse off.

The Transfer Problem

Suppose home makes a transfer of one or more incomes to foreign, say to foreign. Let the amount of the transfer, measured in terms of food, be \( \Delta y \). What effect does this situation have?

As unchanged relative prices there is no effect on supply. The only effect is on demand. Home's income is reduced by \( \Delta y \), while foreign's is raised by the same amount. This adjustment leads to a decrease in \( Q_0 \) by \(-\Delta y\), while \( Q_2 \) rises by \( \Delta y \). Thus

\[
\Delta E_2 = \Delta Q_1 - \Delta Q_2 > 0
\]

and the change in terms of trade is

\[
\Delta y = \frac{\Delta q_2}{(Q_2 + Q_1)} \quad \text{(SP-29)}
\]

Home's terms of trade will worsen if \( a > \rho \), which is widely regarded as the normal case; they will, however, improve if \( \rho > a \).
The effect on Home's real income constitutes a direct negative effect from the transfer and an indirect terms of trade effect that can go either way. Is it possible for a favorable terms of trade effect to outweigh the income loss? In this model, it is not.

To see the reason, notice that
\[
\frac{dy}{\partial P_1} = \phi_1 + (Q_2 - D_2')P_1
\]
\[
= -\delta a \left[ \frac{1}{(1 + \gamma)} \right] (a - \delta) (Q_2 - D_2')
\]
\[
= -\delta a \left[ \frac{1}{(1 + \gamma)} \right] \left( \begin{array}{c}
(\sigma - \delta) (Q_2 - D_2') \\
\sigma ^2 + c + e - (a - \delta) (Q_2 - D_2')
\end{array} \right)
\]
\[
= -\delta a \left[ \frac{1}{(1 + \gamma)} \right] \left( \begin{array}{c}
(\sigma - \delta) (Q_2 - D_2') \\
\sigma ^2 + c + e - (a - \delta) (Q_2 - D_2')
\end{array} \right) < 0 \quad \text{(SP-31)}
\]

Similar algebra will reveal correspondingly that a transfer cannot make the recipient worse off.

An intuitive explanation of this result is the following. Suppose \( p \) were to rise sufficiently to leave Home as well off as it would be if it made no transfer and was foreign no better off as a result of the transfer. Then there would be no income effects on demand in the world economy, that is, the rise in price would produce both increased output of cloth and substitution in demand away from cloth, leading to an excess supply that would drive down the price. This result demonstrates that a sufficiently high tax on the direct welfare effects of a transfer is above the equilibrium \( p \).

In the text we examine that recent work shows how purposeful effects of a transfer are somehow possible. This work depends on relaxing the assumptions of this model, either by breaking the assumption that each country may be treated as if it were one individual or by introducing more than two countries.

A Tariff

Suppose Home places a tariff on imports, imposing a tax equal to the fraction \( r \) of the price. Then for a given world relative price of cloth \( p \), Home consumers and producers will face an internal relative price \( p = (1 + r) \). If the tariff is sufficiently small, the internal relative price will be approximately equal to
\[
\beta = p = p_1 \quad \text{(SP-32)}
\]

In addition to affecting \( p \), a tariff will raise revenue, which will be assumed to be redistributed to the rest of the economy.

At the initial terms of trade, a tariff will influence the entire supply of cloth in two ways. First, the fall in relative price of cloth inside Home will lower protection of cloth and reduce consumers to substitute away from food toward cloth. Second, the tariff may affect Home's real income, with resulting income effects on demand. If Home starts with no tariff and imposes a small tariff, however, the problem may be simplified, because the tariff will have a negligible effect on real income. To see this relation, recall that
\[
\frac{dy}{\partial r} = p \frac{dQ_1}{\partial P_1} + \frac{d\phi}{\partial r}.
\]

The value of output and the value of consumption must always be equal at world prices, so that
\[
p \frac{dQ_2}{\partial P_1} + \frac{d\phi}{\partial r} = p \frac{dQ_2}{\partial P_1} + \frac{d\phi}{\partial r}
\]
at the initial terms of trade. But because the economy was maximizing the value of output before the tariff was imposed,
\[
p \frac{dQ_2}{\partial P_1} + \frac{d\phi}{\partial r} = 0.
\]

Because there is no income effect, only the substitution effect is left. The fall in the internal relative price \( P_1 \) induces a decline in production and a rise in consumption:
\[
\frac{dQ_2}{\partial P_1} = -\frac{d\phi}{\partial r} \quad \text{(SP-33)}
\]
\[
\frac{dQ_1}{\partial P_1} = \frac{d\phi}{\partial r} \quad \text{(SP-34)}
\]

where \( d\phi \) is the tariff increase. Hence
\[
\frac{dQ_2}{\partial P_1} = -\frac{d\phi}{\partial r} \quad \text{(SP-35)}
\]

implying
\[
\frac{dp}{\partial r} = \frac{\frac{dQ_2}{\partial P_1}}{\frac{dQ_1}{\partial P_1}} = \frac{\frac{dQ_1}{\partial P_1} - \frac{d\phi}{\partial r}}{\frac{dQ_1}{\partial P_1} + \frac{d\phi}{\partial r}} = \frac{\frac{dQ_1}{\partial P_1} - \frac{d\phi}{\partial r}}{\frac{dQ_1}{\partial P_1} + \frac{d\phi}{\partial r}} > 0 \quad \text{(SP-36)}
\]

This expression shows that a tariff unambiguously improves the terms of trade of the country that imposes it.

Can a tariff actually improve the terms of trade so much that the internal relative price of the imported goods falls and the internal price of the exported good rises? The change in \( p \) is
\[
\frac{dp}{\partial r} = \frac{d\phi}{\partial r} - \frac{d\phi}{\partial r} = \frac{d\phi}{\partial r} \quad \text{(SP-37)}
\]

so that this paradoxical result will occur if \( \frac{dp}{\partial r} > p \).

By imposing equation (SP-36) and allowing this result, the famous Meltzer paradox is obtained. It is indeed possible. If \( \beta = (1 + r) \), then will be a Meltzer paradox; this need not imply instability, because the extra terms \( \phi \) and \( \phi \) help give the demonstrate a positive sign.
The Monopolistic Competition Model

We want to consider the effects of changes in the size of the market on equilibria in a monopolistically competitive industry. Each firm has the total cost relationship

\[ C = F + AC \]  

where \( c \) is marginal cost, \( F \) is a fixed cost, and \( x \) is the firm's output. This implies an average cost curve of the form:

\[ AC = C/x = F/x + c \]  

Also, each firm faces a demand curve of the form:

\[ x = \left[ \frac{\Delta A}{\Delta x} \right] \]  

where \( \Delta x \) is total industry sales (taken as given), \( A \) is the number of firms, and \( F \) is the average price charged by other firms (which each firm is assumed to take as given).

Each firm chooses its price to maximize profit. Profit of a typical firm is:

\[ \pi = px - C = px\left[ \frac{\Delta x}{\Delta x} \right] - F - c = c\left[ \frac{\Delta x}{\Delta x} \right] - F \]  

To maximize profit, a firm sets the derivative \( \Delta p/\Delta x \) equal to zero. This implies:

\[ x = \sqrt{\Delta x F} \]  

Since all firms are symmetric, however, in equilibrium \( P = F \) and \( x = \Delta x \). Thus (6P-5) implies

\[ P = \text{marginal cost} \]  

which is the relationship derived in the text.

Since \( x = \Delta x \), average cost is a function of \( x \) and \( c \):

\[ AC = F/x + c \]  

In zero-profit equilibrium, however, the price charged by a typical firm must also equal its average cost. So we must have:

\[ \text{marginal cost} = \text{marginal cost} \]  

which in turn implies:

\[ x = \sqrt{\Delta x F} \]
Risk Aversion and International Portfolio Diversification

This paper develops a model of international portfolio diversification by risk-averse investors. The model shows that investors generally care about the risk as well as the return of their portfolios. In particular, people may hold assets whose rate of return is lower than that of other assets if they can achieve the overall reductions of their wealth.

A representative investor can divide his real wealth, \( W \), between a home asset and a foreign asset. The portfolio of assets can occur in the future, and it is impossible to predict in advance which one will be the future. In state 1, which occurs with probability \( q \), a unit of wealth invested in the home asset pays out \( H_1 \), units of output, and a unit of wealth invested in the foreign asset pays out \( F_1 \), units of output. In state 2, which occurs with probability \( 1 - q \), the payoffs to the investor in the Home and Foreign assets are \( H_2 \) and \( F_2 \), respectively.

Let a better share of wealth invested in the Home asset and \( 1 - \alpha \) the share invested in the Foreign asset. Then if state 1 occurs, the investor will be able to consume the weighted average of the two assets' values:

\[
C_1 = \alpha H_1 + (1 - \alpha) F_1 \times W. \tag{21P.1}
\]

Similarly, consumption in state 2 is

\[
C_2 = H_2 (1 - \alpha) F_2 \times W. \tag{21P.2}
\]

In any state, the investor derives utility (C) from a consumption level of C. Since the investor does not know beforehand which state will occur, she makes the portfolio decision to maximize the average or expected utility from future consumption,

\[
q U(C_1) + (1 - q) U(C_2). \tag{21P.3}
\]

**An Analytical Derivation of the Optimal Portfolio**

After the states 1 and 2 consumption levels given by (21P.1) and (21P.2) are substituted into the utility function, we obtain the expected utility function as follows:

\[
q U(\alpha H_1 + (1 - \alpha) F_1) + (1 - q) U(\alpha H_2 + (1 - \alpha) F_2) \times W. \tag{21P.4}
\]

This problem is solved by differentiating the expected utility above with respect to \( \alpha \) and setting the resulting derivative equal to zero.

Let \( U(C) \) be the derivative of utility function (U) with respect to C, that is, \( U'(C) \) is the marginal utility of consumption. Then \( \alpha \) maximizes expected utility if

\[
U'(C_1) = U'(C_2). \tag{21P.5}
\]

This equation can be solved for \( q \), the optimal portfolio share.

For a risk-averse investor, the marginal utility of consumption, \( U'(C) \), falls as consumption state. Defining marginal utility explains why someone who is risk averse will not take a gamble with an expected payoff of zero. The extra consumption made possible by a win yields less utility than the utility sacrificed if the gamble is lost. If the marginal utility of consumption does change as consumption changes, we say the investor is risk neutral rather than risk averse. A risk neutral investor is one who takes gambles with a zero expected payoff.

If the investor's risk neutral, however, so that \( U'(C) \) is constant for all \( C \), equation (21P.3) becomes

\[
q U'(C_1) + (1 - q) U'(C_2) = q U'(C_1) + (1 - q) U'(C_2), \tag{21P.6}
\]

which states that the expected rates of return on Home and Foreign assets are equal. This result is the basis for the assertion in Chapter 13 that all assets must yield the same expected rate of return in equilibrium when considerations of risk (and liquidity) are ignored. Thus, the interest parity conditions of Chapter 13 is valid under risk-neutral behavior, but not, in general, under risk aversion.

For the analysis above to make sense, neither of the assets can yield a higher return than the other in both states of nature. If one must dominate the other, in this type of the left-hand side of equation (21P.3) would be positive while the right-hand side would be negative (because the marginal utility of consumption is usually assumed to be positive). Thus, (21P.3) would have no solution. In the case of a return asset if another asset that always did better were available. Indeed, if anyone did, other investors would be able to make positive spot profits by trading the low-return asset and using the proceeds to purchase the high-return asset.

To define, we therefore assume that \( H_1 > F_1 \) and \( F_2 > F_1 \), so that the Home asset does better in state 1 but does worse in state 2. This assumption is now used to develop a diagrammatic analysis that helps illustrate additional implications of the model.

**A Diagrammatic Derivation of the Optimal Portfolio**

Figure 21P.1 shows indifference curves of the expected utility function described by \( U(C) = 1 - q U(C) \). The points in the diagram should be thought of as contingency plans showing the level of consumption that will occur in each state of nature. The indifference curves represent the investor's decisions in three contiguous consumption plans relative to consumption of different goods in the same state of nature. As with standard indifference curves, however, each curve in the figure represents a set of strategies for consumption only which the investor is equally satisfied.

To compare the investor for a reduction of consumption in state 1 (C1), consumption in state 2 (C2) must rise. The indifference curves therefore slope downward. Each curve becomes flatter; however, as \( C_1 \) falls and \( C_2 \) rises. This property of the curves reflects the property of U(C) that the marginal utility of consumption declines when C rises. As \( C_2 \)
The indifference curves are sets of state-contingent consumption plans with which the individual is equally happy. The budget line describes the trade-off between state 1 and state 2 consumption that results from portfolio selection in the Home and Foreign assets.

To maximize expected utility, the investor makes the state-contingent consumption choices shown at point $P_3$, where the budget line is tangent to the highest attainable indifference curve $I_3$. The optimal portfolio share, $\alpha$, is therefore calculated as $\alpha = \frac{p(W - H_1)}{H_1}$, where $H_1$, $H_2$, $p$, and $W$ are positive. Thus, equation (2.3)-1 looks like the budget line that appears in the usual analysis of consumer choice, with $p$ playing the role of a relative price and $-H_1$ the role of income assessed in terms of state 1 consumption. This budget line is sketched in Figure (2.3)-1 as a straight line with slope $-\frac{1}{H_1}$ intersecting the vertical axis at $P_3$.

The same proof in the market trade-off between state 1 and state 2 consumption (that is, in the price of state 2 consumption in terms of state 1 consumption), suppose the investor shifts one unit of his wealth from the Home to the Foreign asset. Since the Home asset has the higher payoff in state 1, but not in state 2 consumption is $H_2$, the Foreign asset's state 1 payoff is $F_1$. Similarly, let no part of state 2 consumption is $F_2$. To allow additional state 2 consumption, and $p$ in terms of $F_1$ is state 1. The price of a single unit of $C_2$ in terms of $C_1$ is therefore $b_2 = \frac{F_2}{F_1}$, where $b_2$ the absolute value of the slope of the budget line (2.3).-4.

Figure (2.3)-2 shows how the choices of $C_1$ and $C_2$ vary, by implication, the choice of the portfolio share $\alpha$ are determined. As usual, the investor chooses the portfolio mix so as to maximize the expected utility

$$\alpha = \frac{p(W - H_1)}{H_1}.$$
When \( a = 1 \), the investor holds all his wealth in the home asset. When \( a = 0 \) he holds all his wealth in the foreign asset. Plot along the budget constraint curve and to the right from \( a = 1 \) correspond to short sales of the foreign asset, which raise \( a \) above 1. Move downward and to the right from \( a = 1 \) correspond to short sales of the home asset, which push \( a \) below 0.

Figure 21.2.1 shows the points on the investor's budget constraint at which \( a = 1 \) (so that \( C_h = N_h W \), \( C_f = 0 \), and \( a = 0 \) (so that \( C_h = 0 \), \( C_f = N_f W \)). Starting from \( a = 1 \), the investor can move upward and to the left along the budget constraint by going short in the foreign asset (thereby making \( a \) greater than 1 and \( a = 0 \) a negative). She can move downward and to the right from \( a = 0 \) by going short in the home asset.

The Effects of Changing Rates of Return

The diagram we have developed can be used to illustrate the effect of changes in rates of return under risk aversion. Suppose, for example, the home asset's rate is now greater than all other yields and the investor's wealth, \( W \), stays the same. The rise in \( R_h \) raises \( a \), the relative price of state 2 consumption, and therefore steepens the budget line shown in Figure 21.2.3.

We need more information, however, to describe completely how the position of the budget line in Figure 21.2.3 changes when \( R_h \) rises. The following reasoning fills the gap. Consider the portfolio allocation \( a = 0 \) in Figure 21.2.3, under which all wealth is invested in the foreign asset. The contingent consumption levels that result from this investment strategy, \( C_h = N_h W \), \( C_f = 0 \), do not change as a result of a rise in \( R_h \) because the portfolio we are considering does not involve the home asset. Since the consumption pair associated with \( a = 0 \) does not change when \( R_h \) rises, we can see that \( C_h = N_h W \), \( C_f = 0 \) is a point on the new budget constraint. After a rise in \( R_h \), it is still feasible for the investor to put all of her wealth into the foreign asset. It follows that the effect of a rise in \( R_h \) is to make the budget constraint of Figure 21.2.3 pivot clockwise around the point \( a = 0 \).

The effect of an increase in \( R_h \) is shown in Figure 21.2.4, which assumes that initially \( a > 0 \) (the investor initially owns a positive amount of the home asset). As usual, both a "substitution" and an "income" effect influence the shift of the investor's consumption consumption plan from point 1 to point 2. The substitution effect is a tendency to demand more \( C_h \), whose relative price has fallen, and less \( C_f \), whose relative price has risen. The income effect of the rise in \( R_h \), however, makes the entire budget line outward and tends to raise consumption \( a \) both states (as long as \( a > 0 \) initially). Because the investor will be richer in state 1, she can afford to shift some of her wealth toward the foreign asset (which has the higher payoff in state 2) and thereby even out her consumption in the two states of nature. Risk aversion explains the investor's desire to avoid large consumption fluctuations across states. As Figure 21.2.4 suggests, \( a \) definitely rises while \( C_f \) may rise or fall. (In the figure illustrated, the substitution effect is stronger than the income effect and \( C_f \) falls.)

Corresponding to this ambiguity in an ambiguity concerning the effect of the rise in \( R_h \) on the portfolio shown, Figure 21.2.5 illustrates the two possibilities. The key to understanding this figure is the observation that if the investor does not change is as a response to the rise in \( R_h \) her consumption chosen varies given by points 1, which lies on the new budget constraint vertically above the original consumption point 1. Why this is the case? Equation (21.2.5) implies that \( C_f = a (a (1 + a - a N_h W) W) \) doesn't change if \( a \) doesn't change; the new, higher value of state 1 consumption corresponding to the original portfolio choice is
Figure 21P.5: Effects of a Rise in $R_t$ on Portfolio Shares

(a) State 1: consumption, $C_1$

(b) State 2: consumption, $C_2$

In both panels of Figures 21P.5, the slope of the ray OR connecting the origin and point $P$ shows the ratio $C_2/C_1$, implied by the initial portfolio composition after the rise in $R_t$.

In both panels of Figures 21P.5, the slope of the ray OR connecting the origin and point $P$ shows the ratio $C_2/C_1$, implied by the initial portfolio composition after the rise in $R_t$.

It is now clear, however, that to shift to a lower value of $C_1$, the investor must raise $C_2$ above its initial value, then shift the portfolio toward the Home asset. To raise $C_2$, the investor has to shift toward the Foreign asset. Figure 21P.5a shows again the case in which the substitution effect outweighs the income effect. In that case, $C_2$ falls as the investor shifts her portfolio toward the Home asset, whose expected rate of return has risen relative to that on the Foreign asset. This case corresponds to those we studied in the text, in which the portfolio share of an asset rises as its relative expected rate of return rises.

Figure 21P.5b shows the opposite case, in which $C_1$ rises and $C_2$ falls, implying a portfolio shift toward the Foreign asset. You can see that this factor giving rise to this possibility is the sharper curvature of the indifference curves if in Figure 21P.5b. This curvature is precisely what economists mean for the term risk aversion. An investor who becomes more risk averse regards consumptions in different states of nature as poorer substitutes, and then requests a larger increase in state 1 consumption to compensate her for a fall in state 2 consumption (and vice versa). Note that the graphical case shown in Figure 21P.5a, in which a rise in an asset's expected rate of return causes investors to demand less of it, is unlikely in the real world. For example, an increase in the increase rate of a currency offers, other things equal, rises the expected rate of return on deposits of that currency in all states of nature, not just one. The portfolio substitution effect in favor of the currency therefore is small.

The results we have found are quite different from those that would occur if the investors were risk neutral. A risk-neutral investor would shift all of her wealth onto the asset with the higher expected return, paying no attention to the riskiness of that asset. The greater the degree of risk aversion, however, the greater the concern with the riskiness of the overall portfolio of assets.

The line $P_1$, a risk-neutral investor would always place above the maximum possible long position in the low-return asset and, consequently, the maximum possible long position in the high-return asset. It is the behavior that gives rise to the other parity conditions.