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Summary International Economics - Theory and Policy - Paul R. Krugman Maurice Obstfeld, Marc Melitz

Internationale economie (Erasmus Universiteit Rotterdam)

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Summary

International Economics: Theory and Policy

Krugman. Paul R, Obstfield, Maurice

9th Edition

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Contents

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1. Introduction

Throughout the study of international economics seven themes recur: (1) the gains from trade, (2) the pattern of trade, (3) protectionism, (4) the balance of payments, (5) exchange rate determination, (6) international policy coordination, and (7) the international capital market.
International economics consists of two broad subfields: international trade and international money. While the first focuses on the transactions that involve a physical movement of goods, the latter focuses on the financial transactions.

This book introduces the main concepts and methods of international economics. Much of the book is devoted to old ideas that are still valid as ever, such as the Ricardian model and David Hume's monetary analysis. Due to the fact that many new challenges have been thrown up, some of these important concepts are rethought and updated. Finally, new approaches have emerged to old questions, such as the impacts of changes in monetary and fiscal policy.

The study of international economics has never been as important as it is now. Nations are more closely linked through trade and investment in each other's economies than ever. Both policy makers and business leaders must pay attention to the rapidly changing economic fortunes. A look at basic trade statistics shows that international trade has roughly tripled in importance compared with the economy as a whole. Moreover, both imports and exports have increased in the United States, backed up by money from foreign investments in the U.S. economy. Due to the economic crisis these imports and exports took a plunge around 2009, which clearly reflects the linkages between world trade and the world economy.

1.1. What Is International Economics About?

Throughout the study of international economics seven themes recur: (1) the gains from trade, (2) the pattern of trade, (3) protectionism, (4) the balance of payments, (5) exchange rate determination, (6) international policy coordination, and (7) the international capital market.

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. However, international economics involves new and different concerns such as trade quotas or currency fluctuations, because these trades and investments occur between independent nations.

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The subject matter of international economics thus consists of issues raised by the special problems of economic interaction between sovereign states. Throughout the study of international economics seven themes recur: (1) the gains from trade, (2) the pattern of trade, (3) protectionism, (4) the balance of payments, (5) exchange rate determination, (6) international policy coordination, and (7) the international capital market.

1.1.1. The Gains from Trade

The most important single insight in all of international economics is that there are gains from trade – or, when countries sell goods and services to each other there is almost always a mutual benefit. It is a common misconception that trade is harmful if there are large disparities between countries in productivity or wages. On the one hand, less technologically advanced countries worry that they won't be able to compete in international trade. On the other hand, technologically advanced nations worry that lower-wage countries will drag their standard of living down.

This book's first model (Chapter 3) will demonstrate that two countries can trade to their mutual benefit despite any disparity. Chapter 5 will show that trade provides benefits by allowing countries to balance their import and export goods.

The benefits of international trade are not limited to trade in tangible goods as international migration and borrowing and lending are also forms of mutually beneficial trade. Chapter 4 will deal with trade of labor for goods and services, while trade of current goods for the promise of future goods will be discussed in Chapter 6. Chapter 21 will show that the exchange of risky assets can benefit all countries by allowing them to diversify its wealth and reduce the variability of its income.

Although countries generally benefit from international trade, it is possible that trade may hurt groups within nations through a strong effect on the distribution of income. Theorists point out that international trade can adversely affect owners of resources that are specific to industries that compete with imports. Chapters 4 through 6 will deal with the problem that the real wages of less-skilled workers have been declining in particular countries.

1.1.2. The Pattern of Trade

Because economists cannot discuss the effects of international trade with any confidence unless they know their theory is good enough to explain the international

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trade that is actually observed, the pattern of international trade has been a major preoccupation of international economists.

Some aspects of the pattern of trade, such as climate and resources, are easy to understand. Chapter 3 will show a powerful explanation of the pattern of trade in terms of international differences in labor productivity. Chapter 5 presents alternative explanations, such as the influential theory that links trade patterns to an interaction between the relative supplies of national resources such as capital and labor on one side and the relative use of these factors in the production of different goods on the other. Theories that suggest a substantial random component in the pattern of trade will be presented in Chapters 7 and 8.

1.1.3. How Much Trade?

Since the emergence of modern nation-states, governments have worried about the effect of international competition on the prosperity of domestic industries and have often placed limits on imports. The single most consistent mission of international economics has been to analyze the effects of these so-called protectionist policies, and usually to show the advantages of freer international trade.

In the 1990s this debate took a new direction when a broad policy of removing barriers to international trade was pursued that reflected the view that free trade was a force for promoting world peace. Major trade agreements such as the North American Free Trade Agreement (NAFTA) and the World Trade Organization were negotiated. Since that time, however, an international political movement that opposes 'globalization' has grown significantly. This movement has forced advocates of free trade to seek new ways to explain their views.

Over the years, economists have developed an analytical framework for determining the effects of government policies that affect international trade. This framework, presented in Chapters 9 and 10, helps predicting the effects of trade policies while also allowing for cost-benefit analysis.

Although governments do not necessarily do what the cost-benefit analysis of economists tells them they should, economic analysis can help make sense by showing who benefits and who loses from policies such as quotas and subsidies. 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 between nations. Chapters 4 and 5 shows that trade has strong effects on income distribution within countries, while Chapters 10 through 12 reveal that the relative power of different interest groups within countries often determines policies towards international trade.

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1.1.4. Balance of Payments

A key difference between international economics and other areas of economics is that countries usually have their own currencies, whose relative values can change over time. Due to the fact that exchange rates were fixed by government action for a long time, the study of exchange rate determination is a relatively new part of international economics. Fixed-rate systems will be discussed in Chapter 18, Chapter 19 is devoted to the historical performance of alternative exchange-rate systems, and Chapter 20 to the economics of currency areas such as the EU. Chapters 14 through 17 focus on the modern theory of floating exchange rates.

1.1.5. Exchange Rate Determination

A key difference between international economics and other areas of economics is that countries usually have their own currencies, whose relative values can change over time. Due to the fact that exchange rates were fixed by government action for a long time, the study of exchange rate determination is a relatively new part of international economics. Fixed-rate systems will be discussed in Chapter 18, Chapter 19 is devoted to the historical performance of alternative exchange-rate systems, and Chapter 20 to the economics of currency areas such as the EU. Chapters 14 through 17 focus on the modern theory of floating exchange rates.

1.1.6. International Policy Coordination

Although all nations are free to choose their own economic policies, one country's economic policies usually affect other countries as well. Differences in goals or a failure to coordinate policies may lead to losses and conflicts of interest. A fundamental problem in international economics is determining how to produce an acceptable degree of harmony among the international trade and monetary policies of different countries in the absence of a world government. Chapter 9 discusses the rationale for the World Trade Organization system. Chapter 19 is devoted to the theory of international macroeconomic coordination and the developing experience.

1.1.7. The International Capital Market

In any sophisticated economy there is an extensive capital market: a set of arrangements by which individuals and firms exchange money now for promises to pay in the future. The growing importance of international trade has been accompanied by a growth in the international capital market. International capital markets differ from domestic capital markets as they must cope with special regulations that many countries impose on foreign investment. Special risks that are associated with international capital markets include the risk of currency fluctuations

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and national default. This book discusses the functioning of global asset markets (Chapter 21) and foreign borrowing by developing countries (Chapter 22).

1.2. International Economics: Trade and Money

International economics consists of two broad subfields: international trade and international money. While the first focuses on the transactions that involve a physical movement of goods, the latter focuses on the financial transactions.

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 analysis focuses primarily on those transactions that involve a physical movement of goods or a tangible commitment of economic resources. International monetary analysis focuses on the financial transactions such as foreign purchases of U.S. dollars. An example of an international trade issue is the conflict between the United States and Europe over Europe's subsidized exports of agricultural products.

In reality however, there is no simple dividing line between trade and monetary issues as most international trade involves monetary transactions. The first half of this book covers international trade issues. Part One develops the analytical theory of international trade, while Part Two applies trade theory to the analysis of government policies. The second half of the book is devoted to international monetary issues: Part Three develops international monetary theory, and Part Four applies this.

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2. World Trade: An Overview

The gravity model relates the trade between any two countries to the sizes of their economies. Using the gravity model also reveals the strong effects of distance and international borders – even friendly borders like that between the United States and Canada – in discouraging trade. The model can be presented as following, where *A* is a constant term, *Tij* is the value of trade between country *i* and country *j*, *Yi* is country *i*'s GDP, *Yj* is country *j*'s GDP, and *Dij* is the distance between the two countries.

$$Tij = A \times Yi \times Yj / Dij$$

International trade has grown significantly relative to the size of the world economy, due to falling costs of transportation and communications. It has not grown in a straight line though: the world was highly integrated in 1914, but trade was greatly reduced by economic depression, protectionism, and war, and took decades to recover. Nowadays, trade is dominated by manufactured goods and trade in services has become increasingly important. Developing countries, in particular, have shifted from being mainly exporters of primary products to being mainly exporters of manufactured goods.

In 2008 more than 30 percent of all goods and services produced worldwide was sold across national border. The reason why countries export and import a lot of products and the benefits and costs of international trade will be examined in later chapters. This chapter will describe who trades with whom by using the gravity model. Afterwards the changing structure of world trade will be discussed such as the shift in the world's economic center of gravity and the changes in types of goods that make up trade.

2.1. Who Trades with Whom?

The gravity model relates the trade between any two countries to the sizes of their economies. Using this model also reveals the strong effects of distance and international borders.

2.1.1. Size Matters: The Gravity Model

The U.S. trades most heavily with Germany, the UK and France than any other country. This is due to the fact that they have the highest values of gross domestic product. There is a strong empirical relationship between the size of a country's economy and the volume of both its imports and exports.

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Looking at world trade as a whole, economists have found that an equation of the following form predicts the volume of trade between any two countries fairly accurately, where A is a constant term, T_{ij} is the value of trade between country *i* and country *j*, Y_i is country *i*'s GDP, Y_j is country *j*'s GDP, and D_{ij} is the distance between the two countries.

$$T_{ij} = A \times Y_i \times Y_j / D_{ij}$$

That is, the value of trade between any two countries is proportional, other things equal, to the product of the two countries' GDPs, and diminishes with the distance between the two countries. The name gravity model is the analogy to Newton's law of gravity: the gravitational attraction between any two objects is proportional to the product of their masses and diminishes with distance.

Economists often use the following more general gravity model:

$$T_{ij} = A \times Y_i^a \times Y_j^b / D^c_{ij}$$

This equation says that the three things that determine the volume of trade between two countries are the size of the two countries' GDPs and the distance between the countries, without specifically assuming that trade is proportional to the product of the two GDPs and inversely proportional to distance.

The gravity model works because large economies tend to spend large amounts in imports because they have large incomes. So other things equal, the trade between any two economies is larger, the larger is either economy.

2.1.2. Using the Gravity Model: Looking for Anomalies

One of the principal uses of gravity models is to help identify anomalies in trade. A case study of the United States trade partners shows that the Netherlands, Belgium, and Ireland trade considerably more with the U.S than the gravity model would have predicted. Reasons for this can be found in cultural affinity (Ireland) or geography and transport costs due to location near the river Rhine (Belgium and the Netherlands).One of the principal uses of gravity models is to help identify anomalies in trade. A case study of the United States trade partners shows that the Netherlands, Belgium, and Ireland trade considerably more with the U.S than the gravity model would have predicted. Reasons for this can be found in cultural affinity (Ireland) or

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geography and transport costs due to location near the river Rhine (Belgium and the Netherlands).

2.1.3. Impediments to Trade: Distance, Barriers, and Borders

All estimated gravity models show a strong negative effect of distance on international trade; typical estimates say that a 1 percent increase in the distance between two countries is associated with a fall of 0.7 to 1 percent in the trade between those countries. This partly reflects increased transport costs, but also tangible factors such as more personal contact between trade partners. This explains why the U.S. do so much more trade with its neighbors Canada and Mexico than with its European partners. Additionally, Canada and Mexico are part of a trade agreement (NAFTA) with the United States, which ensures that most goods shipped among the countries are not subject to tariffs or other barriers.

Economists use gravity models as a way of assessing the impact of trade agreements on actual international trade: if the agreement is effective, it should lead to significantly more trade among its partners than one would otherwise predict given their GDPs and distances from one another. However, trade agreements rarely make national borders irrelevant and we can see that there is much more trade between regions of the same country than between equivalently situated regions in different countries.

2.2. The Changing Pattern of World Trade

International trade is at record levels relative to the size of the world economy, thanks to falling costs of transportation and communications. Manufactured goods dominate modern trade today. In the past, however, primary products were much more important.

2.2.1. Has the World Gotten Smaller?

People often argue that modern transportation and communications have abolished distance, and made the world smaller. On the one hand, there's some truth to this because everybody is easily and quickly connected. On the other hand, gravity models still show a strong negative relationship between distance and international trade.

A global economy is nothing new, as economists point out two great waves of globalization, with the first wave relying not on jets and the Internet but on railroads, steamships, and the telegraph. This first wave came to an end due to world wars, protectionism and the Great Depression. Since 1970, world trade as a share of world

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GDP has risen to unprecedented heights mostly due to 'vertical disintegration' of production: before a product reaches the customer, it often goes through many production stages in different countries.

2.2.2. What Do We Trade?

International trade is made up of manufactured goods, mineral products, agricultural products, services and so forth. While manufactured goods makes up the main share of world trade, agricultural products represent only a small fraction of the value of trade. In recent years new types of service trade, made possible by modern telecommunications have caused a rise of overseas call and help centers. Currently, manufactured goods dominate world trade and have taken over the dominant position of agricultural and mining goods.

A recent transformation has been the rise of third world exports of manufactured goods. The term third world is applied to the world's poorer nations. These countries in particular, have shifted from being mainly exporters of primary products to being mainly exporters of manufactured goods.

2.2.3. Service Offshoring

One of the hottest disputes in international economics is whether modern information technology will lead to a dramatic increase in new forms of international trade such as performing economic functions at long range. Service offshoring is shifting a service previously done within a country to a foreign location. Additionally, producers must decide between setting up a foreign subsidiary and outsourcing services to another firm.

The economist Alan Blinder argued that the key distinction for international trade will be between services that can be delivered electronically over long distances with little or no degradation of quality, and those that cannot. When we look at how big service outsourcing might get, we can expect that in the long run, trade in services, delivered electronically, may become the most important component of world trade.

2.3. Do Old Rules Still Apply?

Although trade has changed, the fundamental principles still apply to economies and international trade.

Chapter 3 will cover a discussion of the causes of world trade and an analysis of a model by the British economist David Ricardo. Even though much about international

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trade has changed, the fundamental principles discovered by economists at the dawn of a global economy still apply. The sources of modern trade are more subtle. Human resources and human-created resources are more important than natural resources. Political battles over trade typically involve workers whose skills are made less valuable by imports.

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3. Labour Productivity and Comparative Advantage: The Ricardian Model

The Ricardian model is 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. Countries will thus export goods that their labor produces relatively efficiently and will import goods that their labor produces relatively inefficiently.

Trade benefits a country in either of two ways. First, we can think of trade as an indirect method of production. Second, we can show that trade enlarges a country's consumption possibilities, which implies gains from trade. The distribution of the gains from trade depends on the relative prices of the goods countries produces. Furthermore, we can show that three commonly held beliefs about trade are wrong. First, a country gains from trade even if it has lower productivity than its trading partner in all industries. Second, trade is beneficial even if foreign industries are competitive only because of low wages. Third, trade is beneficial even if a country's exports embody more labor than its imports.

Extending the one-factor, two-good model to a world of many commodities does not alter these conclusions. It however becomes necessary to focus directly on the relative demand for labor to determine relative wages rather than to work via relative demand for goods.
While some of the predictions of the Ricardian model are clearly unrealistic, its basic prediction has been confirmed by a number of studies.

Countries engage in international trade for two basic reasons. First, countries trade because they are different from each other and can benefit from their differences by reaching an arrangement in which each does the thing it can do best. Second, countries trade to achieve economies of scale in production.

The next four chapters develop tools to help understand how differences between countries give rise to trade through the concept of comparative advantage. This chapter will give a general introduction to this concept, then will develop a specific model of how the concept determines the pattern of international trade.

3.1. The Concept of Comparative Advantage

In the Ricardian model, countries will export goods that their labor produces relatively efficiently and will import goods that their labor produces relatively inefficiently.

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The case of winter roses on Valentine day in the United States offers an excellent example of the reasons why international trade can be beneficial. Economists use the term opportunity cost to describe trade-offs: the opportunity cost of roses in terms of computers is the number of computers that could have been produced with the resources used to produce a given number of roses. The difference in opportunity costs of different countries offers the possibility of a mutually beneficial rearrangement of world production. Through this rearrangement the world's economic pie can be enlarged, and hence it is possible in principle to raise everyone's standard of living.

The reason that international trade produces this increase in world output is that it allows each country to specialize in producing the good in which it has a comparative advantage, which occurs when a country's opportunity costs of producing good X in terms of other goods is lower than in any other country. This leads to the following 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.*

However, this statement reflects possibilities, not what will actually happen. In this chapter a model developed by David Ricardo (Ricardian model) will be introduced, in which international trade is solely due to international differences in the productivity of labour.

3.2. A One-Factor Economy

Trade is determined by the production possibilities and relative prices and supply of both countries. A country's production pattern is determined by comparative advantage.

We begin by imagining that we are dealing with an economy (Home) that has only one factor of production. Only two goods, wine and cheese, are produced. The technology of Home's economy can be summarized by labor productivity in each industry, expressed in terms of the unit labor requirement, the number of hours of labor required to produce a pound of cheese or a gallon of whine. In the remainder of the chapter, *alw* and *alc* will be the unit labor requirements in wine and cheese production, respectively. *L* is the economy's total labor supply.

3.2.1. Production Possibilities

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Due to limited resources, any economy faces limits on what it can produce and there are always trade-offs. The production possibility frontier graphically depicts the maximum amount of wine that can be produced once the decision has been made to produce any given amount of cheese.

With only one factor of production, this frontier of an economy is a simple straight line. The production possibility frontier is determined by the limits on the economy's resources, in this case labor.

$$a_{LC}Q_C + a_{LW}Q_W \leq L$$

Q_W represents the economy's production of wine, and Q_C its production of cheese, then the labor used in producing wine will be $a_{LW}Q_W$ and so on.

When the production possibility frontier is a straight line, the opportunity cost of a pound of cheese in terms of wine is constant. The 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. The opportunity cost of cheese in terms of wine is a_{LC} / a_{LW}.

3.2.2. Relative Prices and Supply

The production possibility frontier illustrates the different mixes of goods the economy can produce. To determine what actually will be produced, we need to look at the relative price of the economy's two goods. In a competitive economy, supply decisions are determined by the attempts of individuals to maximize their earnings. In our simplified economy, the supply of cheese and wine will be determined by the movement of labour to whichever sector pays the higher wage.

Let P_C and P_W be the prices of cheese and wine, respectively. It takes a_{LC} person-hours to produce a pound of cheese; since there are no profits, the hourly wage in the cheese sector will equal the value of what a worker can produce in an hour, P_C / a_{LC}. The same holds for whine, where P_W / a_{LW}. Wages in the cheese sector will be higher if $P_C / P_W > a_{LC} / a_{LW}$; wages in the wine sector will be higher if $P_C / P_W < a_{LC} / a_{LW}$. Because everyone will want to work in whichever industry offers the higher wage, the economy will specialize in the production of either cheese or wine.

The significance of the number a_{LC} / a_{LW} is the opportunity cost of cheese in terms of wine, which leads to a crucial proposition about the relationship between prices and

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production: *the economy will specialize in the production of cheese if the relative price of cheese exceeds its opportunity cost in terms of wine; it will specialize in the production of wine if the relative price of cheese is less than its opportunity cost in terms of wine.*

In the absence of international trade, Home would have to produce both goods for itself. But now it will produce both goods only if the relative price of cheese is just equal to its opportunity cost. This leads to the following theory: *In the absence of international trade, the relative prices of goods are equal to their relative unit labour requirements.*

3.3. Trade in a One-Factor World

Trade benefits a country in either two ways: (1) as an indirect method of production, and (2) trade enlarges a country's consumption possibilities, which implies gains from trade. The distribution of the gains from trade depends on the relative prices of the goods countries produce. The relative price implies a relative wage rate as well.

The implications that arise from a description of the pattern and effects of trade between two countries with only one factor of production can be surprising.

Let's first get the model stated. There are two countries, Home and Foreign. Each of these countries has one factor of production (labor) and can produce two goods, wine and cheese. Home's labor force and unit labor requirements in wine and cheese production will be denoted by L, $a_{LW,}$ and a_{LC} respectively. For Foreign we will add an asterisk (L^*, $a^*_{LW,}$ and a^*_{LC}). The following arbitrary assumption is made:

$$a_{LC}/a_{LW} < a^*_{LC}/a^*_{LW}$$

or, equivalently, that

$$a_{LC}/a^*_{LC} < a_{LW}/a^*_{LW}$$

We are assuming that the ratio of the labor required to produce a pound of cheese to that required to produce a gallon of wine is lower in Home than it is in Foreign. Thus, Home's relative productivity in cheese is higher than in wine, and hence the above equations say that Home has a comparative advantage in cheese.

One point should be noted: the condition under which Home has this comparative advantage involves all four unit labor requirements, not just two. When one country can produce a unit of a good with less labor than another country, we say that the

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first country has an absolute advantage in producing that good (in our example, Home has an absolute advantage in producing cheese).

However, we cannot determine the pattern of trade from absolute advantage alone. In the absence of trade, the relative prices of cheese and wine in each country would be determined by the relative unit labor requirements. Once we allow for the possibility of international trade, however, prices will no longer be determined purely by domestic considerations. Eventually there will be some level at which the price settles.

3.3.1. Determining the Relative Price after Trade

Prices of internationally traded goods are determined by supply and demand. In some contexts it is reasonable to use partial equilibrium analysis, that is, to study a single market. When we study comparative advantage, however, it is crucial to keep track of the relationships between markets (general equilibrium analysis). Once 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 pound of cheese supplied or demanded divided by the number of gallons of wine supplied or demanded.

World general equilibrium requires that relative supply (*RS*) equals relative demand (*RD*), and thus the world relative price is determined by the intersection of *RD* and *RS*. The *RS* curve in Figure 3-3 shows that there would be no supply of cheese if the world price dropped below a_{LC}/a_{LW}. Recall that Home will specialized in the production of wine whenever $P_C/P_W < a_{LC}/a_{LW}$. Similarly, Foreign will specialize in wine production when $P_C/P_W < a^*_{LC}/a^*_{LW}$. So at relative prices of cheese below a_{LC}/a_{LW}, there would be no world cheese production.
Next, when the relative price of cheese P_C/P_W is exactly a_{LC}/a_{LW}, we know that workers in Home can earn exactly the same amount making either cheese or wine and Home will be willing to supply any relative amount of the two goods, producing a flat section to the supply curve.

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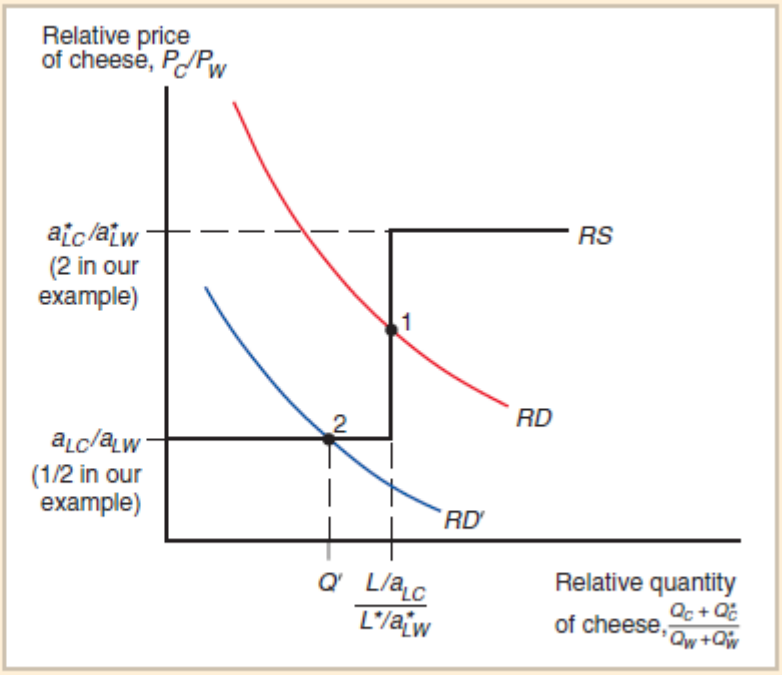
Figure 3-3

World Relative Supply and Demand

The *RD* and *RD′* curves show that the demand for cheese relative to wine is a decreasing function of the price of cheese relative to that of wine, while the *RS* curve shows that the supply of cheese relative to wine is an increasing function of the same relative price.



If P_C/P_W is above a_{LC}/a_{LW}, Home will specialize in the production of cheese. As long as $P_C/P_W < a^*_{LC}/a^*_{LW}$, however, Foreign will continue to specialize in producing wine. When Home specializes in cheese production, it produces L/a_{LC} pounds. Similarly, when Foreign specializes in wine, it produces L^*/a^*_{LW} gallons. So for any relative price of cheese between a_{LC}/a_{LW} and a^*_{LC}/a^*_{LW}, the relative supply of cheese is

$$(L/a_{LC})/(L^*/a^*_{LW}).$$

At $P_C/P_W = a^*_{LC}/a^*_{LW}$, we know that Foreign workers are indifferent between producing cheese and wine. Thus here again we have a flat section of the supply curve.

Finally, for $P_C/P_W > a^*_{LC}/a^*_{LW}$, both Home and Foreign will specialize in cheese production, so that the relative supply of cheese will become infinite.

If the relative price of cheese is equal to its opportunity cost Home, the Home economy need not specialize in producing either cheese or wine. In fact, they must be producing some wine and some cheese.

The normal result of trade is that the price of a traded good relative to that of another good ends up somewhere in between its pretrade levels in the two countries. The effect of this convergence in relative prices is that each country specializes in the production of that good in which it has the relatively lower unit labor requirement.

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3.3.2. The Gains from Trade

Now that we have seen that countries whose relative labor productivities differ across industries will specialize in the production of different goods and will both derive gains from this specialization.

The first way to show that specialization and trade are beneficial is to think of trade as an indirect method of production. Trade with Foreign allows Home to produce wine by producing cheese and then trading cheese for wine. This indirect method of 'producing' is a more efficient method than direct production. If we take in mind that for Home the opportunity cost of cheese in terms of wine is ½, we can simply conclude that instead of using two hours of labor to produce a gallon of wine, it can use that labor to produce two pounds of cheese, and trade that cheese for two gallons of wine.

More generally, consider two alternative ways of using an hour of labor. On one side, Home could use the hour directly to produce $1/a_{LW}$ gallons of wine. Alternatively, the hour could be used to produce $1/ a_{LC}$ pounds of cheese. This cheese could then be traded for wine, so our original hour of labor yields $(1/a_{LC})(P_C/P_W)$ gallons of wine. This will be more wine than the hour could have produced directly as long as

$$(1/a_{LC})(P_C/P_W) > 1/a_{LW},$$

Or,

$$P_C/P_W > a_{LC}/a_{LW.}$$

This shows that Home can produce wine more efficiently by making cheese and trading it than by producing wine directly for itself.

Another way to see the mutual gains from trade is to examine how trade affects each country's possibilities for consumption. In the absence of trade, consumption possibilities are the same as production possibilities. Once trade is allowed, however, each economy can consume a different mix of cheese and wine from the mix it produces.

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3.3.3. A Note on Relative Wages

Political discussions of international trade often focus on comparisons of wage rates in different countries. In our example, once the countries have specialized, all Home workers are employed producing cheese. Since it takes one hour of labor to produce one pound of cheese, workers in Home earn the value of one pound of cheese per hour of their labor. Similarly, foreign workers earn the value of 1/3 of a gallon of wine per hour.

To convert these numbers into dollar figures, we need to know the prices of cheese and wine. If both the pound of cheese and the gallon of wine sell for $12; Home workers will earn $12 per hour, while foreign workers will earn $4 per hour. The relative wage of a country's workers is the amount they are paid per hour, compared with the amount workers in another country are paid per hour. The relative wage of Home workers will therefore be 3.

This wage rate lies between the ratios of the two countries' productivities in the two industries. Home is six times as productive as Foreign in cheese, but only one-and-a half times as productive in wine, and it ends up with a wage rate three times as high as Foreign's; it is precisely because the relative wage is between the relative productivities that each country ends up with a cost advantage in one good.

The simple one-factor model is a good way to deal with several common misconceptions about the meaning of comparative advantage and the nature of gains from free trade. In the next section we will take some more time to discuss some of the most common misunderstandings about comparative advantage in light of our model.

3.4. Misconceptions about Comparative Advantage

The proposition that trade is beneficial is unqualified. In particular, we can show that three commonly held beliefs about trade are wrong: (1) a country gains from trade even if it has lower productivity in all industries, (2) trade is beneficial even if foreign industries are competitive only because of low wages, and (3) trade is beneficial even if a country's exports embody more labor than its imports.

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3.4.1. Productivity and Competitiveness

Myth 1: Free trade is beneficial only if your country is strong enough to stand up foreign competition.

The problem with this view is that it fails to understand the essential point of Ricardo's model – that gains from trade depend on comparative rather than absolute advantage. It is always tempting to suppose that the ability to export a good depends on your country having an absolute advantage in productivity. But an absolute productivity advantage over other countries is neither a necessary nor a sufficient condition for having a comparative advantage in that good: *the competitive advantage of an industry depends not only on its productivity relative to the foreign industry, but also on the domestic wage rate relative to the foreign wage rate.* A country's wage rate, in turn, depends on relative productivity in its other industries. Portugal has for example low productivity in producing, say clothing as compared with the United States, but because Portugal's productivity disadvantage is even greater in other industries, it pays low enough wages to have a comparative advantage in clothing over the United States all the same.

3.4.2. The Pauper Labor Argument

Myth 2: Foreign competition is unfair and hurts other countries when it is based on low wages. People who adhere this belief argue that industries should not have to cope with foreign industries that are less efficient but pay lower wages.

Again, in our simple example, Home is more productive than Foreign in both industries, and Foreign's lower cost of wine production is entirely due to its much lower wage rate. Foreign's lower wage rate, however, is irrelevant to the question of whether Home gains from trade. All that matters to Home is that it is cheaper in terms of its own labour for Home to produce chees and trade it for wine than to produce wine for itself.

3.4.3. Exploitation

Myth 3: Trade exploits a country and makes it worse off if its workers receive much lower wages than workers in other nations.

If one is asking about the desirability of free trade, however, the point is not to ask whether low-wage workers deserve to be paid more but to ask whether they and their country are worse off exporting goods based on low wages than they would be if they refused to enter into such demeaning trade. One cannot declare that a low wage represents exploitation unless one knows what the alternative is.

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3.5. Comparative Advantage with Many Goods

If instead of one good, many goods are used, the conclusions of the model remain the same. However, it becomes necessary to focus directly on the relative demand for labor to determine relative wages.

3.5.1. Setting up the Model

Again, imagine a world of two countries, Home and Foreign, with only one factor of production, labour. However, they both are able to produce a large number of goods (*N*). The technology of each country can be described by its unit labour requirement for each goods, that is, the number of hours of labour it takes to produce one unit of each good. Home's unit labor requirement for a particular good will be labelled as a_{Li}, where *i* is the number we have assigned to that good. For Foreign the unit labor requirement will be a^*_{Li}.

For any good, we can calculate a_{Li}/a^*_{Li}, the ratio of Home's unit labor requirement to Foreign's. The trick is to relabel the goods so that the lower the number, the lower this ratio. That is, we reshuffle the order in which we number goods in such a way that

$$a_{L1}/a^*_{L1} < a_{L2}/a^*_{L2} < a_{L3}/a^*_{L3} < \ldots < a_{LN}/a^*_{LN}.$$

3.5.2. Relative Wages and Specialization

The pattern of trade depends on only one thing: the ratio of Home to Foreign wages. Let *w* be the wage rate per hour in Home and w^* be the wage rate in Foreign. The ratio of wage rates is then w/w^*. The rule for allocating world production is simply this: goods will always be produced where it is cheapest to make them. The cost of making some good, say good *i*, is the unit labor requirement times the wage rate. To produce well *i* in Home will cost wa_{Li}. For Foreign, this will cost $w^*a^*_{Li}$. It will be cheaper to produce the good in Home if

$$wa_{Li} < w^*a^*_{Li},$$

which can be rearranged to yield

$$a^*_{Li}/a_{Li} > w/w^*.$$

On the other hand, it will be cheaper to produce the good in foreign if

$$wa_{Li} > w^*a^*_{Li}, \text{ or } a^*_{Li}/a_{Li} < w/w^*.$$

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Lining up the goods in increasing order tells us that there is a cut in the lineup determined by the ratio of the two countries' wage rates, w/w^*. All the goods to the left of that point are produced in Home, all the goods on the right in Foreign.

This pattern of specialization is beneficial to both countries when comparing the labor cost of producing a good directly in a country with that of indirectly producing it by producing another good and trading for the desired good.

3.5.3. Determining the Relative Wage in the Multigood Model

Who produces what can be determined only after we know the relative wage rate in the multigood model. To determine relative wages in a multigood economy, we must look behind the relative demand for goods to the implied relative demand for labor. This is a derived demand that results from the demand for goods produced with each country's labor.
The relative derived demand for Home labor will fall when the ratio of Home to Foreign wages rises, for two reasons.

1. As Home becomes more expensive relative to foreign labor, goods produced in Home also become relatively more expensive, and world demand for these goods falls.
2. As Home wages rise, fewer goods will be produced in Home and more in Foreign, further reducing the demand for Home labor.

3.6. Adding Transport Costs and Nontraded Goods

Once transport costs are added to the model we see that some goods will become nontraded goods due to the fact that transport costs make the product too expensive.

Transportation costs do not change the fundamental principles of comparative advantage or the gains from trade. 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.
First, notice that the world economy described by the model of the last section is marked by very extreme international specialization. At most there is one good that both countries produce. There are three 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.

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2. Countries sometimes protect industries from foreign competition.
3. It is costly to transport goods and services; in some cases the cost of transportation is enough to lead countries into self-sufficiency in certain sectors.

Recapping, at a relative Home wage of 3, Home can produce apples, bananas, and caviar more cheaply than Foreign, while Foreign can produce dates and enchiladas more cheaply than Home. In the absence of transport costs, then, Home will export the first three goods and import the last two.
Now suppose there is a cost to transport goods, and this is a uniform factor of production cost, say 100 percent. This will discourage trade. Consider dates, for example. One unit of this good requires 6 hours of Home labor or 12 hours of Foreign labor to produce. At a relative wage of 3, 12 hours of Foreign labor costs only as much as 4 hours of Home labor; so in the absence of transport costs, Home imports dates. With a 100 percent transport cost, however, importing dates would cost the equivalent of 8 hours of Home labor, so Home will produce the good for itself instead. The result of introducing transport costs, then, is that Home will still export apples and bananas and import enchiladas, but caviar and dates will become nontraded goods.

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. Many goods end up being nontraded either because of the absence of strong national cost advantages or because of high transportation costs. The important point is that nations spend a large share of their income on nontraded goods.

3.7. Empirical Evidence on the Ricardian Model

While some of the predictions of the Ricardian model are clearly unrealistic, its basic prediction has been confirmed by a number of studies.

The Ricardian model of international trade is an extremely useful tool for thinking about the reasons why trade may happen and about the effects of international trade on national welfare. Furthermore, the model is a good fit to the real world and it makes accurate predictions about actual international trade flows. Clearly there are a number of ways in which the Ricardian model makes misleading predictions. First, the simple Ricardian model predicts an extreme degree of specialization that we do not observe in the real world. Second, it assumes away effects of international trade on the distribution of income within countries, and thus predicts that countries as a whole will always gain from trade, while in practice international trade has strong effects on income distribution. Third, it allows no role for differences in resources among countries as a cause of trade. Finally, the model neglects the possible role of

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economies of scale caused by trade.

However, the basic prediction of the Ricardian model – that countries should tend to export those 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 Ricardian model, performed using data from the early post-World War II period, compared British with American productivity and trade. The test found that the United States had an absolute advantage in everything. Nonetheless, the amount of overall British exports was about as large as the amount of American exports at the time.
The Ricardian model tells us, that having high productivity in an industry compared with that of foreigners is not enough to ensure that a country will export that industry's products; the relative productivity must be high compared with relative productivity in other sectors.

More recent evidence on the Ricardian model has been less clear-cut. In part, this is because the growth of world trade and the resulting specialization of national economies means that we do not get a chance to see what countries do badly!

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 principle 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.

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4. Specific Factors and Income Distribution

When people are risk averse, 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.

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 head offices are based. Regulatory and political factors have encouraged offshore banking. The same factors have encouraged offshore currency trading, that is, trade in bank deposits denominated in currencies of countries other than the one in which the bank is located. Such Eurocurrency trading received a major stimulus from the absence of reserve requirements on deposits in Eurobanks. Creation of a Eurocurrency deposit does not occur because that currency leaves its country of origin; rather, all that is required is that a Eurobank accept a deposit liability denominated in the currency. Eurocurrencies therefore pose no threat to central banks' control over their domestic monetary bases.

Offshore banking is largely unprotected by the safeguards that national governments have imposed to prevent domestic bank failures. In addition, the opportunity that banks have to shift operations offshore has undermined the effectiveness of national bank supervision. The Basel Committee of industrial-country bank supervisors has worked to enhance regulatory cooperation in the international area, releasing a third generation of proposed prudential regulations. There is still uncertainty, however, about a central bank's obligations as an international lender of last resort. That uncertainty may reflect an attempt by international authorities to reduce moral hazard. The trend toward securitization has increased the need for international cooperation in monitoring and regulation nonbank financial institutions. So has the rise of emerging markets and of large shadow banking systems.

The losses caused by financial crises must be evaluated against the gains that international capital markets potentially offer. The international capital market has contributed to an increase in international portfolio diversification, but the extent of diversification still appears incomplete compared with what economic theory would predict. Similarly, some observers have claimed that the extent of intertemporal trade, as measured by countries' current account balances, has been too small. Less

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ambiguous evidence comes from international interest rate comparisons.

The foreign exchange market's record in communicating appropriate price signals to international traders and investors is mixed. Tests based on the interest parity condition seem to suggest that the market ignores readily available information in setting exchange rates; but because the interest parity theory ignores risk aversion and the resulting risk premiums, the theory may be an oversimplification of reality. When people are risk averse, 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.

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The losses caused by financial crises must be evaluated against the gains that international capital markets potentially offer. The international capital market has contributed to an increase in international portfolio diversification, but the extent of diversification still appears incomplete compared with what economic theory would predict. Similarly, some observers have claimed that the extent of intertemporal trade, as measured by countries' current account balances, has been too small. Less ambiguous evidence comes from international interest rate comparisons.

The foreign exchange market's record in communicating appropriate price signals to international traders and investors is mixed. Tests based on the interest parity condition seem to suggest that the market ignores readily available information in setting exchange rates; but because the interest parity theory ignores risk aversion and the resulting risk premiums, the theory may be an oversimplification of reality. When people are risk averse, 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.

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 head offices are based. Regulatory and political factors have encouraged offshore banking. The same factors have encouraged offshore currency trading, that is, trade in bank deposits denominated in currencies of countries other than the one in which the bank is located. Such Eurocurrency trading received a major stimulus from the absence of reserve requirements on deposits in Eurobanks. Creation of a Eurocurrency deposit does not occur because that currency leaves its country of origin; rather, all that is required is that a Eurobank accept a deposit liability denominated in the currency. Eurocurrencies therefore pose no threat to central banks' control over their domestic monetary bases.

Offshore banking is largely unprotected by the safeguards that national governments have imposed to prevent domestic bank failures. In addition, the opportunity that

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Countries engage in international trade for two basic reasons. First, countries trade because they are different from each other and can benefit from their differences by reaching an arrangement in which each does the thing it can do best. Second, countries trade to achieve economies of scale in production.

The next four chapters develop tools to help understand how differences between countries give rise to trade through the concept of comparative advantage. This chapter will give a general introduction to this concept, then will develop a specific model of how the concept determines the pattern of international trade.

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4.1. The Specific Factors Model

The specific factors model allows for a distinction between general-purpose factors that can move between sectors and factors that are specific to particular uses.

This model was developed by Paul Samuelson and Ronald Jones, and assumes an economy that produces two goods and that can allocate its labor supply between the two sectors. Unlike the Ricardian model, however, it 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 (can be used only in the production of particular goods).

4.1.1. Assumptions of the Model

Imagine an economy producing cloth and food, with three factors of production: labor (L), capital (K), and land (T). Cloth is produced using capital and labor, while food is produced using land and labor. 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.
The economy's output of cloth depends on how much capital and labor are used in that sector. This can be summarized by a production function that tells us the quantity of cloth than can be produced given any input of capital and labor.

$$Q_C = Q_C(K,L_C),$$

with Q_C as the economy's output of cloth, K the economy's capital stock, and L_C the labor force employed in cloth. Similarly, for food the production function would equal

$$Q_F = Q_F(T,L_F).$$

Here T is the economy's supply of land. For the economy as a whole, the labor employed must equal the total labor supply L:

$$L_C + L_F = L.$$

4.1.2. Production Possibilities

The specific factors model assumes that each of the specific factors can be used in only one sector. Thus to analyze the economy's production possibilities, we need only to ask how the economy's mix of output changes as labor is shifted from one sector to the other. This can be done graphically be representing the above mentioned production functions of food and cloth, and then by putting them together to derive the production possibility frontier.

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4.1.3. Prices, Wages, and Labor Allocation

To determine how much labor will be employed in each sector 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 cloth producers. Given the prices of cloth and food together with the wage rate, we can determine each sector's employment and output.

For demand, in each sector employers will demand labor up to the point where the value produced by an additional person-hour equals the cost of employing that hour. In the cloth sector, for example, the value of an additional person-hour is the marginal product of labor in cloth multiplied by the price of one unit of cloth: $MPL_C \times P_C$. If w is the wage rate of labor, employers will therefore hire workers up to the point where

$MPL_C \times P_C = w$.

But the marginal product of labor in cloth slopes downward because of diminishing returns. So for any given price of cloth $P_{C,}$ the value of that marginal product, $MPL_C \times P_{C,}$ will also slope down. We can therefore think of the above stated equation as defining the demand curve for labor in the cloth sector: if the wage rate falls, other things equal, employers in the cloth sector will want to hire more workers.

Similarly, the value of an additional person-hour in food is $MPL_F \times P_{F.}$ The demand curve for labor in the food sector is therefore written as

$MPL_F \times P_F = w$.

The wage rate w must be the same in both sectors, because of the assumption that labor is freely mobile between sectors until wages are equalized. The wage rate is determined by the requirement that total labor demand equals total labor supply. By representing these two labor demand curves in a diagram, we can see how the wage rage and employment in each sector are determined given the prices of food and cloth.

There is a useful relationship between relative prices and output that emerges clearly from this analysis of labor allocation; this relationship applies to more general situations than that described by the specific factors model. The equations imply that

$MPL_C \times P_C = MPL_F \times P_F = w$

Or, rearranging, that

$-MPL_F / MPL_C = -P_C / P_{F.}$

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The left side of the equation is the slope of the production possibility frontier at the actual production point; the right side is minus the relative price of cloth. This result tells us that at the production point, the production possibility frontier must be tangent to a line whose slope is minus the price of cloth divided by that of food.

Any price change of food and cloth can be broken into two parts: an equal-proportional change in both P_C and P_F, and a change in only one price. For example, suppose that the price of cloth rises 17 percent and the price of food rises 10 percent. We can analyze the effects of this by first asking what happens if both food and cloth prices rise by 10 percent, and then by finding out what happens if only cloth prices rise by 7 percent.

An Equal-Proportional Change in Prices

When P_C and P_F change in the same proportion, no real changes occur. The wage rate rises in the same proportion as the prices, so real wage rates, the ratios of the wage rate to the price of goods, are unaffected. With the same amount of labor employed in each sector, receiving the same real wage rate, the real incomes of capital owners and landowners also remain the same. So everyone is in exactly the same position as before. This illustrates a general principle: changes in the overall price level have no real effects. Only changes in relative prices affect welfare or the allocation of resources.

A Change in Relative Prices

If P_C rises by 7 percent, the cloth labor demand curve will shift in the same proportion as the price increases. Two important facts about the results of this shift: (1) although the wage rate rises, it rises by less than the increase in the price of cloth, and (2) when only P_C rises, in contrast to a simultaneous rise in P_C and P_F, labor shifts from the food sector to the cloth sector and the output of cloth rises while that of food falls. Food output falls and cloth output rises as a result of the rise in the relative price of cloth.

4.1.4. Relative Prices and the Distribution of Income

The effect of changes in relative prices on the distribution of income is considered before turning to the effects of international trade.
So far the following aspects of the specific factors model have been examined: (1) the determination of production possibilities given an economy's resources and technology and (2) the determination of resource allocation, production, and relative prices in a market economy.

The demand curve for labor in the cloth sector will shift upward in proportion to the

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rise in P_C, so that if P_C rises by 7 percent, the curve defined by P_C x MPL_C also rises by 7 percent. Unless the price of food also rises by at least 7 percent, w will rise by less than P_C.
Thus, workers find that their wage rate has risen, but less than in proportion to the rise in P_C; their real wage in terms of cloth, w/ P_C, falls while their real wage in terms of food w/ P_F, rises. Whether workers are better or worse off will depend on the relative importance of cloth and food in workers' consumption.
Owners of capital are definitely better off as their profits in terms of what they produce rises. The income of capital owners will rise more than proportionately with the rise in P_C. Conversely, landowners are definitely worse off. They lose because the real wage in terms of food rises, squeezing their income, and the rise in cloth price reduces the purchasing power of any given income.

If the relative price had moved in the opposite direction and the relative price of cloth had decreased, then the predictions would be reversed. The effect of a relative price change on the distribution of income can be summarized as follows:

- The factor specific to the sector whose relative price increases is definitely better off.
- The factor specific to the sector whose relative price decreases is definitely worse off.
- The change in welfare for the mobile factor is ambiguous.

4.2. International Trade in the Specific Factors Model

Factors specific to 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.

For trade to take place, a country must face a world relative price that is different from the relative price that would prevail in the absence of trade. Why might the relative supply curve for the world be different from that for our specific factors economy? What is important here is that the economy faces a different relative price when it is open to international trade.

When the economy is open to trade, the relative price of cloth is determined by the relative supply and demand for the world, and is higher than when not in trade. At a higher relative price the economy exports cloth and imports food due to the fact that consumers respond to a higher relative price of cloth by demanding relatively more food. If opening up to trade had been associated with a decrease in the relative price of cloth, the changes would be reversed.

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When opening up to trade, an economy exports the good whose relative price has increased and imports the good whose relative price has decreased.

4.3. Income Distribution and the Gains from Trade

Trade produces overall gains in the limited sense that those who gain could in principle compensate those who lose while still remaining better off than before.

To assess the effects of trade on particular groups, the key point is that international trade shifts the relative price of the goods that are traded. The general outcome is simple: trade benefits the factor that is specific to the export sector of each country but hurts the factor specific to the import-competing sectors, with ambiguous effects on mobile factors.

Do the gains from trade outweigh the losses? One way to try to answer this would be to sum up the gains and the losses and compare them. However, comparing welfare is an inherently subjective thing. A better way to assess the overall gains is to ask: could those who gain from trade compensate those who lose and still be better off themselves? If so, then trade is potentially a source of gain to everyone.
To show this, we need to state some basic relationships among prices, production, and consumption. If D_C is consumption of cloth and D_F consumption of food, then in a closed economy, D_C=Q_C and D_F=Q_F. International trade makes it possible for the mix of cloth and food consumed to differ from the mix produced. However, the value of consumption must be equal to the value of production;

$P_C \times D_C + P_F \times D_F = P_C \times Q_C + P_F \times Q_F$, *or*

$D_F - Q_F = (P_C/P_F) \times (Q_C - D_C)$.

$D_F - Q_F$ 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 cloth and the amount by which production of cloth exceeds consumption. The equation, then, states that imports of food equal exports of cloth times the relative price of cloth; the amount imported is constrained by the amount exported.

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

1. First, we notice that in the absence of trade, the economy would have to produce what it consumed and vice versa.
2. Next, we notice that it is possible for a trading economy to consume more of both goods than it would have in the absence of trade.

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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.

The fundamental reason why trade potentially benefits a country is that it expands the economy's choices.

4.4. The Political Economy of Trade: A Preliminary View

Most economists do not regard the effects of international trade on income distribution as a good reason to limit trade. In its distributional effects, trade is no different from many other forms of economic change, which are not normally regulated.
In the actual politics of trade policy, income distribution is of crucial importance. This is true in particular because those who lose from trade are usually a much more informed, cohesive, and organized group than those who gain.

Our specific factors model informs us that those who stand to lose most from trade are the immobile factors in the import-competing sector. In the real world, this includes not only the owners of capital, but also a portion of the labor force in those importing-competing sectors.

Does this mean that trade should be allowed only if it doesn't hurt lower-income people? There are three main reasons why economists do not generally stress the income distribution effects of trade:

1. Income distribution effects are not specific to international trade. Every change in a nation's economy affects income distribution. Why should someone who suffers unemployment due to increased import competition be treated differently from an unemployed printer machine operator?
2. It is always better to allow trade and compensate those who are hurt by it than to prohibit trade.
3. Those who stand to lose from increase trade are typically better organized than those who stand to gain. This imbalance creates a bias in the political process that requires a counterweight. Many trade restrictions tend to favour the most organized groups, which are often not the most in need of income support.

Most economists believe that it is more important to stress the overall potential gains from trade than the possible losses to some groups in a country.

4.4.1. Income Distribution and Trade Politics

Typically, those who gain from trade in any particular product are a much less concentrated, informed, and organized group than those who lose and are usually less effective in extending free trade.
The U.S. has limited imports of sugar for the past 25 years; however, most consumers

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are unaware of the twice as high sugar price. The higher profits from the import quota are highly concentrated in a small number of producers, who are organized in trade associations that actively lobby. The employees in the sugar sector however, do not see much of the gains from sugar, and the import restrictions also reduce employment in other sectors that rely on large quantities of sugar in their production processes.

Chapters 9 through 12 will show that the politics of import restriction in the sugar industry is an extreme example of a kind of political process that is common in international trade. That world trade in general became steadily freer from 1945 to 1980 depended on a special set of circumstances that controlled what is probably an inherent political bias against international trade.

4.5. International Labor Mobility

Labor moves from countries where it is abundant to countries where it is scarce. This raises total world output, but it also generates strong income distribution effects, so that some groups are hurt as a result.

Due to the fact that there are many restrictions on the flow of labor, labor mobility is less prevalent in practice than capital mobility. It is important to understand the international economic forces that drive desired migration of workers across borders, and the short-run consequences of those migration flows whenever they are realized.

Whenever international migration is possible, workers will also want to move from the low-wage to the high-wage country. Let's assume that two countries produce a single good with labor and an immobile factor, land. There will be trade in labor services when workers move in search of higher wages. Given the different employment levels, technology and land endowment, differences are such that real wages are higher in Foreign than in Home. This will lead to a labor movement from Home to Foreign, which will reduce the Home labor force and thus raise the real wage in Home. If there are no obstacles to labor movement, this process will continue until the real wage rates are equalized.

Three points should be noted about the redistribution of the world's labor force:

1. It leads to a convergence of real wage rates.
2. It increases the world's output as a whole.
3. Despite this gain, some people are hurt by the change. Those who would originally have worked in Home receive higher real wages, but those who would originally have worked in Foreign receive lower real wages.

As in the case of the gains from international trade, then, international labor mobility, while allowing everyone to be made better off in principle, leaves some groups worse

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off in practice. In the following chapter we will see how changes in a country's labor endowment, so long as the country is integrated into world markets through trade, can leave the welfare of all factors unchanged. This has very important implications for immigration in the long run.

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5. Resources and Trade: The Heckscher-Ohlin Model

First, a two-good model is developed, with the goods differing in their factor intensity. 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 favour of labor. An increase in the supply of one factor of production expands production possibilities, but in a strongly biased way.

A country that has a large supply of one resource relative to its supply of other resources is abundant in that resource. A country will tend to produce relatively more of goods that use its abundant resources 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.

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 international differences in technology.

Empirical evidence is mixed on the Heckscher-Ohlin model, but most researchers do not believe that differences in resources alone can explain the pattern of world trade or world factor prices. Instead, it seems to be necessary to allow for substantial international differences in technology.
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If labor were the only factor of production, as the Ricardian model assumes, comparative advantage could arise only because of differences in labor productivity. In the real world, however, trade also reflects differences in countries' 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 shows that comparative advantage is influenced by the interaction between nations' resources and the technology of production.

That international trade is largely driven by differences in countries' resources is one of the most influential theories in international economies. This theory, the Heckscher-Ohlin theory, emphasizes the interplay between the proportions in which different factors of production are available in different countries and 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 this theory, we begin by describing an economy that does not trade and then ask what happens when two such economies trade with each other.

5.1. A Model of a Two-Factor Economy

In this model the two goods differ in their factor intensity. 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. An increase in the supply of one factor of production expands production possibilities, but in a strong biased way.
A country that has a large supply of one resource relative to its supply of other resources is abundant in that resource. The basic Heckscher-Ohlin theory of trade states that countries tend to export goods that are intensive in the factors with which they are abundantly supplied.
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The simplest model is sometimes referred to as "2 by 2 by 2": two countries (Home and Foreign), two goods (cloth and food), two factors of production. The key difference is that in this chapter, we assume that the immobile factors that were specific to each sector are now mobile in the long run. Thus land used for farming can be used to build a textile plant.

5.1.1. Prices and Production

Both cloth and food are produced using capital and labor. The amount of each good produced is determined by a production function for each good:

$Q_C = Q_C(K_C, L_C)$,

$Q_F = Q_F(K_F, L_F)$,

Where Q_C and Q_F are the output levels of cloth and food, K_C and L_C are the amounts of capital and labor employed in cloth production, and K_F and L_F are the amounts of capital and labor employed in food production. Overall, the economy has a fixed supply of capital K and labor L that is divided between employment in the two sectors. We define the following expressions that are related to the two production technologies:

a_{KC} = capital used to produce one yard of cloth

a_{LC} = labor used to produce one yard of cloth

a_{KF} = capital used to produce one calorie of food

a_{LF} = labor used to produce one calorie of food

There is one crucial difference to the Ricardian model: in the above stated definitions, we speak of the quantity of capital or labor used to produce a given amount of cloth or food, rather than the quantity required to produce that amount. The reason for this change from the Ricardian model is that when there are two factors of production, there may be some choice in the use of inputs that will depend on the factor prices for labor and capital.

Let's first look at a special case in which there is only one way to produce each good. Consider the following numerical example: production of one yard of cloth requires a

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combination of two work-hours and two machine-hours. The production of food is more automated; as a result, production of one calorie of food requires only one work-hour along with three machine-hours. Assume that an economy is endowed with 3,000 units of machine-hours along with 2,000 units of work-hours. The total machine-hours used for both cloth and food production cannot exceed the total supply of capital:

$a_{KC} \times Q_C + a_{KF} \times Q_F \leq K$, *or* $2Q_C + 3Q_F \leq 3{,}000$.

This is the resource constraint for capital. Similarly, the resource constraint for labor states that the total work-hours used in production cannot exceed the total supply of labor:

$a_{LC} \times Q_C + a_{LF} \times Q_F \leq L$, *or* $2Q_C + Q_F \leq 2{,}000$.

The important feature of this production possibility frontier is that the opportunity cost of producing an extra yard of cloth in terms of food is not constant. When the economy is producing mostly food, then there is spare labor capacity.

Now let's make the model more realistic and allow the possibility of substituting capital for labor and vice versa in production. This removes the kink in the production possibility frontier; our basic insight about how opportunity costs change with the mix of production remains valid.

5.1.2. Choosing the Mix of Inputs

In this model, in each sector producers will face not fixed input requirements but trade-offs between alternative input combinations that can be used to produce one calorie of food. What input choice will actually be made depends on the relative costs of capital and labor. If capital rental rates are high and wages low, farmers will choose to produce using relatively little capital and a lot of labor. If *w* is the wage and *r* the rental cost of capital, then the input choice will depend on the ratio of these two factor prices, w/r[2].
There is a corresponding relationship between w/r and the labor-capital ratio in cloth production. Figure 5-5 shows that the *CC* curve is shifted out relative to *FF*, indicating that at any given factor prices, production of cloth will always use more labor relative to capital than will production of food. When this is true, production of cloth is labor-intensive, while production of food is capital-intensive. A good can never be both capital- and labor-intensive.

The *CC* and *FF* curves are called relative factor demand curves; their downward slope characterizes the substitution effect in the producers' factor demand. As the wage *w* rises relative to the rental rate *r*, producers substitute capital for labor.

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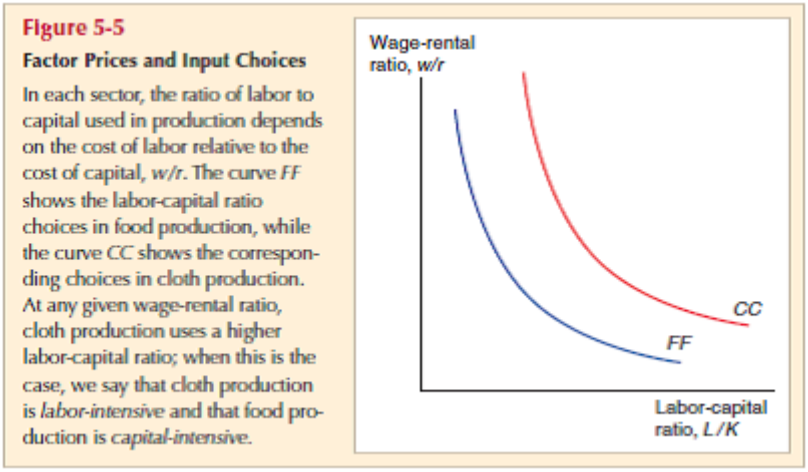

5.1.3. Factor Prices and Goods Prices

Suppose for a moment that the economy produces both cloth and food. Then competition among producers in each sector will ensure that the price of each good equals its cost of production. This cost of producing depends on factor prices: if wages rise, then other things equal to the price of any good whose production uses labor will also rise.
The importance of a particular factor's price depends on how much of that factor the good's production involves. There is a one-to-one relationship between the ratio of the wage rate to the rental rate, w/r, and the ratio of the price of cloth to that of food, P_C/P_F.

When P_C/P_F increases, the ratio of labor to capital falls in both cloth and food production. But in a competitive economy, factors of production are paid their marginal product – the real wage of workers in terms of cloth is equal to the marginal productivity of labor in cloth production, and so on. When the ratio of labor to capital falls in producing either good, the marginal product of labor in terms of that good increases – so workers find their real wage higher in terms of both goods. In this model changes in relative prices have strong effects on income distribution. Not only does a change in the prices of goods change the distribution of income; it always changes it so much that owners of one factor of production gain while owners of the other are made worse off.

5.1.4. Resources and Output

We will now investigate how changes in resources affect the allocation of factors across sectors and the associated changes in output produced.
Suppose that we take the relative price of cloth as given. We know that a given relative price of cloth, say $(P_C/P_F)^1$, is associated with a fixed wage-rental ratio $(w/r)^1$. That ratio, in turn, determines the ratios of labor to capital employed in both the cloth

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and the food sectors: $(L_C/K_C)^1$ and $(L_F/K_F)^1$, respectively. Now we assume that the economy's labor force grows, which implies that the economy's aggregate labor to capital ratio, L/K, increases. At the given relative price of cloth $(P_C/P_F)^1$, we just saw that the ratios of labor to capital employed in both sectors remain constant.

Then how does the economy employ the additional labor hours? The answer lies in the allocation of labor and capital across sectors: the labor-capital ratio in the cloth sector is higher than that in the food sector, so the economy can increase the employment of labor to capital by allocating more labor and capital to the production of cloth. This will result in producing more cloth and less food.

The best way to think about this result is in terms of how resources affect the economy's production possibilities. Once the labor supply increases, the production possibility frontier shifts out more in the direction of cloth than food – that is, there is a biased expansion of production possibilities. In this case, the expansion is so strongly biased toward cloth production that at unchanged relative prices, food output falls, while cloth output increases.

The biased 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 labor expands production possibilities disproportionately in the direction of cloth production, while an increase in the supply of capital expands them disproportionately in the direction of food production. Thus an economy with a high relative supply of labor to capital will be relatively better at producing cloth than an economy with a low relative supply of labor to capital. 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.

5.2. Effects of International Trade Between Two-Factor Economies

Because changes in relative prices of goods have very strong effects on the relative earnings of resources, 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.
In reality, complete factor-price equalization is not observed because of wide differences in resources, barriers to trade, and international differences in technology.

We can now look at what happens when to such economies, Home and Foreign, trade. As always, they are similar along many dimensions; they have relative demands for food and cloth when faced with the same relative prices of the two goods. They

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also have the same technology: a given amount of labor and capital yields the same output of either cloth or food. The only difference between the countries is their resources: Home has a higher ratio of labor to capital than Foreign does.

5.2.1. Relative Prices and the Pattern of Trade

Since Home has a higher ratio of labor to capital than Foreign, Home is labor-abundant and Foreign is capital-abundant. Since cloth is the labor-intensive good, Home's production possibility frontier relative to Foreign's 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 other things that will be equal is the price of cloth relative to that of food. Because the countries differ in their factor abundances, 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. When Home and Foreign trade with each other, their relative prices converge. The relative price of cloth rises in Home and declines in Foreign, and a new world relative price cloth is established at a point somewhere between the pretrade relative prices.

Home becomes an exporter of cloth because it is labor-abundant and because the production of cloth is labor-intensive, while Foreing will export food. These predictions for the pattern of trade can be generalized as the following theorem, named after the original developers of this model of trade:
Hecksher-Ohlin Theorem: *The country that is abundant in a factor exports the good whose production is intensive in that factor.*
In the more realistic case with multiple countries, factors of production, and numbers of goods, we can generalize this result as a correlation between a country's abundance in a factor and its exports of goods that use that factor intensively.

5.2.2. Trade and the Distribution of Income

Relative prices have strong effects on the relative earnings of labor and capital, as we previously discussed. Thus international trade can have a powerful effect on the distribution of income, even in the long run. In Home, where the relative price of cloth rises, people who get their incomes from labor gain from trade, but those who derive their incomes from capital are made worse off.

The resource of which a country has a relatively large supply is the abundant factor in that country, and the resource of which it has a relatively small supply is the scarce factor. The general conclusion about the income distribution effects of international trade in the long run is: owners of a country's abundant factors gain from trade, but owners of a country's scarce factors lose.

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This conclusion is similar to the one reached in our analysis of the case of specific factors. The theoretical argument regarding the aggregate gains from trade is identical to the specific factors case: opening to trade expands an economy's consumption possibilities, so there is a way to make everybody better off. However, there is one crucial difference regarding the income distribution effects in these two models: the specificity of factors to particular industries is often only a temporary problem. Thus income distribution effects that arise because labor and other factors of production are immobile represent a temporary, transitional problem. We will see shortly that international trade has the potential to make low-skilled workers in the United States worse off on a sustained basis, as the U.S. is abundantly endowed with highly skilled labor and that low-skilled labor is correspondingly scarce.

5.2.3. Factor-Price Equalization

In the absence of trade, labor would earn less in Home than in Foreign, and capital would earn more. Without trade, labor-abundant Home would have a lower relative price of cloth than capital-abundant Foreign, and the difference in relative prices of goods implies an even larger difference in the relative prices of factors.
When the countries trade, the relative prices of goods converge, which in turn causes convergence of the relative prices of capital and labor. Thus there is clearly a tendency toward equalization of factor prices.
In the model this tendency goes all the way. International trade leads to complete equalization of factor prices. To understand how this occurs, we have to realize that when Home and Foreign trade with each other, more is happening than a simple exchange of goods. In an indirect way, the two countries are in effect trading factors of production. Although this view of trade is simple and appealing, the problem is that in the real world, factor prices are not equalized.

To understand why the model doesn't give us an accurate prediction, we need to look at its assumptions. Three assumptions crucial to the prediction of factor-price equalization are in reality certainly untrue: (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 rates from the prices of cloth and food 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 capital might produce only cloth, while a country with a very high ratio of capital 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.
2. The proposition that trade equalizes factor prices will not hold if countries have different technologies of production. For example, a country with superior

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technology might have both a higher wage rate and a higher rental rate than a country with an inferior technology.

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, due to both natural barriers and barriers to trade such as tariffs and import quotas.

5.3. Empirical Evidence on the Heckscher-Ohlin Model

Although empirical evidence on the Heckscher-Ohlin model is mixed and most researchers do not believe that differences in resources alone can explain the patter of world trade, the model does a good job of predicting the pattern of trade between developed and developing countries.

The essence of the Heckscher-Ohlin model is that trade is driven by differences in factor abundance across countries. We will see that the empirical successes are very limited – mainly due to the same reasons that undermine the prediction for factor-price equalization.

5.3.1. Trade in Goods as a Substitute for Trade in Factors

Tests on U.S. Data

Until recently, and to some extent even now, the United States has been a special case among countries. Until a few years ago, the United States was much wealthier than other countries, and U.S. workers visibly worked with more capital per person than their counterparts in other countries. One would then expect the United States to be an exporter of capital-intensive goods and an importer of labor-intensive goods; surprisingly this was not the case in the 25 years after World War II. In a famous study economist Wassily Leontief found that U.S. exports were less capital-intensive than U.S. imports; this result is known as the Leontief paradox.

Why do we observe the Leontief paradox? Some studies have argued that this paradox was specific to the time considered. Others point to the needed assumption of common technologies used by the United States and its trading partners, which is likely to be violated. One such violation goes as follows: the U.S. has a special advantage in producing new products or goods made with innovative technologies, which may be less capital-intensive.

Tests on Global Data

An important study by Bowen, Leamer, and Sveikauskas extended the predictions for the factor content of trade to 27 countries and 12 factors of production. The theory behind this is the same as for Leontief's test for the U.S. The results confirm the

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Leontief paradox on a broader level: trade often does not run in the direction that the Heckscher-Ohlin theory predicts. Explanations for this result have centered on the failure of the common technology assumption.

The Case of the Missing Trade

Another indication of large technology differences across countries comes from discrepancies between the observed volumes of trade and those predicted by the Heckscher-Ohlin model. In an influential paper, Trefler pointed out that the Heckscher-Ohlin model can also be used to derive predictions for a country's volume of trade based on differences in that country's factor abundance with that of the rest of the world. In fact, factor trade turns out to be substantially smaller than the 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 nations.

Allowing for technology differences also helps to resolve this puzzle of missing trade. If workers in the United States are much more efficient than those in China, then the effective labor supply in the United States is much larger compared with that of China than the raw data suggest.

5.3.2. Patterns of Exports Between Developed and Developing Countries

Although the overall pattern of international trade does not seem to be very well accounted for by a pure Heckscher-Ohlin model, comparisons of the exports of labor-abundant, skill-scarce nations in the third world with the exports of skill-abundant, labor-scarce nations do fit the theory quite well. A key prediction of the model is that changes in factor abundance lead to biased growth toward sectors that use that factor intensively in production. We can see that the experience of for example Asian economies fit very well with these predictions: as the supply of skilled labor increased, they increasingly specialized in the production of skill-intensive goods.

5.3.3. Implications of the Tests

The empirical testing of the Heckscher-Ohlin model has produced mixed results. In particular, the evidence is weak concerning the prediction of the model that, absent technology differences between countries, trade in goods is a substitute for trade in factors.
However, the pattern of goods trade between developed and developing countries fits the predictions of the model quite well.

The model also remains vital for understanding the effects of trade, especially its effects on the distribution of income.

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6. The Standard Trade Model

The standard trade model derives a world relative supply curve from production possibilities and a world relative demand curve from preferences. The price of exports relative to imports, a country's terms of trade, is determined by the intersection of the world relative supply and demand curves. Other things equal, a rise in a country's terms of trade increases its welfare.

Economic growth means an outward shift in a country's production possibility frontier. Such growth is usually biased; the immediate effect of biased growth is to lead, other things equal, to an increase in the world relative supply of the goods toward which the growth is biased. This shift in the world relative supply curve in turn leads to a change in the growing country's terms of trade, which can go either direction.
The direction of the terms of trade effects depends on the nature of the growth. Growth that is export-biased worsens the terms of trade, while growth that is import-biased improves a country's terms of trade.

Import tariffs and export subsidies affect both relative supply and relative demand. A tariff raises relative supply of a country's import good while lowering relative demand. An export subsidy has the reverse effect; it hurts the terms of trade and reduces relative demand for the country's export good. This suggest that export subsidies do not make sense from a national point of view and that foreign export subsidies should be welcomed rather than countered.

International borrowing and lending can be viewed as a kind of international trade, but one that involves trade of present consumption for future consumption rather than trade of one good for another. The relative price at which this intertemporal trade takes place is 1 plus the real rate of interest.
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Previous chapters developed several different models of international trade, each with different assumptions. These models are:

- The Ricardian model: production possibilities are determined by the allocation of a single resources, labor, between sectors. It does not allow us to talk about the distribution of income.
- The specific factors model: includes multiple factors of production. Also captures the short-run consequences of trade on the distribution of income.
- The Heckscher-Ohlin model: multiple factors of production that can move across sectors. This model also captures the long-run consequences of trade on the distribution of income.

When we analyze real problems, we want to base our insights on a mixture of these models. The changing pattern of trade has differential effects on different groups; to understand the effects of increased trade we may want to apply the specific factors or the Heckscher-Ohlin.

In spite of 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 national relative supply schedules.

This chapter stresses those insights from international trade theory that are not

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strongly dependent on the details of the economy's supply side. We develop a standard model of a trading world economy and use this model to ask how a variety of changes in underlying parameters affect the world economy.

6.1. A Standard Model of a Trading Economy

This model derives a world relative supply curve from production possibilities and a world relative demand curve from preferences. A country's terms of trade is determined by the intersection of supply and demand; an increase means an increase in welfare.

Economic growth means an outward shift in a country's production possibility frontier. The direction of the terms of trade effects depends on the nature of the growth. Export-biased growth worsens the terms of trade, while import-biased growth improves a country's terms of trade. It is possible for import-biased growth abroad to hurt a country.

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

6.1.1. Production Possibilities and Relative Supply

For 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. 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. At given market prices, a market economy will choose production levels that maximize the value of its output $P_CQ_C + P_FQ_F$, where Q_C is the quantity of cloth produced and Q_F is the quantity of food produced.

The market value of output can be indicated by drawing isovalue lines – defined by an equation of the form $P_CQ_C + P_FQ_F = V$, and slope equalling $-P_C/P_F$. The higher V is, the rather out an isovalue line lies; thus isovalue lines farther from the origin correspond to higher values of output. If P_C/P_F were to rise (cloth becomes more valuable relative to food), the isovalue lines would be steeper than before, and the economy will produce more cloth and less food.

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6.1.2. Relative Prices and Demand

As we pointed out in Chapter 5, the value of an economy's consumption equals the value of its production:

$P_C Q_C + P_F Q_F = P_C D_C + P_F D_F = V$,

Where D_C and D_F are the consumption of cloth and food, respectively. The equation above says that production and consumption must lie on the same isovalue line. This point depends on the tastes of the consumers. For our standard model, we assume that the economy's consumption decisions may be represented as if they were based on tastes of a single representative individual.
These tastes can be represented graphically by a series of indifference curves, which have three properties:

1. They are downward sloping: if an individual is offered less food (*F*), then to be made equally well off, she must be given more cloth (*C*).
2. The farther up and to the right an indifference curve lies, the higher the level of welfare to which it corresponds: an individual will prefer having more of both goods to less.
3. Each indifference curve gets flatter as we move to the right (they are bowed-out to the origin): the more *C* and the less *F* an individual consumes, the more valuable a unit of *F* is at the margin compared with a unit of *C*, so more *C* will have to be provided to compensate for any further reduction in *F*.

Now consider what happens when P_C/P_F increases. First, the economy moves to a higher indifference curve, meaning that it is better off. 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 at any given level of welfare is a substitution effect.

6.1.3. The Welfare Effect of Changes in the Terms of Trade

When P_C/P_F increases, a country that initially exports cloth is made better off. Conversely, if P_C/P_F were to decline, the country would be made worse off. We cover all these cases by defining the terms of trade as the price of the good a country initially exports divided by the price of the good it initially imports. The general statement, then, is that a rise in the terms of trade increases a country's welfare, while a decline in the terms of trade reduces its welfare. Note, however, that changes in a country's terms of trade can never decrease the country's welfare below its welfare level in the absence of trade.

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6.1.4. Determining Relative Prices

Let's now suppose that the world economy consists of two countries Home (which exports cloth) and Foreign (which exports food). Home's terms of trade are measured by P_C/P_F, while Foreign's are measured by P_F/P_C. We assume that these trade patterns are induced by differences in Home's and Foreign's production capabilities, and that the two countries share the same preferences and hence have the same relative demand curve. At any given relative price P_C/P_F, Home will produce quantities of cloth and food Q_C and Q_F, while Foreign produces quantities Q^*_C and Q^*_F, where $Q_C/Q_F > Q^*_C/Q_F$. The relative supply for the world is then: $(Q_C + Q^*_C)/(Q_F + Q^*_F)$. This relative supply curve lies in between the relative supply curves for both countries. Relative demand also aggregates the demands for cloth and food: $(D_C + D^*_C)/(D_F + D^*_F)$.

The equilibrium relative price for the world is then given by the intersection of world relative supply and demand. This determines how many units of cloth and food are exported.

6.1.5. Economic Growth: A Shift of the RS curve

The effects of economic growth in a trading world economy are a perennial source of concern and controversy. The debate revolves around two questions: (1) is economic growth in other countries good or bad for our nation? And (2) is growth in a country more or less valuable when that nation is part of a closely integrated world economy? On one side, economic growth in the rest of the world may be good for our economy because it means larger markets for our exports and lower prices for our imports. On the other side, growth in other countries may mean increased competition for our exporters and domestic producers, who need to compete with foreign exporters. The standard model of trade developed in the last section provides a framework that can cut through these seeming contradictions and clarify the effects of economic growth in a trading world.

6.1.6. Growth and the Production Possibility Frontier

Economic growth means an outward shift of a country's production possibility frontier. The international trade effects of growth result from the fact that such growth typically has a bias. Biased growth takes place when the production possibility frontier shifts out more in one direction than in the other. Growth may be biased for two main reasons:

1. The Ricardian model (Chapter 3) shows that technological progress in one sector of the economy will expand the economy's production possibilities more

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in the direction of that sector's output than in the direction of the other sector's output.

2. The Heckscher-Ohlin model (Chapter 5) showed that an increase in a country's supply of a factor of production will produce biased expansion of production possibilities.

6.1.7. World Relative Supply and the Terms of Trade

Suppose now that Home experiences growth strongly biased toward cloth, so that its output of cloth rises at any given relative price of cloth, while its output of food declines. Then the output of cloth relative to food will rise at any given price for the world as a whole, shifting world relative supply to the right. It results in a decrease in the relative price of cloth and worsening Home's terms of trade, while improving Foreign's terms of trade.

Notice that the important consideration here is not which economy grows but rather the bias of that growth. Growth that disproportionately expands a country's production possibilities in the direction of the good it exports is export-biased growth. Our analysis leads to the following general principle: export-biased growth tends to worsen a growing country's terms of trade, to the benefit of the rest of the world; import-biased growth tends to improve a growing country's terms of trade at the rest of the world's expense.

6.1.8. International Effects of Growth

Using this principle, we are now in a position to resolve our questions about the international effects of growth. Whether growth in the rest of the world good or bad is for a country depends on the bias of the growth. 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.

Some analysts suggested that growth in the poorer nations would actually be self-defeating. They argued that export-biased growth by poor nations would worsen their terms of trade so much that they would be worse off than if they had not grown at all. This situation is known to economists as the case of immiserizing growth.

While growth at home normally raises our own welfare even in a trading world, this is by no means true of growth abroad. Import-baised growth is not an unlikely possibility, and whenever the rest of the world experiences such growth, it worsens our terms of trade.

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6.2. Tariffs and Export Subsidies: Simultaneous Shifts in RS and RD

A tariff raises relative supply of a country's import good while lowering relative demand. An export subsidy has the reverse effect and hurts a country's terms of trade. Both tariffs and subsidies have strong effects on the distribution of income within countries.

Import tariffs and export subsidies are not usually put in place to affect a country's terms of trade, but for income distribution, the promotion of industries thought to be crucial to the economy, or for balance of payments. Whatever the motive for tariffs or subsidies, however, they do have effects on terms of trade 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 prices at which those goods can be purchased within a country. The direct effect of a tariff is to make imported goods more expensive inside a country, while an export subsidy gives producers an incentive to export. Note that this is very different from the effects of a production subsidy, which also lowers domestic prices for the affected goods.
When countries are big exporters or importers of a good, the price changes caused by tariffs and subsidies change both relative supply and relative demand on world markets, resulting in a shift in the terms of trade for the world.

6.2.1. Relative Demand and Supply Effects of a Tariff

Tariffs and subsidies drive a wedge between the external prices and internal prices. This means we have to be careful in defining the terms of trade, which are intended to measure the ratio at which countries exchange goods, and hence correspond to external prices. When analysing the effects of a tariff or export subsidy, therefore, we want to know how that tariff or subsidy affects relative supply and demand as a function of external prices.

If Home imposes a 20 percent tariff on the value of food imports, the internal price of food relative to cloth faced by Home producers and consumers will be 20 percent higher than the external relative price of food on the world 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. Clearly, Home's terms of trade improve at Foreign's expense due to a rise in the world relative price of cloth.

The extent of this terms of trade effect depends on how large the country imposing the tariff is relative to the rest of the world: a small country cannot have much effect

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on world relative supply and demand and therefore cannot have much effect on relative prices.

6.2.2. Effects of an Export Subsidy

Tariffs 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. This will raise Home's internal price of cloth relative to that of food by 20 percent. A Home export subsidy worsens Home's terms of trade and improves Foreign's.

6.2.3. Implications of Terms of Trade Effects: Who Gains and Who Loses?

If Home imposed a tariff, it improves its terms of trade at Foreign's expense. Thus tariffs hurt the rest of the world. The terms of trade improvement benefits Home; however, a tariff also imposes costs by distorting production and consumption incentives within Home's economy. The terms of trade gains will outweigh the losses from distortion only as long as the tariff is not too large. The effects of an export subsidy are quite clear: Foreign's terms of trade improve at Home's expense, leaving it clearly better off. At the same time, Home loses from terms of trade deterioration and from the distorting effects of its policy. It is difficult to come up with situations where export subsidies would serve the national interest.

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 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. Alternatively, a country may impose a tariff on something the United States also imports, lowering its price and benefiting the United States.

6.3. International Borrowing and Lending

International borrowing and lending involves trade of present consumption for future consumption. The relative price at which this intertemporal trade takes place is 1 plus the real rate of interest.

Any international transaction that occurs over time has a financial aspect. Instead of trading one good for another at a point in time, we exchange goods today in return for some goods in the future. This kind of trade is known as intertemporal trade; for now we will analyze it using a variant of our standard trade model with a time dimension.

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6.3.1. Intertemporal Production Possbilities and Trade

Even in the absence of international capital movements, any economy faces a trade-off between consumption now and consumption in the future. 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.

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 is summarized by the intertemporal production possibility frontier.
Again, there are two countries, Home (which' possibilities are biased toward current consumption), and Foreign (which' possibilities are biased toward future consumption). In the absence of international borrowing and lending, we would expect the relative price of future consumption to be higher in Home than in Foreign, and thus if we open the possibility of trade over time, we would expect Home to export present consumption and import future consumption.

6.3.2. The Real Interest Rate

Like an individual, a country can trade over time by borrowing or lending. Clearly the price of future consumption in terms of present consumption has something to do with the interest rate. 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 the future will be $(1+r)$ times the quantity borrowed in the present, where r is the real interest rate on borrowing. Since the trade-off is one unit of consumption in the present for $(1+r)$ units in the future, the relative price of future consumption is $1/(1+r)$.

When this relative price of future consumption rises, a country responds by invest more; this increases the supply of future consumption relative to present consumption and implies an upward-sloping relative supply curve for future consumption. The substitution effects are captured by an intertemporal relative demand curve that relates the relative demand for future consumption to its relative price.

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.

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6.3.3. Intertemporal Comparative Advantage

We have assumed that Home's intertemporal production possibilities are biased toward present production. The sources of intertemporal comparative advantage are somewhat different from those that give rise 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 low relative price of future consumption, that is, a high real interest rate. This corresponds to a high return on investment, that is, a high return to diverting resources from current production of consumption goods to production of capital goods, and other activities that enhance the economy's future ability to produce.

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7. External Economies of Scale and the International Location of Production

Trade need not be the result of comparative advantage; it can also result from increasing returns or economies of scale. Economies of scale give countries an incentive to specialize and trade even in the absence of differences in resources or technology between countries. They can be either internal or external, and can lead to a breakdown of perfect competition, unless they take the form of external economies.

External economies give an important role to history and accident in determining the pattern of international trade. When external economies are important, a country starting with a large advantage may retain that advantage even if another country could potentially produce the same goods more cheaply.

There are two reasons why countries specialize and trade: (1) countries differ either in their resources or in their technology and specialize in the things they do relatively well; (2) economies of scale make it advantageous for each country to specialize in the production of only a limited range of goods and services. This chapter will introduce the role of economies of scale.
The analysis of trade based on economies of scale presents certain problems that we have avoided so far. Our analysis has to take into account the effects of imperfect competition such as monopoly or oligopoly. However, economies of scale need not lead to imperfect competition if they take the form of external economies, which apply at the level of the industry rather than at the level of the individual firm.

7.1. Economies of Scale and International Trade: An Overview

Trade can also result from increasing returns or economies of scale. Economies of scale give countries an incentive to specialize and trade even in the absence of differences in resources or technology between countries.

The models of comparative advantage already presented were based on the assumption of constant returns to scale. In practice, however, many industries are characterized by economies of scale, which will more than double the industry's production once inputs are doubled.

Imagine a world consisting of two countries, the United States and Britain, both of which have the same technology for producing widgets. Suppose they both initially produce 10 widgets, which requires 15 hours of labor. Now suppose that we

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concentrate world production of widgets in one country, the U.S., and this will take 30 hours of labor to produce 25 widgets. So, by concentrating production of widgets the world economy can use the same amount of labour to produce 25 percent more widgets.
To find the extra labor to produce the widgets, the United States must decrease or abandon the production of other goods. To take advantage of economies of scale each of the countries must concentrate on producing only a limited number of goods. Consumers in each country will still want to consume a variety of goods, and hence will import these products, leading to international trade.

Our example, then, suggest how mutually beneficial trade can arise as a result of economies of scale. Each country specialized in producing a limited range of products, which enables it to produce these goods more efficiently than if it tried to produce everything for itself; these specialized economies then trade with each other to be able to consume the full range of goods. Unfortunately, trade based on economies of scale is not that simple.

7.2. Economies of Scale and Market Structure

Economies of scale can lead to a breakdown of perfect competition, unless they take the form of external economies.

To analyze the effects of economies of scale on market structure, however, one must be clear about what kind of production increase is necessary to reduce average cost. External economies of scale occur when the cost per unit depends on the size of the industry but not necessarily on the size of any one firm. Internal economies of scale occur when the cost per unit depends on the size of an individual firm but not necessarily on that of the industry.
External and internal economies of scale have different implications for the structure of industries. An industry where economies of scale are purely external will typically consist of many small firms and be perfectly competitive. Internal economies of scale, by contrast, give large firms a cost advantage over small firms and lead to an imperfectly competitive market structure. Both are important causes of international trade.

7.3. The Theory of External Economies

External economies given an important role to history and accident in determining the pattern of international trade. They arise because of specialized suppliers, labor market pooling, and knowledge spillovers.

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For a variety of reasons, it is often the case that concentrating production of an industry in one or a few locations reduces the industry's costs even if the individual firms in the industry remain small. The analysis of external economies of scale goes back more than a century to the British economist Alfred Marshall, who was struck by the phenomenon of industrial districts. There are many modern examples of industries where there seem to be powerful external economies, such as the investment banking industry in New York, or concentrated industries in China.
Marshall argued that there are 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 specialized suppliers; the way that a geographically concentrated industry allows labor market pooling; and the way that a geographically concentrated industry helps foster knowledge spillovers.

7.3.1. Specialized Suppliers

In many industries, the production of goods and services requires the use of specialized equipment or support services; yet an individual company 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 wide range of specialized suppliers. Such dense networks of specialized suppliers, such as the one supporting high-technology firms in Silicon Valley, give some considerable advantages such as cheaper key inputs that are more easily available and firms can concentrate on what they do best.

7.3.2. Labor Market Pooling

A second source of external economies is the way that a cluster of firms can create a pooled market for workers with highly specialized skills. This is to the advantage of both the producers and workers, as the producers are less likely to suffer from labor shortages and the workers are less likely to become unemployed. From the companies' point of view; if firms are located near each other, they 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 will lower the risk of unemployment.

7.3.3. Knowledge Spillovers

Companies can acquire technical know-how via the informal exchange of information and ideas that takes place at a personal level. This seems to take place most effectively when an industry is concentrated in a fairly small area, so that employees of different companies mix socially and talk freely about technical issues.

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7.3.4. External Economies and Market Equilibrium

As we've just seen, a geographically concentrated industry is able to support specialized suppliers, provide a pooled labor market, and facilitate knowledge spillovers in a way that a geographically dispersed industry cannot. But the strength of these economies presumably depends on the industry's size: other things equal, a bigger industry will generate stronger external economies.
In an ordinary picture of market equilibrium, the demand curve is downward sloping, while the supply curve is upward sloping. In the presence of external economies of scale, however, there is a forward-falling supply curve; the larger the industry's output, the lower the price at which firms are willing to sell, because their average cost of production falls as industry output rises.

7.4. External Economies and International Trade

When external economies are important, a country starting with a large advantage may retain the advantage even if another country could potentially produce the same goods more cheaply.

External economies drive a lot of trade both within and between countries. But what are the implications of this kind of trade? We'll first look at the effects of trade on output and prices; then at the determinants of the pattern of trade; and finally at the effects of trade on welfare.

7.4.1. External Economies, Output, and Prices

Imagine that we live in a world in which it is impossible to trade buttons across national borders. Assume, also, that there are just two countries in this world, China and the United States. Finally, assume that production of buttons is subject to external economies of scale, which lead to a forward-falling supply curve. Then, in both China and the United States, equilibrium prices and output would be at the point where the domestic supply curve intersects the domestic demand curve.
What will happen if we open up the potential for trade in buttons? Then the Chinese button industry will expand, while the U.S. button industry will contract, given that prices in China are lowest. After trade, China will supply the world market and the production will be concentrated in China. Because China's supply curve is forward-falling, increased production as a result of trade leads to a button price that is lower than the price before trade. Thus, the effect of trade is that prices are reduced everywhere. The reason for this is that when there are external economies of scale, international trade makes it possible to concentrate world production in a single location, and therefore to reduce costs by reaping the benefits of even stronger external economies.

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7.4.2. External Economies and the Pattern of Trade

What might lead to an initial advantage of lower production costs in the Chinese industry? One possibility is comparative advantage – underlying differences in technology and resources. However, in industries characterized by external economies of scale, comparative advantage usually provides only a partial explanation of the pattern of trade. So what does determine the pattern of specialization and trade in industries with external economies of scale? The answer, often, is historical contingency: something gives a particular location an initial advantage in a particular industry, and this advantage gets 'locked in' by external economies of scale even after the circumstances that created the initial advantage are no longer relevant.
Often sheer accident plays a key role in creating an industrial concentration. One consequence of the role of history in determining industrial location is that industries aren't always located in the 'right' place: once a country has established an advantage in an industry, it may retain that advantage even if some other country could potentially produce the goods more cheaply.

7.4.3. Trade and Welfare with External Economies

In general, we can presume that external economies of scale lead to gains from trade over and above those from comparative advantage. The world is more efficient and thus richer because international trade allows nations to specialize in different industries and thus reap the gains from external economies as well as from comparative advantage.
However, there are a few possible qualifications to this presumption. The importance of established advantage means that there is no guarantee that the right country will produce a good subject to external economies. In fact, it is possible that trade based on external economies may actually leave a country worse off than it would have been in the absence of trade.
It is also worth pointing out that while external economies can sometimes lead to disadvantageous patterns of specialization and trade, it's virtually certain that it is still to the benefit of the world economy to take advantage of the gains from concentrating industries.

7.4.4. Dynamic Increasing Returns

Some of the most important external economies probably arise from the accumulation of knowledge. When an individual firm improves its products or production techniques through experience, other firms are likely to imitate the firm and benefit from its knowledge. This spillover gives rise to a situation in which the production costs of individual firms fall as the industry as a whole accumulates experience.
Notice that external economies arising from the accumulation of knowledge differ

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somewhat from the external economies considered so far, in which industry costs depend on current output. In this alternative situation, industry costs depend on experience, usually measured by the cumulative output of the industry to date. This kind of relationship is often summarized by a learning curve. When costs fall with cumulative production over time rather than with the current rate of production, this is referred to as a case of dynamic increasing returns.

Dynamic scale economies, like external economies at a point in time, potentially justify protectionism. Suppose that a country could have low enough costs to produce a good for export if it had more production experience, but that given the current lack of experience, the good cannot be produced competitively. Such a country might increase its long-term welfare either by encouraging the production of the good by a subsidy or by protecting it from foreign competition until the industry can stand on its own feed. The argument for temporary protection of industries to enable them to gain experience is known as the infant industry argument; this argument has played an important role in debates over the role of trade policy in economic development.

7.5. Interregional Trade and Economic Geography

External economies play an important role in shaping the pattern of international trade, but they are even more decisive in shaping the pattern of interregional trade.

To understand the role of external economies in interregional trade, we first need to discuss the nature of regional economies. In some cases the location of tradable industries is determined by natural resources. However, factors of production such as labor and capital play a less decisive role in interregional trade than in international trade, for the simple reason that such factors are highly mobile within countries. Resources, then, play a secondary role in interregional trade. What large drives specialization and trade, instead is external economies. Clusters promote localized networking.
But if external economies are the main reason for regional specialization and interregional trade, what explains how a particular region develops the external economies that support an industry? In general, accidents of history play a crucial role. A question you might ask is whether the forces driving interregional trade are really all that different from those driving international trade. They are not, especially when one looks at trade between closely integrated national economies. In recent years, there has been a growing movement among economists to model interregional and international trade, as well as such phenomena as the rise of cities, as different aspects of the same phenomenon – economic interaction across space. This is often referred to as economic geography.

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8. Firms in the Global Economy: Export Decisions, Outsourcing, and Multinational Enterprises

Trade need not be the result of comparative advantage. Instead, it can result from increasing returns or economies of scale. Economies of scale give countries an incentive to specialize and trade even in the absence of differences between countries in their resources or technology. They can be internal or external. Economies of scale internal to firms lead to a breakdown of perfect competition; models of imperfect competition must be used instead to analyze the consequences of increasing returns at the level of the firm.

In monopolistic competition, an industry contains a number of firms producing differentiated products. These firms act as individual monopolists, but additional firms enter a profitable industry until monopoly profits are competed away. Equilibrium is affected by the size of the market; a large market will support a large number of firms, each producing at a larger scale and thus a lower average cost, than a small market.

International trade allows for the creation of an integrated market that is large than any one country's market. As a result, it is possible to simultaneously offer consumers a greater variety of products and lower prices. The type of trade generated by this model is intra-industry trade.

When firms differ in terms of their performance, economic integration generates winners and losers. The more productive firms thrive and expand, while the less productive firms contract. The least-productive firms are forced to exit.
In the presence of trade costs, markets are no longer perfectly integrated through trade. Firms can set different prices across markets. These prices reflect trade costs as well as the level of competition perceived by the firm. When there are trade costs, only a subset of more productive firms choose to export.

Dumping occurs when a firm sets a lower price on exports than it charges domestically. A consequence of trade costs is that firms will feel competition more intensely on export markets because the firms have smaller market shares in those export markets. This leads firms to reduce markups for their export sales relative to their domestic sales; this is characterized as dumping. It is viewed an unfair trade practice, but it arises naturally in a model of monopolistic competition and trade costs where firms from both countries behave in the same way.

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Some multinationals replicate their production processes in foreign facilities located near large customer bases. This is categorized as horizontal foreign direct investment. An alternative is to export to a market instead of operating a foreign affiliate in that market. The trade-off between exports and FDI involves a lower per-unit cost for FDI but no additional fixed cost associated with the foreign facility.
Some multinationals break up their production chain and perform some parts of that chain in their foreign facilities. This is categorized as vertical foreign direct investment. One alternative is to outsource those parts of the production chain to an independent foreign firm.
Multinational firms and firms that outsource parts of production to foreign countries take advantage of cost differences across production locations. This is similar to models of comparative advantage where production at the level of the industry is determined by differences in relative costs across countries.

In this chapter, we continue to explore how economies of scale generate incentives for international specialization and trade. We now focus on internal economies of scale – that imply that a firm's average cost of production decreases the more output it produces. Perfect competition that drives the price of a good down to marginal cost would imply losses for those firms because they would not be able to recover the high costs incurred from producing the initial units of output. As a result, perfect competition would force those firms out of the market, and this process would continue until an equilibrium featuring imperfect competition is attained.
Modeling imperfect competition means that we will explicitly consider the behaviour of individual firms. This will allow us to introduce two additional characteristics of firms that are prevalent in the real world: (1) in most sectors, firms produce goods that are differentiated from one another, and (2) performance measures vary widely across firms.

8.1. The Theory of Imperfect Competition

Trade need not be the result of comparative advantage. Instead, it can result from increasing returns or economies of scale. Economies of scale give countries an incentive to specialize and trade even in the absence of differences between countries in their resources or technology. They can be internal or external.

In a perfectly competitive market firms are price takers. That is, they are sellers of products who believe they can sell as much as they like at the current price but cannot influence the price they receive for their product.
When only a few firms produce a good, however, the situation is different. In imperfect competition, then, firms are aware that they can influence the prices of

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their products and that they can sell more only by reducing their price. This situation occurs in one of two ways: when there are only a few major producers of a particular good, or when each firm produces a good that is differentiated from that of rival firms. This type of competition is an inevitable outcome when there are economies of scale at the level of the firm: the number of surviving firms is forced down to a small number and/or firms must develop products that are clearly differentiated from those produced by their rivals. Under these circumstances, each firm views itself as a price setter.

The simplest imperfectly competitive market structure to examine is that of a pure monopoly.

8.1.1. Monopoly: A Brief Review

A monopolistic firm faces a downward-sloping demand curve, indicating that the firm can sell more units of output only if the price of the output falls. As you may recall, a marginal revenue curve corresponds to the demand curve. For a monopolist, the marginal revenue curve, *MR*, always lies below the demand curve.

Marginal Revenue and Price

Marginal revenue is always less than the price – but how much less? This relationship depends on two things: first, it depends on how much output the firm is already selling, second the gap between price and marginal revenue depends on the slope of the demand curve. If the curve is very flat, then the monopolist can sell an additional unit with only a small price cut. On the other hand, if the demand curve is very steep, selling an additional unit will require a large price cut, implying that marginal revenue will be much less than the price.

If we assume that the demand curve the firm faces is a straight line, the dependence of the monopolist's total sales on the price it charges can be represented by an equation of the form

$Q = A - B \times P$,

where Q is the number of units the firm sells, P the price it charges per unit, and A and B are constants. Marginal revenue then is

Marginal revenue = $MR = P - Q/B$.

In other words, the greater is B, the more sales fall for any given increase in price and the closer the marginal revenue is to the price of the good.

Average and Marginal Costs

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A firm's average cost of production, is its total cost divided by its output. The firm's marginal cost is the amount it costs the firm to produce on extra unit.

If we denote *c* as the firm's marginal cost and *F* as the fixed cost, then we can write the firm's total cost (*C*) as

$C = F + c \times Q$,

Where *Q* is once again the firm's output. Given this linear cost function, the firm's average cost is

$AC = C/Q = (F/Q) + c$.

As we have discussed, this average cost is always greater than the marginal cost, and declines with output produced.
The profit-maximizing output of a monopolist is that at which marginal revenue equals marginal cost.

8.1.2. Monopolistic Competition

Monopoly profits rarely go uncontested. A firm making high profit normally attracts competitors. Thus 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.
The general analysis of oligopoly is a complex and controversial subject because in oligopolies, the pricing policies of firms are interdependent. For now we will focus on a special case of oligopoly known as monopolistic competition.

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 product from that of its rivals. This ensures 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. As a result, the monopolistic competition model assumes that even though each firm is in reality facing competition from other firms, each firm behaves as if it were a monopolist.
The first assumption of product differentiation across firms fits very well with the empirical evidence in most industries. The second assumption – that firms ignore the consequence on rival firms of their pricing decisions – is more of an approximation.

Before we can examine trade we need to develop a basic model of monopolistic competition. Let us imagine an industry consisting of a small number of firms. These firms produce differentiated products.

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Assumptions of the Model

A particular equation for the demand facing a firm that has these properties is

$Q = S \times [1/n - b \times (P-P^*)]$,

Where Q is the quantity of output demanded, S is the total output of the industry, n is the number of firms in the industry, b is a constant term representing the responsiveness of a firm's sales to its price, P is the price charged by the firm itself, and P^* is the average price charged by its competitors. A firm charging more than the average of other firms will have a smaller market share, whereas a firm charging less will have a larger share.

It is helpful to assume that total industry output S is unaffected by the average price P^* charged by firms in the industry. This is an unrealistic assumption, but it simplifies the analysis and helps us focus on the competition among firms. In particular, it means that S is a measure of the size of the market and that if all firms charge the same price, each sells S/n units.

Market Equilibrium

When the individual firms are symmetric, the state of the industry can be described without describing any of the features of individual firms: all we really need to know to describe the industry is how many firms there are (n) and what price the typical firm charges (P^*).

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. This relationship is upward sloping: the more firms there are, the lower the output of each firm, and thus the higher each firm's cost per unit of output. (2) We next show the relationship between the number of firms and the price each firm charges, which must equal P^* in equilibrium. This relationship is downward sloping: the more firms there are, the more intense competition is and the lower the prices. (3) Finally, we introduce firm entry and exit decisions based on the profits that each firm earns. In the long run, this process will drive profits to zero, and 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: we now ask how the average cost of a typical firm depends on the number of firms in the industry. The following equation tells us that other things equal, the more firms there are in the industry, the higher is average cost.
    - $AC = F/Q + c = (n \times F/S) + c$
2. The number of firms and the price: the price the typical firm charges also depends on the number of firms in the industry.

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First, in the monopolistic competition model, firms are assumed to take each other's prices as given. Thus, we can rewrite the demand curve in the form:

$Q = [(S/n) + S \times b \times P^*] - S \times b \times P$,

If we plug these values back into the formula for marginal revenue, we have a marginal revenue for a typical firm of

$MR = P - Q/(S \times b)$.

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

$MR = P - Q/(S \times b) = c$, or $P = c + Q/(S \times b)$.

However, if all firms charge the same price, each will sell an amount $Q = S/n$. Thus,

$P = c + 1/(b \times n)$.

This tells us that the more firms there are in an industry, the lower the price each firm will charge. This is because each firm's markup over marginal cost decreases with the number of competing firms.

3. The equilibrium number of firms: the more firms there are, the more competition each firm faces. The upward-sloping curve tells us that the more firms there are in the industry, the higher the average cost of each firm.

8.2. Monopolistic Competition and Trade

In monopolistic competition, an industry contains a number of firms producing differentiated products. These firms act as individual monopolists, but additional firms enter a profitable industry until monopoly profits are competed away. Equilibrium is affected by the size of the market; a large market will support a large number of firms, each producing at a larger scale and thus a lower average cost, than a small market.
International trade allows for the creation of an integrated market that is large than any one country's market. As a result, it is possible to simultaneously offer consumers a greater variety of products and lower prices. The type of trade generated by this model is intra-industry trade.

Underlying the application of the monopolistic competition model to trade is the idea that trade increases market size. In industries where there are economies of scale,

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both the variety of goods that a country can produce and the scale of its production are constrained by the size of the market. By trading with each other, and therefore forming an integrated world market that is bigger than any individual national market, nations are able to loosen these constraints.

8.2.1. The Effects of Increased Market Size

The number of firms in a monopolistically competitive industry and the prices they charge are affected by the size of the market. In larger markets there usually will be both more firms and more sales per firm; consumers will be offered both lower prices and a greater variety of products.

The definition of the *CC* curve is given by the following equation:

$$AC = F/Q + c = n \times F/S + c.$$

We see that an increase in total industry output S will reduce average costs for any given number of firms n. Meanwhile, the *PP* curve, which relates the price charged by firms to the number of firms, does not shift.

8.2.2. Gains from an Integrated Market: A Numerical Example

International trade can create a larger market. Imagine that automobiles are produced by a monopolistically competitive industry. Thus the demand facing any one producer is given by

$$Q = S \times [(1/n) - (1/30{,}000) \times (P-P^*)],$$

Where Q is the number of automobiles sold per firm, S is the total number sold for the industry, n is the number of firms, P is the price that a firm charges, P^* is the average price of other firms, and b=1/30,000. We also assume that the cost function for producing automobiles has a fixed cost F = \$750,000,000 and a marginal cost c = \$5,000 per automobile.
The average cost curve is therefore

$$AC = (750{,}000{,}000/Q) + 5{,}000.$$

Now suppose there are two countries, Home and Foreign. Home has annual sales of 900,000 automobiles, Foreign has annual sales of 1.6 million.
Substituting the actual values of the marginal cost, the demand parameter, and the number of Home firms, we find

$$P = \$10{,}000 = c + 1/(b \times n) = \$5{,}000 + 1/[(1/30{,}000) \times 6.$$

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So, each firm sells 900,000 units/6 firms = 150,000 units/firm. Its average cost is then $10,000. This is the long-run equilibrium in the Home market.

This example highlights two important new features about trade with monopolistic competition relative to the models of trade based on comparative advantage. First, the example shows how product differentiation and internal economies of scale lead to trade between similar countries with no comparative advantage differences between the. This intra-industry trade is a two-way exchange of similar goods. Second, it highlights two new channels for welfare benefits from trade.

8.2.3. The Significance of Intra-Industry Trade

The proportion of intra-industry trade in world trade has steadily grown over the last half-century. Intra-industry trade plays a prominent role in the trade of manufactured goods among advanced industrial nations.

Intra-industry trade is a very important component of trade for the United States in many different industries. Those industries tend to be ones that produce sophisticated manufactured goods, such as chemicals, and specialized machinery. These goods are exported principally by advanced nations and are probably subject to important economies of scale in production.

In 1957 the major countries of Western Europe established a free trade area in manufactured goods called the Common Market. The result was a rapid growth of trade that was dominated by intra-industry trade. Recent studies have also found that the adoption of the euro has led to a substantial increase in the number of different products that are traded within the Eurozone.

8.3. Firm Responses to Trade: Winners, Losers, and Industry Performance

When firms differ in terms of their performance, economic integration generates winners and losers. The more productive firms thrive and expand, while the less productive firms contract. The least-productive firms are forced to exit.

In the real world, performance varies widely across firms, so the effects of increased competition from trade are far from inconsequential. As one would expect, increased competition tends to hurt the worst-performing firms the hardest, because they are the ones who are forced to exit.
Competition changes have a crucial consequence at the level of the industry: when the better performing firms expand and the worse-performing ones contract or exit, then overall industry performance improves.

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8.3.1. Performance Differences Across Producers

We now relax the symmetry assumption that we imposed in our previous development of the monopolistic competition model so that we can examine how competition from increased market size affects firms differently. Suppose now that firms have different cost curves because they produce with different marginal cost levels, c_i.
Then, compared to a firm with a higher marginal cost, a firm with a lower marginal cost will: (1) set a lower price, but at a higher markup over marginal cost; (2) produce more output; and (3) earn higher profits.

We assume that entrants face some randomness about their future production cost. This randomness disappears only after F is paid and sunk. Thus, some firms will regret their entry decision if their overall profit is negative. On the other hand, some firms will discover that their production cost is very low and that they earn high positive overall profit levels.

8.3.2. The Effects of Increased Market Size

What happens when economies integrate into a single larger market? As was the case with symmetric firms, a larger market can support a larger number of firms that can a smaller market. This also implies more competition in the larger market.
First, consider the effects of increased competition on the individual firm-demand curves. With increased competition, a producers can gain more market share from a given price cut.

Increased market size generates both winners and losers among firms in an industry. The low-cost firms thrive and increase their profits and market shares, while the highest-cost firms contract and the highest-cost firms exit. These composition changes imply that overall productivity in the industry is increasing as production is concentrated among the more productive firms.

8.4. Trade Costs and Export Decisions

In the presence of trade costs, markets are no longer perfectly integrated through trade. Firms can set different prices across markets. These prices reflect trade costs as well as the level of competition perceived by the firm. When there are trade costs, only a subset of more productive firms choose to export.

Up to now, we have modelled economic integration as an increase in market size. This implicitly assumes that this integration occurs to such an extent that a single combined market is formed. In reality, integration rarely goes that far.
Trade costs associated with this border crossing are also a salient feature of firm-level

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trade patterns: very few firms in the United States reach Canadian customers.

In our integrated economy without any trade costs, firms were indifferent as to the location of their customers. We now introduce trade costs to explain why firms actually do care about the location of their customers, and why so many firms choose not to reach customers in another country.

To keep things simple, we will consider the response of firms in a world with two identical countries. Let the market size parameter S now reflect the size of each market, so that 2 x S now reflects the size of the world market.
Specifically, assume that a firm must incur an additional cost t for each unit of output that it sells to customers across the border. Due to these costs, firms will set different prices in their export market relative to their domestic market. Thus, the lowest-cost firms with $c_i \leq c^* - t$ export; the higher-cost firms with $c^* - t < c_i \leq c^*$ still produce for their domestic market but do not export; the highest-cost firms with $c_i > c^*$ cannot profitably operate in either market and thus exit.

8.5. Dumping

Dumping occurs when a firm sets a lower price on exports than it charges domestically. It is viewed an unfair trade practice, but it arises naturally in a model of monopolistic competition and trade costs where firms from both countries behave in the same way.

Adding trade costs also added another dimension of realism: because markets are no longer perfectly integrated through costless trade, firms can choose to set different prices in different markets. The trade costs also affect how a firm responds to competition in a market. An exporting firm will respond to the trade cost by lowering its markup for the export market. This is considered dumping and is regarded by most countries as an unfair trade practice. Any firm can appeal to its local authorities and seek punitive damages against the other firm; this usually takes the form of an antidumping duty imposed on the dumping firm.

8.6. Multinationals and Outsourcing

Some multinationals replicate their production processes in foreign facilities located near large customer bases. This is categorized as horizontal foreign direct investment. An alternative is to export to a market instead of operating a foreign affiliate in that market. The trade-off between exports and FDI involves a lower per-unit cost for FDI but no additional fixed cost associated with the foreign facility. Some multinationals break up their production chain and perform some parts of that chain in their foreign facilities. This is categorized as vertical foreign direct investment. One alternative is to outsource those parts of the production chain to an

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independent foreign firm.

When a U.S firm buys more than 10 percent of a foreign firm, or when a U.S. firm builds a new production facility abroad, that investment is considered a U.S. outflow of foreign direct investment. The latter is called greenfield FDI, while the former is called brownfield FDI.

The production activities that the affiliate carries out fall into two main categories: (1) the affiliate replicates the production process elsewhere in the world; and (2) the production chain is broken up, and parts of the production processes are transferred to the affiliate location. Investing in affiliates that do the first type of activities is categorized as horizontal FDI, while investing in affiliates that do the second type of activities is called vertical FDI.
Vertical FDI is mainly driven by production cost differences between countries. In contrast, horizontal FDI is dominated by flows between developed countries; that is, both the multinational parent and the affiliates are located in developed countries. The main reason for this type of FDI is to locate production near a firm's large customer bases.

8.6.1. The Firm's Decision Regarding Foreign Direct Investment

One main drive is high trade costs associated with exporting, which leads to an incentive to locate production near customers. On the other hand, there are also increasing returns to scale in production. As a result, it is not cost effective to replicate the production process too many times and operate facilities that produce too little output to take advantage of those increasing returns. This is called the proximity-concentration trade-off for FDI.

Empirical evidence strongly confirms this trade-off, and also shows that there is an even stronger sorting pattern for FDI at the firm level within industries.

The Horizontal FDI Decision
If a firm wants to reach customers in another country, it has only one possibility: export, and incur the trade cost t per unit exported. A firm could avoid this cost by building a production facility in the foreign country. The firm's export versus FDI choice will then involve a trade-off between the per-unit export cost and the fixed cost of setting up an additional production facility. Higher trade costs on one hand, and lower fixed production costs on the other hand, both lower the FDI cutoff. A firm with low enough cost will want to sell more units to foreign customers, and will build an affiliate.

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The Vertical FDI Decision
A firm's decision to break up its production chain and move parts of that chain to a foreign affiliate will also involve a trade-off between per-unit and fixed costs. The key cost saving is not related to the shipment of good across borders; rather, it involves production cost differences for the parts of the production chain that are being moved.

8.6.2. Outsourcing

We discussed the location motive for production facilities that leads to multinational formation. However, we will now discuss the internalization motive; why the parent firm chooses to own the affiliate in that location and operate as a single multinational firm.

As a substitute for horizontal FDI, a parent could license an independent firm to produce and sell its products in a foreign location; as a substitute for vertical FDI, a parent could contract with an independent firm to perform specific parts of the production process in the foreign location with the best cost advantage (foreign outsourcing).
Offshoring represents the relocation of parts of the production chain abroad and groups together both foreign outsourcing and vertical FDI.

Control over a firm's proprietary technology offers one clear advantage for internalization. Licensing another firm to perform the entire production process in another location often involves a substantial risk of losing some proprietary knowledge. Horizontal FDI is widely favored over the alternative of technology licensing to replicate the production process.
On the other hand, there are many reasons why an independent firm could produce some parts of the production process at lower cost than the parent firm.

8.6.3. Consequences of Multinationals and Foreign Outsourcing

Relocating production to take advantage of cost differences leads to overall gains from trade, but it is also likely to induce some income distribution effects that leave some people worse off. Yet some of the most visible effects of multinationals and outsourcing occur in the short run, as some firms expand employment while others reduce employment in response to increased globalization. Policies that impede firms' abilities to relocate production and take advantage of these cost differences may prevent these short-run costs for some, but they also forestall the accumulation of long-run economy-wide gains.

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9. The Instruments of Trade Policy

For analysis of trade policy it is usually sufficient to use a partial equilibrium approach.

A tariff drives a wedge between foreign and domestic prices, raising the domestic price but by less than the tariff rate. An important and relevant 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 is fully reflected in domestic prices. The costs and benefits of a tariff or other trade policy may be measured using the concepts of consumer surplus and producer surplus. Using these concepts, we can show that the domestic producers of a good gain because a tariff raises the price they receive; the domestic consumer lose. 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: an efficiency loss and a terms of trade gain.

The analysis of a tariff can be readily adapted to analyze other trade policy measures, such as export subsidies, import quotas, and voluntary export restraints. An export subsidy causes efficiency losses similar to those of a tariff but compounds these losses by causing a worsening of the terms of trade. Import quotas and voluntary export restraints differ from tariffs in that the government gets no revenue.

This chapter will cover the question: 'What should a nation's trade policy be?' For example, who will benefit and who will lose from an import quota? And will the benefits outweigh the costs? We will examine the policies that governments adopt toward international trade, policies that involve a number of different actions such as taxes or subsidies.

9.1. Basic Tariff Analysis

A tariff raises domestic prices, but by less than the tariff rate. In the small country case, that cannot have any substantial influence on foreign prices, a tariff is fully reflected in domestic prices.

A tariff, the simplest of trade policies, is a tax levied when a good is imported. Specific tariffs are levied as a fixed charge for each unit of goods imported. Ad valorem tariffs are taxes that are levied as a fraction of the value of the imported goods. In either case, the effect of the tariff is to raise the cost of shipping goods to a country.
Their true purpose has usually been twofold: both to provide revenue and to protect particular domestic sectors. 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 and export restraints.

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In Chapters 3 through 8, we adopted a general equilibrium perspective. However, in many cases, trade policies toward one sector can be reasonably well understood without going into detail about those policies' repercussions on the rest of the economy. For the most part, then, trade policy can be examined in a partial equilibrium framework.

9.1.1. Supply, Demand, and Trade in a Single Industry

We will get back to our two countries, Home and Foreign, both of which consume and produce wheat, which can be costlessly transported between the countries. Normally, Home supply and demand will depend on the price in terms of Home currency, and Foreign supply and demand will depend on the price in terms of Foreign currency. As we assume that the exchange rate is not affected by trade policies, we quote prices in terms of Home currency.
Trade will arise in such a market if prices are different in the absence of trade. Suppose that the price of wheat is higher in Home than it is in Foreign. Once we allow for trade, shippers begin to move wheat from Foreign to Home.
To determine the world price and the quantity traded, we should 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.

9.1.2. Effects of a Tariff

In the absence of a tariff, the price of wheat would be equalized in both Home and Foreign. With the tariff in place, however, shippers are not willing to move wheat from Foreign to Home unless the Home price exceeds the Foreign price by at least t. Thus the price in Home will rise and that in Foreign will fall until the price difference is t.
Introducing a tariff, then, drives a wedge between the prices in the two markets. The tariff raises the price in Home and lowers the price in Foreign. In Home, producers supply more, while consumers demand less, so that fewer imports are demanded. In Foreign, the lower price leads to reduced supply and increased demand, and thus a smaller export supply.

The increase in the price in Home 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. The size of this effect on the exporters' price, however, is often very small in practice. When a small country imposes a tariff, its share of the world market for the goods it imports is usually minor to begin with, so that its import reduction has very little effect on the world price.

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9.1.3. Measuring the Amount of Protection

A tariff on an imported good raises the price received by domestic producers of that good. This effect is often the tariff's principal objective – to protect domestic producers from the low prices that would result from import competition.
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 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 equivalent.
However, there are two problems with trying to calculate the rate of protection this simply: (1) 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, and (2) tariffs may have very different effects on different stages of production of a good.

Suppose that an automobile sells on the world market for $8,000 and that the parts sell for $6,000. One country wants to develop an auto assembly industry and one already has an assembly industry and wants to develop a parts industry. To encourage a domestic industry, the first country places a 25 percent tariff on imported autos, allowing domestic assemblers to charge $10,000. Before the tariff, domestic assembly would take place only if it could be done for $2,000 (8000-6000), but now it will take place even if it costs as much as $4,000. That is, the 25 percent tariff rate provides assemblers with an effective rate of protection of 100 percent.

Thus, trade policies aimed at promoting economic development often lead to rates of effective protection much higher than the tariff rates themselves.

9.2. Costs and Benefits of a Tariff

The costs and benefits of a tariff are measured using the concepts of consumer surplus and producer surplus. We can show that the domestic producers gain because a tariff raises the price they receive, while the domestic consumers lose. Governments gain too.
The net effect on national welfare can be separated into two parts: an efficiency loss and a terms of trade gain.

A tariff raises the price of a good in the importing country and lowers it in the exporting country. As a result, consumers lose in the importing country and gain in the exporting country. On the other hand, producers gain in the importing country and lose in the exporting country. To compare these costs and benefits, it is necessary to quantify them.

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9.2.1. Consumer and Producer Surplus

Consumer surplus measures the amount a consumer gains from a purchase by computing the difference between the price he actually pays and the price he would have been willing to pay. It can be derived from the market demand curve.
If P is the price of a good and Q the quantity demanded at that price, then consumer surplus is calculated by subtracting P times Q from the area under the demand curve up to Q.
Producer surplus is a similar concept. A producer willing to sell a good for $2 but receiving a price of $5 gains a producer surplus of $3. Again, if P is the price of a good and Q the quantity demanded at that price, then producer surplus is P times Q minus the area under the demand curve up to Q.

Important is the question of whether the direct gains to producers and consumers in a given market accurately measure the social gains. Additional benefits and costs not captured by consumer and producer surplus are at the core of the case for trade policy activism discussed in Chapter 10.

9.2.2. Measuring the Costs and Benefits

Figure 9-9 illustrates the costs and benefits of a tariff for the importing country. The tariff raises the domestic price from P_W to P_T but lowers the foreign export price from P_W to P^*_T.
Domestic production rises from S^1 to S^2 while domestic consumption falls from D^1 to D^2. The costs and benefits to different groups can be expressed as sums of the areas of five regions, labelled *a*, *b*, *c*, *d*, *e*.
Consider first the gain to domestic producers. They receive a higher price and therefore have higher producer surplus. Domestic consumers also face a higher price, which makes them worse off (indicated by a fall of areas *a + b + c + d)*.
There is a third player here as well: the government. The government gains by collecting tariff revenue, equal to the tariff rate t times the volume of imports $Q_T = D^2 - S^2$. This is equal to the sum of the two areas *c* and *e*.

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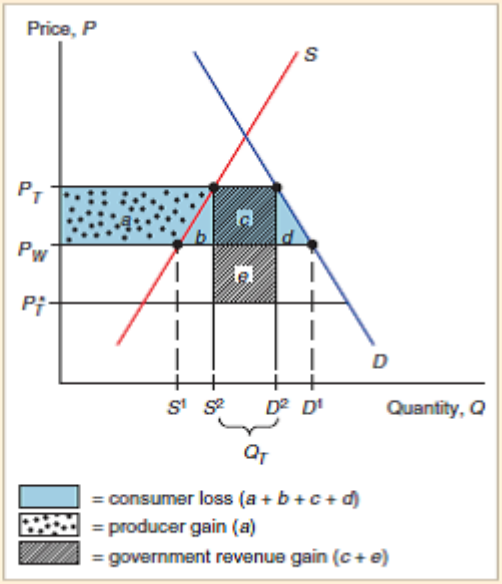
Figure 9-9

Costs and Benefits of a Tariff for the Importing Country

The costs and benefits to different groups can be represented as sums of the five areas *a*, *b*, *c*, *d*, and *e*.



Since these 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 benefit to each group. It is common for analysts of trade policy to attempt to compute the net effect of a tariff on national welfare by assuming that at the margin, a dollar's worth of gain or loss to each group is of the same social worth. The net cost of a tariff is

Consumer loss – producer gain – government revenue,

Or by replacing these concepts by the areas in Figure 9-9,

$(a + b + c + d) - a - (c + e) = b + d - e.$

That is, there are two 'triangles' whose area measures loss to the nation as a whole and a 'rectangle' whose are measures an offsetting gain. A useful way to interpret these gains and losses is the following: the triangles represent the efficiency loss that arises because a tariff distorts incentives to consume and produce, while the rectangle represents the terms of trade gain that arise because a tariff lowers foreign export prices.

The gain depends on the ability of the tariff-imposing country to drive down foreign export prices. A tariff distorts the incentives of both producers and consumers by inducing them to act as if imports were more expensive than they actually are. Thus the economy produces at home additional units of the good that it could purchase more cheaply abroad.

The net welfare effects of a tariff include the production distortion loss resulting from the fact that the tariff leads domestic producers to produce too much of this good, and the consumption distortion loss resulting from the fact that a tariff leads consumers to consume too little of the good. In the important case of a small country

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that cannot significantly affect foreign prices, the costs of a tariff unambiguously exceed its benefits.

9.3. Other Instruments of Trade Policy

An export subsidy causes efficiency losses similar to those of a tariff but compounds these losses by worsening the terms of trade. Import quotas and voluntary export restraints differ from tariffs in that the government gets no revenue.

In the modern world, most government intervention in international trade takes other forms, such as export subsidies, import quotas, voluntary export restraints, and local content requirements.

9.3.1. Export Subsidies: Theory

An export subsidy is a payment to a firm or individual that ships a good abroad. Like a tariff, it can be either specific or ad valorem. When the government offers an export subsidy, shippers will export the good up to the point at which 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. The price in the exporting country rises, while the price in the importing country falls. In the exporting country, consumers are hurt, producers gain, and the government loses because it must expend money on the subsidy.

9.3.2. Import Quotas: Theory

An import quota is a direct restriction on the quantity of some good that may be imported. This is usually enforced by issuing licences to some group of individuals or firms.
It is imported to avoid having the misconception that import quotas somehow limit imports without raising domestic prices. The truth is that an import quota always raises the domestic price of the imported good. When imports are limited, the immediate result is that at the initial price, the demand for the good exceeds domestic supply plus imports.
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 with a tariff as government revenue is collected by whoever receives the import licences. License holders are thus able to buy imports and resell them at a higher price in the domestic market. These profits are known as quota rents.

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9.3.3. Voluntary Export Restraints

A variant on the import quota is the voluntary export restraint (VER), also known as a voluntary restraint agreement. VERs are generally imposed at the request of the importer and are agreed to by the exporter to forestall other trade restrictions. From an economic point of view, a voluntary export restraint is exactly like an import quota where the licenses are assigned to foreign governments and is therefore very costly to the importing country.
A VER is always more costly to the importing country than a tariff that limits imports by the same amount. The difference is that what would have been revenue under a tariff becomes rents earned by foreigners under the VER.
A study of the effects of some VERs has shown that the bulk of cost represents a transfer of income rather than a loss of efficiency.

9.3.4. Local Content Requirements

A local content requirement is a regulation that requires some specified fraction of a final good to be produced domestically. In some cases this will be specified in physical units, in other cases it will be stated in value terms.
From the point of view of the domestic producers of parts, a local content regulation provides protection in the same way an import quota does. From the point of view of the firms that must buy locally, however, the effects are somewhat different. Local content does not place a strict limit on imports. Instead, it allows firms to import more, provided that they also buy more domestically.
The important point is that a local content requirement does not produce either government revenue or quota rents, but the difference between the prices of imports and domestic goods get averaged in the price and is passed on to consumers.

9.3.5. Other Trade Policy Instruments

Some other ways in which governments influence trade:

1. Export credit subsidies.
2. National procurement: a classic example is the European telecommunications industry, where the main purchases are phone companies owned by governments.
3. Red-tape barriers: an informal import restriction by twisting normal health, safety, and customs procedures in order to place substantial obstacles in the way of trade.

9.4. The Effects of Trade Policy: A Summary

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The effects of the major instruments of trade policy are summarized by Table 9-1. All four trade policies benefit producers and hurt consumers. Two of the policies definitely hurt the nation as a whole, while tariffs and import quotas are potentially beneficial only for large countries that can drive down world prices.

TABLE 9-1 Effects of Alternative Trade Policies

	Tariff	Export Subsidy	Import Quota	Voluntary Export Restraint
Producer surplus	Increases	Increases	Increases	Increases
Consumer surplus	Falls	Falls	Falls	Falls
Government revenue	Increases	Falls (government spending rises)	No change (rents to license holders)	No change (rents to foreigners)
Overall national welfare	Ambiguous (falls for small country)	Falls	Ambiguous (falls for small country)	Falls

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10. The Political Economy of Trade Policy

Although few countries practice free trade, most economists continue to hold up free trade as a desirable policy. This rests on three lines of argument: (1) a case for the efficiency gains from free trade that is simply the cost-benefit analysis of trade policy read in reverse, (2) many economists believe that free trade produces additional gains that go beyond this analysis, and (3) by others it is seen as a useful rule of thumb.

There is an intellectually respectable case for deviating from free trade. One argument that is clearly valid in principle is that countries can improve their terms of trade through optimal tariffs and export taxes. As small countries cannot have much influence on their import or export prices, they cannot use tariffs or other policies to raise their terms of trade, which makes this argument not too important.
The other argument for deviating from free trade rests on domestic market failures. If some domestic market, such as the labor market, fails to function properly, deviating from free trade can sometimes help reduce the consequences of this malfunctioning. The theory of the second best states that if one market fails to work properly, it is no longer optimal for the government to abstain from intervention in other markets.
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. Furthermore, market failure is difficult to analyze well enough to be sure of the appropriate policy recommendation.

In practice, trade policy is dominated by considerations of income distribution. No single way of modelling the politics of trade policy exits, but several useful ideas have been proposed. Political scientists often argue that policies are determined by competition among political parties that try to attract as many votes as possible. In the simplest case, this leads to the adoption of policies that serve the interest of the median voter. Economists and political scientists 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, those groups that are well organized are often able to get policies that serve their interests at the expense of the majority.

If trade policy were made on a purely domestic basis, progress toward freer trade would be very difficult to achieve. In fact, however, industrial countries have achieved substantial reductions in tariffs through a process of international negotiation. International negotiation helps the cause of tariff reduction in two ways: it helps broaden the constituency for freer trade by giving exporters a direct stake,

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and it helps governments avoid the mutually disadvantageous trade wars that internationally uncoordinated policies could bring.

Although some progress was made in the 1930s toward trade liberalization via bilateral agreements, since World War II international coordination has taken place primarily via multilateral agreements under the auspices of the GATT, which compromises both a bureaucracy and a set of rules of conduct. The most recent worldwide GATT agreement also set up a new organization, the WTO, to monitor and enforce the agreement.
In addition to the overall reductions in tariffs that have taken place through multilateral negotiation, 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: customers unions and free trade areas. Either kind of agreement has ambiguous effects on economic welfare.

In this chapter we will examine some of the reasons governments either should not or, at any rate, do not base their trade policy on economists' cost-benefit calculations. The first step toward understanding actual trade policies is to ask what reasons there are for governments not to interfere with trade.

10.1. The Case for Free Trade

Although few countries practice free trade, most economists continue to hold up free trade as a desirable policy. This rests on three lines of argument: (1) a case for the efficiency gains from free trade that is simply the cost-benefit analysis of trade policy read in reverse, (2) many economists believe that free trade produces additional gains that go beyond this analysis, and (3) by others it is seen as a useful rule of thumb.

Since the time of Adam Smith, economists have advocated free trade as an ideal toward which trade policy should strive. The reasons 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.

10.1.1. Free Trade and Efficiency

The efficiency case for free trade is simply the reverse of the cost-benefit analysis of a tariff.
A tariff causes a net loss to the economy by distorting the economic incentives of both producers and consumers. Conversely, a move to free trade eliminates these

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distortions and increases national welfare.
In the modern world tariff rates are generally low and import quotas relatively rare. As a result, estimates of the total costs of distortions due to tariffs and import quotas tend to be modest in size. Recently, the gains from a move to worldwide free trade are measured as a percentage of free trade.

10.1.2. Additional Gains from Free Trade

There is a widespread belief among economists that such calculations, even though they report substantial gains from free trade in some cases, do not represent the whole story.
One kind of additional gain involves economies of scale. Protected markets limit gains from external economies of scale by inhibiting the concentration of industries; when the economies of scale are internal, they not only fragment production internationally, but by reducing competition and raising profits, they also lead too many firms to enter the protected industry.

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 more opportunities for learning and innovation that are provided by a system of managed trade.
A related form of gains from free trade involves the tendency for more productive firms to engage in exports, while less productive firms stay with the domestic market.

These additional arguments for free trade are difficult to quantify, although some economists have tried to do so.

10.1.3. Rent-Seeking

When imports are restricted with a quota rather than a tariff, the cost is sometimes magnified by a process known as rent-seeking.
A famous example involved India in the 1950s and 1960s. At that time, Indian companies were allocated the right to buy imported inputs in proportion to their installed capacity, which created an incentive to overinvest.

10.1.4. 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 in practice are dominated by special-interest politics rather than by consideration of national costs and benefits.

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Economists can sometimes show that in theory, a selective set of tariffs and export subsidies could increase national welfare, but that in reality, any government agency attempting to pursue a sophisticated program of intervention in trade would probably be captured by interest groups and converted into a device for redistributing income to politically influential sectors.

The three arguments outlined in the previous section probably represent the standard view of most international economists:

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 subverted by the political process.

Nonetheless, there are intellectually respectable arguments for deviating from free trade, and these deserve a fair hearing.

10.2. National Welfare Arguments Against Free Trade

There is an intellectually respectable case for deviating from free trade. One argument that is clearly valid in principle is that countries can improve their terms of trade through optimal tariffs and export taxes. The other argument for deviating from free trade rests on domestic market failures. If some domestic market, such as the labor market, fails to function properly, deviating from free trade can sometimes help reduce the consequences of this malfunctioning. The theory of the second best states that if one market fails to work properly, it is no longer optimal for the government to abstain from intervention in other markets.
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. Furthermore, market failure is difficult to analyze well enough to be sure of the appropriate policy recommendation.

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10.2.1. The Terms of Trade Argument for a Tariff

One argument for deviating from free trade comes directly out of cost-benefit analysis: for a large country that is able to affect the prices of foreign exporters, a tariff lowers the price of imports and thus generates a terms of trade benefit.

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The tariff rate that maximizes national welfare is the optimum tariff. It is always positive but less than the prohibitive rate that would eliminate all imports.

What policy would the terms of trade argument dictate for export sectors? Since an export subsidy worsens the terms of trade, and therefore unambiguously reduces national welfare, the optimal policy in export sectors must be a negative subsidy, that is, a tax on exports that raises the price of exports to foreigners. Like the optimum tariff, the optimum export tax is always positive but less than the prohibitive tax that would eliminate exports completely.

The terms of trade argument against free trade has some important limitations, however. Most small countries have very little ability to affect the world prices of either their imports or their exports, and thus the terms of trade argument is of little practical importance to them. It is intellectually impeccable but of doubtful usefulness.

10.2.2. The Domestic Market Failure Argument Against Free Trade

Many economists have made a case against free trade based on the counterargument that these concepts, producer surplus in particular, do not properly measure costs and benefits. Why might this be the case? We consider a variety of reasons: these include the possibility that the labor used in a sector would otherwise be unemployed or underemployed, and the existence of defects in the capital or labor markets that prevent resources from being transferred as rapidly as they should to the sectors that yield high returns. These can all be classified under the general heading of domestic market failures.

Suppose, for example, that the production of some goods yields experience that will improve the technology of the economy as a whole but that firms in the sector cannot appropriate this benefit and therefore do not take it into account in deciding how much to produce. Then there is a marginal social benefit to additional production that is not captured by the producer surplus measure. This marginal social benefit can serve as a justification for tariffs or other trade policies.

The domestic market failure argument against free trade is a particular case of a more general concept known in economics as the theory of the second best. This theory states that a hands-off policy is desirable in any one market only if all other markets are working properly. If they are not, a government intervention that appears to distort incentives in one market may actually increase welfare by offsetting the consequences of market failures elsewhere.
When economists apply this theory, they argue that imperfections in the internal functioning of an economy may justify interfering in its external economic relations.

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10.2.3. How Convincing Is the Market Failure Argument?

When they were first proposed, market failure arguments for protection seemed to undermine much of the case for free trade. After all, who would want to argue that the real economies we live in are free from market failures?

There are two lines of defense for free trade: the first argues that domestic market failures should be corrected by domestic policies aimed directly at the problems' sources; the second argues that economist cannot diagnose market failure well enough to prescribe policy.

The point that domestic market failure calls for domestic policy changes, not international trade policies, can be made by cost-benefit analysis modified to account for any unmeasured marginal social benefits. This illustrates a general principle when dealing with market failures: it is always preferable to deal with market failures as directly as possible, because indirect policy responses lead to unintended distortions of incentives elsewhere in the economy. This has important implications for trade policy makers: any proposed trade policy should always be compared with a purely domestic policy aimed at correcting the same problem. Critics of the domestic market failure justification for protection argue that most deviations from free trade are adopted not because their benefits exceed their costs but because the public fails to understand their true costs.

The second defense of free trade is that because market failures are typically hard to identify precisely, it is difficult to be sure what the appropriate policy response should be. The difficulty of ascertaining the correct second-best trade policy to follow reinforces the political argument for free trade mentioned earlier.

10.3. Income Distribution and Trade Policy

In practice, trade policy is dominated by considerations of income distribution. Political scientists often argue that policies are determined by competition among political parties that try to attract as many votes as possible. Economists and political scientists 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, those groups that are well organized are often able to get policies that serve their interests at the expense of the majority.

Most tariffs, import quotas, and other trade policy measures are undertaken primarily to protect the income of particular interest groups. Politicians often claim, however, that the policies are being undertaken in the interest of the nation as a whole. Although economists often argue that deviations from free trade reduce national

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welfare, there are, in fact some theoretical grounds for believing that activist trade policies can sometimes increase the welfare of the nation as a whole.

10.3.1. Electoral Competition

Suppose there are two competing parties, each of which is willing to promise whatever will enable it to win the next election. Suppose that policy can be described along a single dimension, say, the level of the tariff rate. And finally suppose that voters differ in the policies they prefer. Voters with high skill levels will favour low tariff rates, while low skill voters will be better off with a high tariff. We can therefore think of lining up all the voters in the order of the tariff rate they prefer.
The policy that the two parties promise to follow will tend to converge on the tariff rate preferred by the median voter.

One area in which the median voter model does not seem to work very well, however, is trade policy! According to this model, a policy should be chosen on the basis of how many voters it pleases: a policy that inflicts large losses on few people but benefits a large number of people should be a political winner; a policy that inflicts widespread losses but helps a small group should be a loser. In fact, protectionist policies are more likely to fit the latter than the former description.

10.3.2. Collective Action

Economist Mancur Olson pointed out that political activity on behalf of a group is a public good; that is, the benefits of such activity accrue to all members of the group, not just the individual who performs the activity. This public goods character of politics means that the policies that impose large losses in total, but small losses on any individual, may not face any effective opposition. In Olson's phrase, there is a problem of collective action: while it is in the interests of the group as a whole to press for favourable policies, it is not in any individual's interest to do so. The problem of collective action can best be overcome when a group is small and/or well organized.

10.3.3. Modeling the Political Process

A growing body of analysis tries to fill the gap on the ways in which organized interest groups actually go about influencing policy, with simplified models of the political process.
Recent models of the political economy of trade policy envision a sort of auction in which interest groups buy policies by offering contributions contingent on the policies followed by the government. Politicians will not ignore overall welfare, but they will

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be willing to trade off some reduction in the welfare of voters in return for a larger campaign fund. As a result, well-organized groups will be able to get policies that favour their interests at the expense of the public as a whole.

10.3.4. Who Gets Protected?

Many developing countries traditionally have protected a wide range of manufacturing, in a policy known as import-substituting industrialization. The range of protectionism in advanced countries is much narrower; much protectionism is concentrated in just two sectors, agriculture and clothing.

Agriculture
Farmers are usually a well-organized and politically powerful group that has been able in many cases to achieve very high rates of effective protection.

Clothing
The clothing industry consists of two parts: textiles (spinning and weaving of cloth) and apparel (assembly of cloth into clothing). Both, but especially the apparel industry, historically have been protected heavily through both tariffs and import quotas. Apparel production has two key features: it is labor0intensive and the technology is relatively simple.

10.4. International Negotiations and Trade Policy

If trade policy were made on a purely domestic basis, progress toward freer trade would be very difficult to achieve. In fact, however, industrial countries have achieved substantial reductions in tariffs through a process of international negotiation. It helps the cause of tariff reduction in two ways: it helps broaden the constituency for freer trade by giving exporters a direct stake, and it helps governments avoid the mutually disadvantageous trade wars that internationally uncoordinated policies could bring.
Since World War II international coordination has taken place primarily via multilateral agreements under the auspices of the GATT, which compromises both a bureaucracy and a set of rules of conduct. The most recent worldwide GATT agreement also set up a new organization, the WTO, to monitor and enforce the agreement.

We have argued that it is difficult to devise trade policies that raise national welfare and that trade policy is often dominated by interest group politics. Yet, in fact, from the mid-1930s until about 1980, the United States and other advanced countries gradually removed tariffs and some other barriers to trade, and by doing so aided a

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rapid increase in international integration. This was achieved through international negotiation; governments agreed to engage in mutual tariff reduction. These agreements linked reduced protection for each country's import-competing industries to reduced protection by other countries against that country's export industries.

10.4.1. The Advantages of Negotiation

There are at least two reasons why it is easier to lower tariffs as part of a mutual agreement than to do so as a unilateral policy: (1) a mutual agreement helps mobilize support for free trade, and (2) negotiated agreements on trade can help governments avoid getting caught in destructive trade wars.

How a trade war would arise can be illustrated by a situation that is known as a Prisoner's dilemma. Each government, making the best decision for itself, will choose to protect. These choices lead to the lowest outcome. Yet both governments are better off if neither protects.

10.4.2. International Trade Agreements: A Brief History

Bilateral negotiations do not take full advantage of international coordination. For one thing, benefits from a bilateral negotiation may spill over to parties that have not made any concessions.

Multilateral negotiations began soon after the end of World War II. Originally, diplomats from the victorious Allies imagined that such negotiations would take place under the auspices of a proposed body called the International Trade Organization, paralleling the International Monetary Fund and the World Bank. In 1947, unwilling to wait until the ITO was in place, a group of 23 countries began trade negotiations under a provisional set of rules that become known as the General Agreement on Tariffs and Trade.

In 1995, the World Trade Organization was established, finally creating the formal organization envisaged 50 years earlier. However, the GATT rules remain in force, and the basic logic of the system remains the same.
The principal ratchet 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. In addition, the GATT-WTO system generally tries to prevent nontariff interventions in trade.

The lever used to make forward progress is the somewhat stylized process known as trade round, in which a large group of countries get together to negotiate a set of tariff reductions and other measures to liberalize trade.

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10.4.3. The Uruguay Round

Major international trade negotiations invariably open with a ceremony in one exotic local and conclude with a ceremonial signing in another. The eight round of global trade negotiations began in 1986 in Uruguay. The round had been scheduled for completion by 1990 but ran into serious political difficulties. In late 1993, the negotiators finally produced a basic document consisting of 400 pages of agreements, that was signed in Morocco in April 1994. As the length of the document suggest, the end results are not easy to summarize. The most important results may be grouped under two headings, trade liberalization and administrative reforms.

10.4.4. Trade Liberalization

The Uruguay Round cut tariff rates around the world. The numbers can sound impressive, but tariff rates were already quite low. More important than this overall tariff reduction were the moves to liberalize trade in two important sectors, agriculture and clothing.
World trade in agricultural products has been highly distorted. Japan is notorious for import restrictions, while Europe is known for its massive export subsidies. The agreement required agricultural exporters to reduce the value of subsidies.

World trade in textiles and clothing was also highly distorted by the arrangement. World trade in clothing has been largely liberalized.
A final important trade action under the Uruguay Round was a set of rules concerning government procurement, purchases made by government agencies.

10.4.5. Administrative Reforms: From the GATT to the WTO

Much of the publicity that surrounded the Uruguay Round, and much of the controversy swirling around the world trading system since then, has focused on the round's creation of the WTO.

How different is the WTO from the GATT? From a legal point of view, the GATT was a provisional agreement, whereas the WTO is a full-fledged international organization. The GATT applied only to trade in goods; world trade in services was not subject to any agreed-upon set of rules. As a result, many countries applied regulations that openly discriminated against foreign supplies. So the WTO includes rules on trade in services.

In addition to a broad shift from producing goods to producing services, advanced countries have also experienced a shift from depending on physical capital to depending on intellectual property. The WTO tries to take on this issue with its Agreement on Trade-Related Aspects of Intellectual Property.

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The most important new aspect of the WTO, is generally acknowledge to be its dispute settlement procedure. The WTO contains a formal and effective procedure. Panels of experts are selected to hear cases, usually reaching a final conclusion in less than a year.

10.4.6. Benefits and Costs

The economic impact of the Uruguay Round is difficult to estimate. The most widely cited estimates are those of the GATT itself and of the Organization for Economic Cooperation and Development. Both suggest a gain to the world economy as a whole of more than $200 billion annually.
In any case, it is clear that the usual logic of trade liberalization applies: the cost of the Uruguay Round were felt by concentrated, often well-organized groups, while the benefit accrued to broad, diffuse populations. Given these strong distributional impacts of the Uruguay Round, it is actually remarkable that an agreement was reached at all. An important factor in the final success of the round was fear of what would happen if it failed. They feared that a failed round would not merely mean lack of progress but substantial backsliding on the progress made toward free trade over the previous four decades.

10.5. The Doha Disappointment

In addition to the overall reductions in tariffs that have taken place through multilateral negotiation, 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: customers unions and free trade areas. Either kind of agreement has ambiguous effects on economic welfare.

The ninth major round of world trade negotiations began in 2001 with a ceremony in the city of Doha. Like previous rounds, this one was marked by difficult negotiation. But as of the summer of 2010, it appeared that something new had happened: for the first time since the creation of the GATT, a round of trade negotiations appeared to have broken down with no agreement in sight.
It is important to understand that the apparent failure of the Doha Round does not undo the progress achieved in previous trade negotiations. In fact, Doha's apparent failure owes a lot to the success of previous trade negotiations. Because these had been so successful at reducing trade barriers, the remaining barriers to trade are fairly low, so that potential gains are modest.

There was a more or less desperate attempt to revive the Doha Round in 2007 because of the U.S. political calendar. A meeting was held between the four key

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players, but the result was an impasse. There was one more attempt to revive the round in 2008, but talks collapsed over disagreements on agricultural trade among the United States, India, and China.

10.5.1. Preferential Trading Agreements

The international trade agreements that we have described so far all involved a nondiscriminatory reduction in tariff rates. The United States grants many countries a status known formally as that of 'most favoured nation', a guarantee that their exporters will pay tariffs no higher than that of the nation that pays the lowest. There are some important cases, however, in which nations establish preferential trading agreements under which the tariffs they apply to each other's products are lower than the rates on the same goods coming from other countries. The GATT in general prohibits such agreements but makes a rather strange exception: it is against the rules for country A to have lower tariffs on imports from country B than on those from country C, but it is acceptable if countries B and C agree to have zero tariffs on each other's products.

In general, two or more countries agreeing to establish free trade can do so in one of two ways. They can establish a free trade area in which each country's goods can be shipped to the other without tariffs, but in which the countries set tariffs against the outside world independently. Or they can establish a customs union in which the countries must agree on tariff rates. If one country gains from the formation of a customs union through new trade, we call it trade creation. When a country loses if the trade within the customs union simply replaces trade with countries outside the union, it is trade diversion.

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11. Trade Policy in Developing Countries

The standard trade model derives a world relative supply curve from production possibilities and a world relative demand curve from preferences. The price of exports relative to imports, a country's terms of trade, is determined by the intersection of the world relative supply and demand curves. Other things equal, a rise in a country's terms of trade increases its welfare.

Economic growth means an outward shift in a country's production possibility frontier. Such growth is usually biased; the immediate effect of biased growth is to lead, other things equal, to an increase in the world relative supply of the goods toward which the growth is biased. This shift in the world relative supply curve in turn leads to a change in the growing country's terms of trade, which can go either direction.
The direction of the terms of trade effects depends on the nature of the growth. Growth that is export-biased worsens the terms of trade, while growth that is import-biased improves a country's terms of trade.

Import tariffs and export subsidies affect both relative supply and relative demand. A tariff raises relative supply of a country's import good while lowering relative demand. An export subsidy has the reverse effect; it hurts the terms of trade and reduces relative demand for the country's export good. This suggest that export subsidies do not make sense from a national point of view and that foreign export subsidies should be welcomed rather than countered.

International borrowing and lending can be viewed as a kind of international trade, but one that involves trade of present consumption for future consumption rather than trade of one good for another. The relative price at which this intertemporal trade takes place is 1 plus the real rate of interest.
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This chapter will seek an answer to the following questions: 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?
For about 30 years after World War II, trade policies in many developing countries were strongly influenced by the beliefs that the key to economic development was the creation of a strong manufacturing sector, and that the best way to create that manufacturing sector was to protect domestic manufacturers from international competition.

11.1. Import-Substituting Industrialization

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 against competition form established industries in other countries. Two usual justifications are the existence of imperfect capital markets and the problem of appropriability of knowledge generated by pioneering firms.

From World War II until the 1970s, many developing countries attempted to accelerate their development by limiting imports of manufactured goods, in order to foster a manufacturing sector serving the domestic market. This strategy became popular for a number of reasons.

11.1.1. 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

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developed countries. Thus it makes sense, according to this argument, to use tariffs or import quotas as temporary measures to get industrialization started.

Problems with the Infant Industry Argument

This argument has been persuasive to many governments, yet economists have pointed out many pitfalls in the argument.

First, it is not always a good idea to try to move today into the industries that will have a comparative advantage in the future. Resources for example should first accumulate.

Second, protecting manufacturing does no good unless the protection itself helps make industry competitive. Some economists have warned of the case of the 'pseudoinfant industry,' in which an industry is initially protected, then becomes competitive for reasons that have nothing to do with protection.

More generally, the fact that it is costly and time-consuming to build up an industry is not an argument for government intervention unless there is some domestic market failure.

Market Failure Justifications for Infant Industry Protection

To justify the argument, it is necessary to go beyond the plausible but questionable view that industries always need to be sheltered when they are new. That is, the argument for protecting an industry in its early growth must be related to some particular set of market failures that prevent private markets from developing the industry as rapidly as they should.

There have been identified two market failures as reasons why infant industry protection may be a good idea:

1. Imperfect capital markets justifications: if a developing country does not have a set of financial institutions that would allow savings from traditional sectors to be used to finance investment in new sectors, then growth of new industries will be restricted by the ability of firms in these industries to earn current profits. The first-best policy is to create a better capital market, but protection of new industries can be justified as a second-best policy option.
2. Appropriability argument: can take many forms, but all have in common the idea that firms in a new industry generate social benefits for which they are not compensated. The first-best answer is to compensate firms for their intangible contributions. If this is not possible, a second-best case for encouraging entry into a new industry is by using tariffs or other trade policies.

The difference with these arguments to any other arguments is that these clearly apply specifically to new industries rather than any industry.

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11.1.2. Promoting Manufacturing Through Protection

In most developing countries the basic strategy for industrialization has been to develop industries oriented toward the domestic market by using trade restrictions such as tariffs and quotas to encourage the replacement of imported manufactures by domestic products. This strategy is known as import-substituting industrialization. The reasons why import substitution rather than export growth has usually been chosen as an industrialization strategy are a mixture of economics and politics. First, until the 1970s many developing countries were sceptical about the possibility of exporting manufactured goods. Second, in many cases, import-substituting industrialization policies dovetailed naturally with existing political biases.

It is also worth pointing out that some advocates of a policy of import substitution believed that the world economy was rigged against new entrants – that the advantages of established industrial nations were simply too great to be overcome by newly industrializing economies.
The 1950s and 1960s saw the high tide of import-substituting industrialization. In most developing 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.
Although many economists approved of import-substitution measures in the 1950s and early 1960s, since the 1960s, import-substituting industrialization has come under increasingly harsh criticism. Indeed, much of the focus of policy makers has shifted to trying to correct the damage done by bad import-substitution policies.

11.2. Results of Favoring Manufacturing: Problems of Import-Substituting Industrialization

Many less-developed countries have pursued policies of import-substituting industrialization. Although these policies have succeeded in promoting manufacturing, by and large they have not delivered the expected gains in economic growth and living standards.

Import-substituting industrialization began to lose favor when it became clear that countries pursuing import substitution were not catching up with advanced countries. The most important reason why the import-substituting industrialization does not work seems to be that the infant industry argument is not as universally valid as many people had assumed. A period of protection will not create a competitive manufacturing sector if there are fundamental reasons why a country lacks a comparative advantage in manufacturing. Experience has shown that the reasons for failure to develop often run deeper than a simple lack of experience with manufacturing. These problems, such as lack of skilled labor and entrepreneurs, may

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not be beyond the reach of economic policy, but they cannot be solved by trade policy.

With import substitution failing to deliver the promised benefits, attention turned to the costs of the policies used to promote industry. A growing body of evidence showed that the protectionist policies of many less-developed countries badly distorted incentives. Studies show that the degree of protection is often both higher and more variable across industries than the government intended.
A further cost that has received considerable attention is the tendency of import restrictions to promote production at an inefficiently small scale. Often, the whole domestic market is not large enough to allow an efficient-scale production facility. The answer to this problem is to specialize in the production and export of a limited range of products and to import other goods. Import-substituting industrialization eliminates this option by focusing industrial protection on the domestic market.

By the late 1980s, the critique of import-substituting industrialization had been widely accepted. Statistical evidence appeared to suggest that developing countries that followed relatively free trade policies had grown more rapidly than those that followed protectionist policies. This led to a considerable shift in actual policies, as many developing countries removed import quotas and lowered tariff rates.

11.3. Trade Liberalization Since 1985

The view that economic development must take place via import substitution, and the pessimism about economic development that spread as import-substituting industrialization seemed to fail, have been confounded by the rapid economic growth of a number of Asian economies.

Beginning in the mid-1980s, a number of developing countries moved to lower tariff rates and removed import quotas and other restrictions on trade. The shift of developing countries toward freer trade is the big trade policy story of the past two and a half decades.

Trade liberalization in developing countries had two clear effects. One was a dramatic increase in the volume of trade. The other effect was a change in the nature of trade. Before the change, developing countries mainly exported agricultural and mining products. But after 1980 the share of manufactured goods in developing-country exports surged, coming to dominate the exports of the biggest developing economies.

But trade liberalization, like import substitution, was intended as a means to an end rather than a goal in itself. But has it delivered better results? There is much dispute

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about how much of acceleration in for example India can be attributed to trade liberalization. Additionally, there is growing concern about rising inequality in developing countries.
One thing is clear, however: the old view that import substitution is the only path to development has been proved wrong, as a number of developing countries have achieved extraordinary growth while becoming more, not less, open to trade.

11.4. Trade and Growth: Takeoff in Asia

The view that economic development must take place via import substitution, and the pessimism about economic development that spread as import-substituting industrialization seemed to fail, have been confounded by the rapid economic growth of a number of Asian economies.

As we have seen, by the 1970s there was widespread disillusionment with import-substituting industrialization as a developments strategy. But what could take its place?
A possible answer began to emerge as economists and policy makers took note of some economies that experienced a dramatic acceleration in their growth and began to converge on the incomes of advanced nations.
Each of these countries, such as South Korea, Singapore and China, experienced a major change in its economic policy around the time of its economic takeoff. This new policy involved reduced government regulation in a variety of areas, such as a move toward freer trade. It seems fair to say that these Asian success stories demonstrated that the proponents of import-substituting industrialization were wrong: it is possible to achieve development through export-oriented growth.

The implications of Asia's economic takeoff remain somewhat controversial, because the extent to which trade liberalization explains these success stories is less clear. One thing is clear, however: the once widely held view that the world economy is rigged against new entrants and that poor countries cannot become rich have been proved spectacularly wrong.

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12. Controversies in Trade Policy

Some new arguments for government intervention in trade have emerged over the past quarter-century: the theory of strategic trade policy offered reasons why countries might gain from promoting particular industries. Possible action on climate change has raised some major trade issues, including that of the desirability and legality of carbon tariffs.

Activist trade policy arguments rest on two ideas: one is the argument that governments should promote industries that yield technological externalities. The other, the Brander-Spencer analysis, suggest that strategic intervention can enable nations to capture excess returns.

With the rise of manufactured exports 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. The response of most economists is that trade allows them to earn more than they otherwise would. The discussion of globalization is a moral issue. The causes most favoured by activists, such as labor standards, are feared by developing countries, which believe the standards will be used as protectionist devices.

The environmental Kuznets curve says that economic growth initially tends to increase environmental damage as a country grows richer but that beyond a certain point, growth is actually good for the environment. Unfortunately, some of the world's fastest-growing economies are still relatively poor and on the wrong side of the curve.

There is growing concern that globalization may allow highly polluting industries to move to pollution havens, where regulation is looser, increasing the need for carbon tariffs.

The theory if international trade policy has a long intellectual tradition. This chapter describes three controversies over international trade that have arisen over the past quarter-century, each raising issues that previously had not been seriously analysed by international economists.

1. In the 190s a new set of sophisticated arguments for government intervention in trade emerged in advanced countries. This new theory of strategic trade policy was based on different ideas and created a considerable stir.

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2. 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 rates and labor conditions.

More recently, there has been growing concern about the intersection between environmental issues and trade policy.

12.1. Sophisticated Arguments for Activist Trade Policy

Activist trade policy arguments rest on two ideas: (1) governments should promote industries that yield technological externalities, and (2) the Brander-Spencer analysis, which suggest that strategic intervention can capture excess returns.

The framework, developed in Chapter 9 and 10, shows that activist government policy needs a specific kind of justification; namely, it must offset some pre-existing domestic market failure. The difficulty with market failure arguments for intervention is being able to recognize a market failure when you see one. One of these failures is the presence of monopoly profits in highly concentrated oligopolistic industries. The other, the inability of firms in high-technology industries to capture the benefits of knowledge spill overs.

12.1.1. Technology and Externalities

The discussion of the infant industry argument noted that there is a potential market failure arising from difficulties of appropriating knowledge. If firms in an industry generate knowledge that other firms can use without paying for it, the industry is in effect producing some extra output. Where such externalities can be shown to be important, there is a good case for subsidizing the industry.

In advanced countries this argument has a special edge because in those countries, there are important high-technology industries in which the generation of knowledge is in many ways the central aspect of the enterprise.
The point for activist trade policy is that while firms can appropriate some of the benefits of their own investment in knowledge, they usually cannot appropriate them fully. Because patents for example provide only weak protection for innovators, high-technology firms do not receive as strong an incentive to innovate as they should.

The Case for Government Support of High-Technology Industries
Two questions in particular arise: (1) can the government target the right industries or activities, and (2) how important, quantitatively, would the gains be from such targeting?
Although high-technology industries probably produce extra social benefits because of the knowledge they generate, much of what goes on even in those industries has nothing to do with generating knowledge. A general principle is that trade and

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industrial policy should be targeted specifically on the activity in which the market failure occurs. The problem, however, is that it is not always easy to identify that knowledge generation.

The Rise, Fall, and Rise of High-Tech Worries

Arguments that the United States in particular have a deliberate policy of promoting high-technology industries and helping them compete against foreign rivals have a curious history. Such arguments gained widespread attention and popularity in the 1980s and early 1990s, then fell from favor, only to experience a strong revival in recent years.

These discussions in the 1980s were driven in large part by the rise of Japanese firms in some prominent high-tech sectors that had previously been dominated by U.S. producers. After the U.S.'s shares plunged, they regained technological dominance. More recently, however, concerns about the status of U.S. high-technology industries have reemerged. The United States has moved into a large trade deficit in ICT goods, while employment in this sector has plunged since 2000.

12.1.2. Imperfect Competition and Strategic Trade Policy

During the 1980s a new argument for industrial targeting received substantial theoretical attention. This argument identifies the market failure that justifies government intervention as the lack of perfect competition. In particular, there will typically be excess returns; that is, firms will make profits above what equally risky investment elsewhere in the economy can earn.

Barbara Spencer and James Brander notices that, it is possible in principle for a government to alter the rules of the game to shift these excess returns from foreign to domestic firms. In the simplest case, a subsidy to domestic firms, by deterring investment and production by foreign competitors, can raise the profits of domestic firms by more than the amount of the subsidy.

The Brander-Spencer Analysis: An Example

The analysis can be illustrated with a simple example in which there are only two firms competing, each from a different country. Let's call the firms Boeing and Airbus, and the countries the United States and Europe. Suppose there is a new product, a superjumbo aircraft, that both firms are capable of making.

The yes/no decision either to produce or not reflects the following assumption: either firm alone could earn profits making superjumbo aircraft, but if both firms try to produce them, both will incur losses. The firm which will actually get the profits depends on who gets there first.

Now comes the Brander-Spencer point: the European government can reverse this situations. Suppose it commits itself to pay its firm a subsidy of 25 if it enters. This will have the following implications: Boeing now knows that whatever it does, it will have

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to compete with Airbus and will therefore lose money if it chooses to produce. The subsidy thus raises profits by more than the amount of the subsidy itself for Airbus, because of its deterrent effect on foreign competition.

Problems with the Brander-Spencer Analysis

This example might seem to indicate that this strategic trade policy argument provides a compelling case for government activism. In fact, this strategic justification for trade policy, while it has attracted much interest, has also received much criticism. Critics argue that making practical use of the theory would require more information than is likely to be available, and that such policies would risk foreign retaliation.

The problem of insufficient information has two aspects. First, even when looking at an industry in isolation, it may be difficult to fill in the entries in a table with any confidence. And if the government gets it wrong, a subsidy policy may turn out to be a costly misjudgement. 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 lead to increases in their costs.

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. Strategic policies are beggar-thy-neighbour policies that increase our welfare at other countries' expense.

12.2. Globalization and Low-Wage Labor

With the rise of international trade, an anti-globalization movement has emerged, concerned with the low wages paid. The discussion of globalization is really difficult as it involves people trying to do well, but actually doing harm.

The rise of manufactured exports from developing countries has been one of the major shifts in the world economy over the last generation. 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. Nor should it come as any surprise that the conditions of work are also very bad in many cases.

In the 1990s the anti-globalization movement attracted many adherents in advanced countries; outrage over low wages and poor working conditions in developing-country export industries was a large part of the movement's appeal. Most economists have viewed the anti-globalization movement as at best misguided; the standard analysis of comparative advantage suggests that trade is mutually beneficial to the countries that engage in it.

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12.2.1. The Anti-Globalization Movement

Before 1995 most complaints about international trade made by citizens of advanced countries targeted its effects on people who were also citizens of advanced countries. In the second half of the 19902, however, a rapidly growing movement – drawing considerable support from college students – began stressing the alleged harm that world trade was doing to workers in the developing countries.
The anti-globalization movement grabbed world headlines in November 1999, when a major meeting of the World Trade Organization took place in Seattle. The demonstrations, joined by thousands of activists, brought considerable disruption to the meetings. In the end the meeting was regarded as a failure. In a relatively short period of time, in other words, the anti-globalization movement had become a highly visible presence. But what was the movement's goal – and was it right?

12.2.2. Trade and Wages Revisited

Activists pointed to the very low wages earned by many workers in developing-country export industries. These critics argued that the low wages showed that, contrary to the claims of free trade advocates, globalization was not helping workers in developing countries.
The standard economist's answer to this argument goes back to our analysis of the misconceptions about comparative advantage; it is a common misconception that trade must involve the exploitation of workers if they earn much lower wages than their counterparts in a richer country.
Suppose the United States and Mexico have a high-tech and low-tech industry respectively, and U.S. labor is more productive. Once trade is opened, the relative wage rates of these countries will be in equilibrium somewhere between the relative productivity of workers in the two industries. A critic of globalization might look at this trading equilibrium and conclude that trade works against the interest of workers. First of all, in low-tech industries, highly paid jobs in the U.S. are replaced with lower-paid jobs in Mexico. Moreover, you could make a plausible case that the Mexican workers are underpaid. In contrast to this, purchasing power of wages has actually increase in both countries.

The standard economist's argument is that despite the low wages earned by workers in developing countries, those workers are better off than they would have been if globalization had not taken place. Some activists do not accept this argument – they maintain that increased trade makes workers in both advanced and developing countries worse off. Perhaps the most popular argument is that capital is mobile internationally, while labor is not; and that this mobility gives capitalists a bargaining advantage.

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12.2.3. Labor Standards and Trade Negotiations

Narrower practical policy issues are at stake, however: whether and to what extent international trade agreements should also contain provisions aimed at improving wages and working conditions in poor countries.
The most modest proposals have come from economists who argue for a system that monitors wages and working conditions and makes the results of this monitoring available to consumers. Because consumers can choose to buy only 'certified goods', they are better off because they feel better about their purchases. Meanwhile, workers in the certified factories gain a better standard of living.

Proponents of such a system admit that it would not have a large impact on the standard of living in developing countries, mainly because it would affect only the wages of workers in export factories, who are a small minority of the work even in highly export-oriented economies.

A stronger step would be to include formal labor standards as part of trade agreements. The economic argument in favor of labor standards in trade agreements is similar to the argument in favor of a minimum wage rate for domestic workers: while economic theory suggest that the minimum wage reduces the number of low-skill jobs available, some reasonable economists argue that such effects are small and are outweighed by the effect of the minimum wage in raising the income of the workers who remain employed.
Labor standards in trade, however, are strongly opposed by most developing countries, which believe that the standards would inevitably be used as a protectionist tool.

12.2.4. Environmental and Cultural Issues

Many critics argue that globalization is bad for the environment. It is true that environmental standards in developing countries are much lower than in advanced countries. On the other hand, there are at least as many cases of environmental damage that has occurred in the name of 'inward-looking' policies of countries reluctant to integrate with the global economy.

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 can lead to at least modest improvements in the environment, benefiting all concerned. On the other side, opponents insist that attaching environmental standards to trade agreements will in effect shut down potential export industries in poor countries.

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An even trickier issue involves the effect of globalization on local and national cultures; the growing integration of markets has led to a homogenization of cultures around the world. It is hard to deny that something is lost as a result of this cultural homogenization.
As soon as one advances this argument, however, it becomes clear that there is another principle involved: the right of individuals in free societies to entertain themselves as they like.

12.2.5. 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.
The short answer is that the WTO does not look anything like a world government; its authority is basically limited to that of requiring countries to live up to their international trade agreements. However, the small grain of truth in the view of the WTO as a supranational authority is that its mandate allows it to monitor not only the traditional instruments of trade policy but also domestic policies that are de facto trade policies.

12.3. Globalization and the Environment

The environmental Kuznets curve says that economic growth initially tends to increase environmental damage as a country grows richer but that beyond a certain point, growth is actually good for the environment. Globalization may allow highly polluting industries to move to pollution havens, where regulation is looser, increasing the need for carbon tariffs.

Inevitably environmental issues are playing a growing role in disputes about international trade as well. Some anti-globalization activists claim that growing international trade automatically harms the environment; some also claim that international trade agreements have the effect of blocking environmental action. Most international economists deny that there is a simple relationship between globalization and environmental damage.

12.3.1. Globalization, Growth, and Pollution

Both production and consumption often lead, as a byproduct, to environmental damage. As a result – other things equal – economic growth, which increases both production and consumption, leads to greater environmental damage. However, other things are not equal. For one thing, countries change the mix of their production and consumption as they grow richer, to some extent in ways that tend to reduce the environmental impact.

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In the early 1990s, Princeton economists Gene Grossman and Alan Krueger, studying the relationship between national income levels and pollutants such as sulphur dioxide, found that these offsetting effects of economic growth lead to a distinctive 'inverted U' environmental Kuznets curve. The idea is that as a country's income per capita rises due to economic growth, the initial effect is growing damage to the environment. But when a country gets sufficiently rich, it can afford to take action to protect the environment.

What does this have to do with international trade? Trade liberalization is often advocated on the grounds that it will promote economic growth. To the extent that it succeeds in accomplishing this end, it will raise per-capita income. Whether this improves or worsens environmental quality depends on which side of the environmental Kuznets curve the economy is.

However, the environmental Kuznets curve does not necessarily imply that globalization is good for the environment. In fact, it's fairly easy to make the argument that at a world level, globalization has indeed harmed the environment. It is important to realize, though, that the problem isn't globalization per se – it's a country's economic success, which has to some extent come as a result of globalization.

12.3.2. The Problem of 'Polution Havens'

When ships get too old to continue operating, they are disassembled to recover their scrap metal and other materials. One way too look at 'shipbreaking' is that it is a form of recycling: instead of leaving a ship to rust, a shipbreaking firm extracts and reuses its components. The task itself, however, can be environmentally hazardous: everything from the residual oil in a ship's tanks to the plastic in its chairs and interior fittings, if not handed carefully, can be toxic to the local environment.
As a result, shipbreaking in advanced countries is subject to close environmental regulation. But these days, shipbreaking rarely takes place in advanced countries; instead it's done in places like the Indian shipbreaking center of Alang. In effect, Alang has become a pollution haven: thanks to international trade, an economic activity that is subject to strong environmental controls in some countries can take place in other countries with less strict regulation.

There are really two questions about pollution havens: (1) whether they are really an important factor, and (2) whether they deserve to be a subject of international negotiation. On the first question, most empirical research suggests that there is not much evidence that dirty industries move to countries with lax environmental regulation. Second, whether nations have a legitimate interest in each other's environmental policies depends on the nature of the environmental problem. Pollution

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is the classic example of a negative externality, and thus a valid reason for government intervention.

12.3.3. The Carbon Tariff Dispute

In 2009 the U.S. House of Representatives passed a bill that would have created a cap-and-trade system for greenhouse gases. The Senate failed to pass any comparable bill, so climate-change legislation is on hold for the time being. Nonetheless, this bill imposed carbon tariffs on imports from countries that fail to enact similar policies.

One question that has been raised about climate-change legislation is whether it can be effective if only some countries take action. The obvious answer is that to make the initiative global, all major economies should adopt similar policies. But there's no guarantee that such an agreement would be forthcoming, especially when some countries like China feel that they deserve the right to have laxer environmental policies than rich countries that have already achieved a high standard of living.

The idea behind carbon tariffs is to give overseas producers and incentive to limit their carbon emissions and it would remove the incentive to shift production to countries with lax regulation. In addition, it would give countries with lax regulations an incentive to adopt climate-change policies of their own.
Critics of carbon tariffs argue that they would be protectionist, and also violate international trade rules, which prohibit discrimination between domestic and foreign products. Supporters argue that they would simply place producers of imported goods and domestic producers on a level playing field when selling to domestic consumers, with both required to pay for their greenhouse gas emissions.

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13. National Income Accounting and the Balance of Payments

Some new arguments for government intervention in trade have emerged over the past quarter-century: the theory of strategic trade policy offered reasons why countries might gain from promoting particular industries. Possible action on climate change has raised some major trade issues, including that of the desirability and legality of carbon tariffs.

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With the rise of manufactured exports 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. The response of most economists is that trade allows them to earn more than they otherwise would. The discussion of globalization is a moral issue. The causes most favoured by activists, such as labor standards, are feared by developing countries, which believe the standards will be used as protectionist devices.

The environmental Kuznets curve says that economic growth initially tends to increase environmental damage as a country grows richer but that beyond a certain point, growth is actually good for the environment. Unfortunately, some of the world's fastest-growing economies are still relatively poor and on the wrong side of the curve.

There is growing concern that globalization may allow highly polluting industries to move to pollution havens, where regulation is looser, increasing the need for carbon tariffs.

In this chapter we will examine some of the reasons governments either should not or, at any rate, do not base their trade policy on economists' cost-benefit calculations. The first step toward understanding actual trade policies is to ask what reasons there are for governments not to interfere with trade.

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13.1. The National Income Accounts

A country's GNP is equal to the income received by its factors of production and is divided in consumption, investment, government purchases, and the current account balance. GDP, equal to GNP less net receipts of factor income from abroad, measures the output produced within a country's territorial borders.

Of central concern to macroeconomic analysis is a country's gross national product. GNP is calculated by adding up the market value of all expenditures on final output. To distinguish among the different types of expenditure that make up a country's GNP, government economists and statisticians who compile national income accounts divide GNP among the four possible uses for which a country's final output is purchased: consumption, investment, government purchases, and the current account balance. The term national income accounts, rather than national output accounts, is used to describe this fourfold classification because a country's income in fact equals its output.
It is useful to divide GNP into the four classifications because we cannot hope to understand the cause of a particular recession or boom without knowing how the main categories of spending have changed and thus cannot recommend a sound policy response. In addition, these accounts provide information essential for studying why some countries are rich while some are poor.

13.1.1. National Product and National Income

First, we should understand why the GNP a country generates over some time period must equal its national income. The reason for this equality is that every dollar used to purchase goods or services automatically ends up in somebody's pocket.
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. Our definition counts only final goods and services that are produced.

13.1.2. Capital Depreciation and International Transfers

Because we have defined GNP and national income so that they are necessarily equal, their equality is really an identity. Two adjustments to the definition of GNP must be made, however, before the identification of GNP and national income is entirely correct in practice.

1. GNP does not take into account the economic loss due to the tendency of machinery and structures to wear out as they are used. 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.

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2. A country's income may include gifts from residents of foreign countries, called unilateral transfers.

National income equals GNP less depreciation plus net unilateral transfers. Macroeconomics has little to say about the difference between GNP and national income. Therefore, for the purposes of this text, we usually use the terms GNP and national income interchangeable.

13.1.3. Gross Domestic Product

Most countries have long reported gross domestic product rather than GNP as their primary measure of national economic activity. GDP is supposed to measure the volume of production within a country's borders, whereas GNP equals GDP plus net receipts of factor income from the rest of the world.
GDO does not correct, as GNP does, for the portion of countries' production carried out using services provided by foreign-owned capital and labor. As a practical matter, movements in GDP and GNP usually do not differ greatly.

13.2. National Income Accounting for an Open Economy

In a closed economy, GNP must be consumed, invested, or purchased by the government. National saving must thus equal investment. In an open economy, GNP equals the sum of consumption, investment, government purchases and net exports. Unlike a closed economy, an open economy can save by domestic and foreign investments.

The main lesson of this section is the relationship among national saving, investment, and trade imbalances. We will see that in open economies, saving and investment are not necessarily equal, as they are in a closed economy.

13.2.1. Consumption

The portion of GNP purchased by private households to fulfil current wants is called consumption. Consumption expenditure is the largest component of GNP in most economies.

13.2.2. 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.

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13.2.3. 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 these purchases are federal military spending, government support of cancer research and funds spent on highway repair and education. They include investment as well as consumption. Government transfer payments such as social security are not included in purchases.

13.2.4. The National Income Identity for an Open Economy

In a closed economy, any final good or service that is not purchased by households or the government must be used by firms to produce new plant, equipment, and inventories.
Let *Y* stand for GNP, *C* for consumption, *I* for investment, and *G* for government purchases. Since all of a closed economy's output must be consumed, invested, or bought by the government, we can write

$$Y = C + I + G.$$

When foreign trade is possible, however, some output is purchased by foreigners while some domestic spending goes to purchase goods and services produced abroad. The value of imports, denoted by *IM*, must be subtracted from total domestic spending, $C + I + G$, to find the portion of domestic spending that generated domestic national income. Exports, denoted by *EX*, are the amount foreign residents' purchases add to the national income of the domestic economy. Thus, the national income identity for an open economy is

$$Y = C + I + G + EX - IM.$$

13.2.5. An Imaginary Open Economy

To make the above stated equation concrete, let's consider an imaginary closed economy, Agraria, whose only output is 100 bushels of wheat. Each citizen is both a consumer and a producer of wheat (55 bushels), and consumes milk (40 gallons). Farmers invest by putting aside a portion of each year's crop as seed for the next year's planting. There is also a government that appropriates part of the crop to feed the Agrarian army. Agraria can import milk from the rest of the world in exchange for exports of wheat.

If one gallon of milk equals 0,5 bushel of wheat, then the value of consumption in terms of what is 55 + (0,5 * 40) = 75. Then,

Y = C + I + G + EX – IM -> 100 = 75 + 25 + 10 + 10 – 20.

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13.2.6. The Current Account and Foreing Indebtedness

In reality, a country's foreign trade is exactly balanced only rarely. The difference between exports of goods and services and imports of goods and services is known as the current account balance (*CA*).

$CA = EX - IM$.

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 current account is important because it measures the size and direction of international borrowing. When a country imports more than it exports, it is buying more from foreigners than it sells to them and must somehow finance this current account deficit. This can only be done by borrowing the difference from foreigners, and thus increasing its net foreign debts by the amount of the deficit.

Similarly, a country with a current account surplus is earning more from its exports than it spends on imports. This country finances the current account deficit of its trading partners by lending to them. 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. The current account is also equal to the difference between national income and domestic residents' total spending:

$Y - (C + I + G) = CA$.

13.2.7. Saving and the Current Acount

Simple as it is, the GDP identity has many illuminating implications. To explain the most important of these implications, we define the concept of national saving, that is, the portion of output, *Y*, that is not devoted to household consumption, *C*, or government purchases, *G*. In a closed economy, national saving always equals investment.
Let *S* stand for national saving. Our definition of *S* tells us that

$S = Y - C - G$.

Since the closed-economy GNP identity, $Y = C + I + G$, may also be written as $I = Y - C - G$, then,

$S = I$,

And national saving must equal investment in a closed economy. In an open economy they can differ:

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$S = I + CA$.

This highlights an important difference between open and closed economies: an open economy can save either by building up its capital stock or by acquiring foreign wealth, but a closed economy can save only by building up its capital stock.

Because one country's savings can be borrowed by a second country in order to increase the second country's stock of capital, a country's current account surplus is often referred to as its net foreign investment. Of course, when one country lends to another to finance investment, part of the income generated by the investment in future years must be used to pay back the lender.

13.2.8. Private and Government Saving

Unlike private saving decisions, government saving decisions are often made with an eye toward their effect on output and employment.

Private saving is defined as the part of disposable income that is saved rather than consumed. Private saving, denoted S^P, can therefore be expressed as

$S^P = Y - T - C$.

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^g stand for government saving, then

$S^g = T - G$.

The two types of saving add up to national saving. We can use the definitions of private and government saving to rewrite the national income identity in a form that is useful for analysing the effects of government saving decisions on open economies.

$S^P = I + CA - S^g = I + CA - (T - G) = I + CA + (G - T)$.

To interpret this equation, we define the government budget deficit as $G - T$. The equation then states that a country's private saving can take three forms: investment in domestic capital, purchases of wealth from foreigners, and purchases of the domestic government's newly issued debt.

13.3. The Balance of Payments Accounts

Balance of payments accounts provide a detailed picture of the composition and financing of the current account. 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 mainly nonmarket asset transfers. International asset transactions carried out by

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central banks are included in the financial account. Central banks can intervene through official foreign exchange intervention.

In addition to national income accounts, government economists and statisticians also keep balance of payments accounts, which keeps track of a country's payments to and its receipts from foreigners. Any transaction resulting in a receipt from foreigners is entered in the balance of payments account as a credit. Any transaction resulting in a payment to foreigners is entered as a debit. Three types of international transaction are recorded in the balance of payments:

1. Transactions that arise from the export or import of goods or services and therefore enter directly into the current account.
2. Transactions that arise from the purchase or sale of financial assets. The difference between a country's purchases and sales of foreign assets is called its financial account balance, or its net financial flows.
3. Certain other activities resulting in transfers of wealth between countries are recorded in the capital account.

Every international transaction automatically enters the balance of payments twice, once as a credit and once as a debit. This principle of balance of payments accounting holds true because every transaction has two sides: one party pays, while the other receives.

13.3.2. The Fundamental Balance of Payments Identity

Because any international transaction automatically gives rise to offsetting credit and debit entries in the balance of payments, the sum of the current account balance and the capital account balance automatically equals the financial account balance:

Current account + capital account = Financial account.

Because the sum of the current and capital accounts is the total change in a country's net foreign assets, this sum necessarily equals the difference between a country's purchases of assets from foreigners and its sales of assets to them – that is, the financial account balance.

13.3.3. The Current Account, Once Again

As we have learned, the current account balance measures a country's net exports of goods and services. The balance of payments accounts divide exports and imports into three finer categories. The first is goods trade, that is, exports or imports of merchandise. The second category, services, includes items such as payments for legal assistance, and shipping fees. The final category, income is made up mostly of international interest and dividend payments and the earnings of domestically owned firms operating abroad.

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We include income on foreign investments in the current account because that income really is compensation for the services provided by foreign investments. Before calculating the current account, we must include one additional type of international transaction that we have largely ignored until now. In discussing the relationship between GNP and national income, we defined unilateral transfers between countries as international gifts, that is, payments that do not correspond to the purchase of any good, service, or asset. Net unilateral transfers are considered part of the current account as well as a part of national income.

13.3.4. The Capital Account

Because an excess of national spending over income must be covered by net borrowing from foreigners, this negative current plus capital account balance must be matched by an equal negative balance of net financial flows.

13.3.5. The Financial Account

While the current account is the difference between sales of goods and services to foreigners and purchases of goods and services from them, the financial account measures the difference between acquisitions of assets from foreigners and the buildup of liabilities to them.

13.3.6. Net Errors and Omissions

It can happen that for example the United States found less financing abroad than it needed to fund its current plus capital account deficit. 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. Because data from different sources may differ in coverage, accuracy, and timing, the balance of payments accounts seldom balance in practice as they must in theory.
Account keepers force the two sides to balance by adding to the accounts a net errors and omissions item.

13.3.7. Official Reserve Transactions

Although there are many types of financial account transactions, one type is important enough to merit separate discussion. This type of transaction is 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

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money. Official international reserves are foreign assets held by central banks as a cushion against national economic misfortune. Central banks often buy or sell international reserves in private asset markets to affect macroeconomic conditions in their economies. Official transactions of this type are called official foreign exchange intervention. One reason why this can alter macroeconomic conditions is that it is a way for the central bank to inject money into the economy or withdraw it from circulation. Government agencies other than central banks may hold foreign reserves and intervene officially in exchange markets.
When a central bank purchases or sells a foreign asset, the transaction appears in its country's financial account just as if the same transaction had been carried out by a private citizen.

The level of net central bank financial flows is called the official settlements balance or the balance of payments. This balance is the sum of the current account and capital account balances, less the nonreserve portion of the financial account balance, and it indicates the payments gap that official reserve transactions need to cover.

The balance of payments played an important historical role as a measure of disequilibrium in international payments, and for many countries it still plays this role. A negative balance of payments may signal a crisis, for it means that a country is running down its international reserve assets or incurring debt to foreign monetary authorities. If 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.

13.3.1. Examples of Paired Transactions

An example will show how the principle of double-entry bookkeeping operates in practice.

Imagine you buy an ink-jet fax machine from the Italian company Olivetti and pay for your purchase with a $1,000 check. Your payment to buy a good (the fax machine) from a foreign resident enters the U.S. current account as a debit. But where is the offsetting balance of payments credit? Olivetti's U.S. salesperson must do something with your check – let's say he deposits 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 $1,000 – and the transaction shows up as a $1,000 credit in the U.S. financial account. The transaction creates the following two offsetting bookkeeping entries in the U.S. balance of payments:

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	Credit	Debit
Fax machine purchase (Current account, U.S. good import)		$1,000
Sale of bank deposit by Citibank (Financial account, U.S. asset sale)	$1,000	

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14. Exchange Rates and the Foreign Exchange Market: An Asset Approach

An exchange rate is the price of one country's currency in terms of another country's currency. All else equal, a depreciation of a country's currency against foreign currencies makes its exports cheaper and its imports more expensive. An appreciation of its currency makes its exports more expensive and its imports cheaper.
Exchange rates are determined in the foreign exchange market. The major participants are commercial banks, international corporations, nonbank financial institutions and national central banks. An important category of foreign exchange trading is forward trading, in which parties agree to exchange currencies on some future date at a prenegotiated exchange rate. In contrast, spot trades are settled immediately.

Because the exchange rate is the relative price of two assets, it is most appropriately thought of as being an asset price itself. The basic principle of asset pricing is that an asset's current value depends on its expected future purchasing power. Savers look at the expected rate of return when evaluating an asset.
When relative asset returns are relevant it is appropriate to compare expected changes in assets' currency values, provided those are expressed in the same currency. If risk and liquidity factors do not strongly influence the demands for foreign currency assets, participants in the foreign exchange market always prefer to hold those assets yielding highest rates of return.

Equilibrium in the foreign exchange market requires interest parity; deposits of all currencies must offer the same expected rate of return when returns are measured in comparable terms. For given interest rates and a given expectation of the future exchange rate, the interest parity tells us the current equilibrium exchange rate. Other things equal, a dollar depreciation today reduces the expected dollar return on euro deposits by reducing the depreciation rate of the dollar against the euro expected for the future.

The price of one currency in terms of another is called an exchange rate. Because an exchange rate, the price of one country's money in terms of another's, is also an asset price, the principles governing the behaviour of other asset prices also govern the behaviour of exchange rates. 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

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people's expectations about the future level of that rate.
Our general goals in this chapter are to understand the role of exchange rates in international trade and to understand how exchange rates are determined.

14.1. Exchange Rates and International Transactions

An exchange rate is the price of one country's currency in terms of another country's currency; a depreciation of a country's currency makes its exports cheaper and its imports more expensive, while an appreciation of its currency makes its exports more expensive and its imports cheaper.

Exchange rates allow us to compare the prices of goods and services produced in different countries. An exchange rate can be quoted in two ways: as the price of the foreign currency in terms of dollars (for example, $0.01194 per yen) or as the price of dollars in terms of the foreign currency (for example, ¥83.77 per dollar). The first of these exchange rate quotations is said to be in direct terms, the second in indirect terms.
Households and firms use exchange rates to translate foreign prices into domestic currency terms. Once the money prices of domestic goods and imports have been expressed in terms of the same currency, households and firms can compute the relative prices that affect international trade flows.

14.1.1. Domestic and Foreign Prices

If we know the exchange rate between two countries' currencies, we can compute the price of one country's exports in terms of the other country's money.

Changes in exchange rates are described as depreciations or appreciations. A depreciation of the pound against the dollar is a fall in the dollar price of pounds. All else equal, a depreciation of a country's currency makes its goods cheaper for foreigners. A rise in the pound's price in terms of dollars, is an appreciation of the pound against the dollar.

Descriptions of exchange rate changes as depreciations or appreciations can be bewildering, because when one currency depreciates against another, the second currency must simultaneously appreciate against the first. When a country's currency depreciates, foreigners find that its exports are 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 domestic consumers pay less for foreign products.

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14.1.2. Exchange Rates and Relative Prices

Import and export demands are influenced by relative prices, such as the price of sweater in terms of designer jeans. Exchange rates also allow individuals to compute the relative prices of goods and services whose money prices are quoted in different currencies. 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.

14.2. The Foreign Exchange Market

The major participants in the foreign exchange market are commercial banks, international corporations, nonbank financial institutions, and national central banks. Even though foreign exchange trading takes place in many financial centers around the world, modern communication technology links those centers together into a single market that is open 24 hours a day. Spot trades are settled immediately, while forward trading agrees on some future date at a prenegotiated exchange rate.

Exchange rates are determined by the interaction of the households, firms, and financial institutions that buy and sell foreign currencies to make international payments. The market in which international currency trades take place is called the foreign exchange market.

14.2.1. The Actors

The major participants in the foreign exchange market are commercial banks, corporations that engage in international trade, nonbank financial institutions such as insurance companies, and central banks. A description of these actors and their roles.

1. Commercial banks: they are the center of the foreign exchange market because almost every sizable international transaction involves the debiting and crediting of accounts at commercial banks in various financial centers. Banks routinely enter the foreign exchange market to meet the needs of their customers. In addition, a bank will also quote to other banks exchange rates at which it is willing to buy currencies from them and sell currencies to them. Foreign currency trading among banks – interbank trading – accounts for much of the activity in the foreign exchange market. The rates available to corporate customers, called retail rates, are usually less favourable than the wholesale interbank rates.
2. Corporations: firms with operations in several countries frequently make or receive payments in currencies other than that of the country in which they are headquartered.

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3. Nonbank financial institutions: due to deregulation of financial markets these institutions have offered their customers a broader range of services. Among these have been services involving foreign exchange transactions.
4. Central banks: these sometimes intervene in foreign exchange markets.

14.2.2. Characteristics of the Market

Foreign exchange trading takes place in many financial centers, with the largest volumes of trade occurring in such major cities as London, New York, Tokyo, and Frankfurt. The worldwide volume of foreign exchange trading is enormous, and it has ballooned in recent years. Telephone, fax, and Internet links among the major foreign exchange trading centers make each a part of a single world market on which the sun never sets. Economic news released at any time of the day is immediately transmitted around the world and may set off a flurry of activity by market participants.

The integration of financial centers implies that there can be no significant difference between the dollar/euro exchange rate quoted in New York at 9 a.m. and the dollar/euro exchange rate quoted in London at the same time. If there were a difference, profits could be made through arbitrage.

Because of its pivotal role in so many foreign exchange deals, the U.S. 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 vehicle currency.

14.2.3. Spot Rates and Forward Rates

The foreign exchange transactions we have been discussing take place on the spot: two parties agree to an exchange of bank deposits and execute the deal immediately. Exchange rates governing such 'on-the-spot' trading are called spot exchange rates, and the deal is called a spot transaction.

Foreign exchange deals sometimes specify a future transaction date. The exchange rates quoted in such transactions are called forward exchange rates. Forward and spot exchange rates, while not necessarily equal, do move closely together.

From now on, when we mention an exchange rate but do not specify whether it is a spot rate or a forward rate, we will always be referring to the spot rate.

14.2.4. Foreign Exchange Swaps

A foreign exchange swap is a spot sale of a currency combined with a forward repurchase of that currency. A three-month swap of dollars into euros may result in

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lower brokers' fees than the two separate transactions of selling dollars for spot euros and selling the euros for dollars on the forward market. Swaps make up a significant proportion of all foreign exchange trading.

14.2.5. Futures and Options

Several other financial instruments traded in the foreign exchange market, like forward contracts, involve future exchanges of currencies.
When you buy a futures contract, 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 private party is an alternative way to ensure that you receive the same amount of foreign currency on the date in question.
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 at the discretion of the option's owner, who is under no obligation to exercise his right.

Imagine that you are uncertain about when in the next month a foreign currency payment will arrive. To avoid the risk of a loss, 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 instead you expect to make a payment abroad sometime in the month, a call option, which gives you the right to buy foreign currency to make the payment at a known price, might be attractive.

14.3. The Demand for Foreign Currency Assets

The basic principle of asset pricing is that an asset's current value depends on its expected future purchasing power. Savers look at the expected rate of return when evaluating an asset. When relative asset returns are relevant it is appropriate to compare expected changes in assets' currency values, provided those are expressed in the same currency. If risk and liquidity factors do not strongly influence the demands for foreign currency assets, participants in the foreign exchange market always prefer to hold those assets yielding highest rates of return.

To understand how exchange rates are determined by the foreign exchange market, we first must ask how the major actors' demands for different types of foreign currency deposits are determined.
The demand for a foreign currency bank deposit is influenced by the same considerations that influence the demand for any other asset. A foreign currency deposit's future value depends in turn on two factors: the interest rate it offers and the expected change in the currency's exchange rate against other currencies.

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14.3.1. Assets and Asset Returns

People can hold wealth in many forms – stocks, bonds, cash, real estate, diamonds, and so on. The object of acquiring wealth – of saving – is to transfer purchasing power into the future.

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.
You often cannot know with certainty the return that an asset will actually pay after you buy it. Both the dividend paid by a share of stock and the share's resale price, for example, may be hard to predict. Your decision therefore must be based on an expected rate of return. When we measure an asset's rate of return, we compare how an investment in the asset changes in total value between two dates.

The Real Rate of Return
The expected rate of return that savers consider in deciding which asset to hold is the expected real rate of return. It is the expected real return that matters because the ultimate goal of saving is future consumption, and only the real return measures the goods and services a saver can buy in the future in return for giving up some consumption today.

The distinction between real rates of return and dollar rates of return illustrates an important concept in studying how savers evaluate different assets: the returns on two assets cannot be compared unless they are measured in the same units.

14.3.2. Risk and Liquidity

All else equal, individuals prefer to hold those assets offering the highest expected real rate of return. Savers care about two main characteristics of an asset other than its return: its risk and its liquidity.

1. Risk: an asset's real return is usually unpredictable and may turn out to be quite different from what savers expected when they purchased the asset. Savers dislike uncertainty and are reluctant to hold assets that make their wealth highly variable.
2. Liquidity: assets also differ according to the cost and speed at which savers can dispose of them. Savers prefer to hold some liquid assets as a precaution against unexpected pressing expenses that might force them to sell less liquid assets at a loss.

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14.3.3. Interest Rates

As in other asset markets, participants in the foreign exchange market base their demands for deposits of different currencies on a comparison of these assets' expected rates of return. To compare returns on different deposits, market participants need two pieces of information; (1) how the money values of the deposits will change, and (2) how exchange rates will change so that they can translate rates of return measured in different currencies into comparable terms.

The first piece of information needed is the currency's interest rate. Interest rates play an important role in the foreign exchange market because the large deposits traded there pay interest, each at a rate reflecting its currency of denomination.

14.3.4. Exchange Rates and Asset Returns

The interest rates offered by a dollar and a euro deposit tell us how their dollar and euro value will change over a year. The other piece of information we need in order to compare the rates of return offered by dollar and euro deposits is the expected change in the dollar/euro exchange rate over the year. For this we calculate the dollar rate of return on a euro deposit.

Let's look at the following situation. Suppose that today's exchange rate is $1.10 per euro, but that you expect the rate to be $1.165 per euro in a year. Suppose also that the dollar interest rate is 10 percent per year while the euro interest rate is 5 percent per year. To see which of the deposits offers the higher return we need to follow five steps:

1. Use today's dollar/euro exchange rate to figure out the dollar price of a euro deposit of €1.
2. Use the euro interest rate to find the amount of euros you will have a year from now if you purchase a €1 deposit today.
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.
4. Now that you know the dollar price of a €1 deposit today and can forecast its value in a year, you can calculate the expected dollar rate of return on a euro deposit as a percent per year.
5. Compare the result of Step 4 with the dollar rate of return on dollar deposits.

14.3.5. A Simple Rule

A simple rule shortens 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. Once you have calculated this, our rule is: the dollar rate of return on euro

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deposits is approximately the euro interest rate plus the rate of depreciation of the dollar against the euro.

We summarize our discussion by introducing some notation:

$R_€$ = today's interest rate on one-year euro deposits,

$E_{\$/€}$ = today's dollar/euro exchange rate,

$E^e_{\$/€}$ = dollar/euro exchange rate expected to prevail a year from today.

Using these symbols, we write the expected rate of return on a euro deposit, measured in terms of dollars, as the sum of (1) the euro interest rate and (2) the expected rate of dollar depreciation against the euro:

$R_€ + (E^e_{\$/€} - E_{\$/€})/ E_{\$/€}$.

This expected return is what must be compared with the interest rate on one-year dollar deposits, $R_\$$, 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 $R_\$$ less the above expression. When this difference is positive, dollar deposits yield the higher expected rate of return; when it is negative, euro deposits yield the higher expected rate of return.

So far we have been translating all returns into dollar terms. But the rate of return differentials we calculated would have been the same had we chosen to express returns in terms of euros or in terms of some third currency. Following our simple rule, we would add to the dollar interest rate $R_\$$ the expected rate of depreciation of the euro against the dollar. But the expected rate of depreciation of the euro against the dollar is approximately the expected rate of appreciation of the dollar against the euro. This means that in terms of euros, the return on a dollar deposit is

$R_\$ - (E^e_{\$/€} - E_{\$/€})/ E_{\$/€}$.

14.3.6. Return, Risk, and Liquidity in the Foreign Exchange Market

There is no consensus among economists about the importance of risk in the foreign exchange market. Even the definition of foreign exchange risk is a topic of debate. Some market participants may be influenced by liquidity factors in deciding which currencies to hold. Because payments connected with international trade make up a very small fraction of total foreign exchange transactions, we ignore the liquidity motive for holding foreign currencies.

We are therefore assuming for now that participants in the foreign exchange market base their demands for foreign currency assets exclusively on a comparison of those assets' expected rates of return.

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14.4. Equilibrium in the Foreign Exchange Market

Equilibrium in the foreign exchange market requires interest parity; deposits of all currencies must offer the same expected rate of return when returns are measured in comparable terms. For given interest rates and a given expectation of the future exchange rate, the interest parity tells us the current equilibrium exchange rate.

When market participants willingly hold the existing supplies of deposits of all currencies, we say that the foreign exchange market is in equilibrium.

14.4.1. Interest Parity: The Basic Equilibrium Condition

The foreign exchange market is in equilibrium when deposits of all currencies offer the same expected rate of return; this is the interest parity condition. It implies that potential holders of foreign currency deposits view them all as equally desirable assets, provided their expected rates of return are the same.

Only when all expected rates of return are equal – that is, when the interest parity condition holds – is there no excess supply of some type of deposit and no excess demand for another; the foreign exchange market is in equilibrium.
To represent interest parity between dollar and euro deposits symbolically, we use the below presented expression, which shows the difference between the two assets' expected rates of return measured in dollars. These are equal when

$R_{\$} = R_{€} + (E^{e}_{\$/€} - E_{\$/€})/E_{\$/€}$.

Thus, when the 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 euro deposits that initially offer the higher return.

14.4.2. How Changes in the Current Exchange Rate Affect Expected Returns

Other things equal, depreciation of a country's currency today lowers the expected domestic currency return on foreign currency deposits. Conversely, appreciation of the domestic currency today, all else equal, raises the domestic currency return expected of foreign currency deposits.
For fixed values of the expected future dollar/euro exchange rate and the euro interest rate, the relation between today's dollar/euro exchange rate and the expected dollar return on euro deposits defines a downward-sloping schedule.

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14.4.3. The Equilibrium Exchange Rate

We continue to assume that the dollar interest rate, the euro interest rate, and the expected future dollar/euro exchange rate are all given. If the rate of return on euro deposits is less than the rate of return on dollar deposits, anyone holding euro deposits wishes to sell them for the more lucrative dollar deposits: the foreign exchange market is out of equilibrium because participants such as banks and multinational corporations are unwilling to hold euro deposits. As euro holders try to entice dollar holders to trade by offering them a better price for dollars, the dollar/euro exchange rate falls. Thus, the exchange rates always adjust to maintain interest parity.

14.5. Interest Rates, Expectations, and Equilibrium

An increase in the interest paid on deposits of a currency causes that currency to appreciate against foreign currencies. A rise in the expected future exchange rate causes a rise in the current exchange rate, while a fall in the expected future exchange rate causes a fall in the current rate.

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.

14.5.1. The Effect of Changing Interest Rates on the Current Exchange Rate

All else equal, an increase in the interest paid on deposits of a currency causes that currency to appreciate against foreign currencies. We must remember that our assumption of a constant expected future exchange rate often is unrealistic. In many cases, a change in interest rates will be accompanied by a change in the expected future exchange rate. This change will depend, in turn, on the economic causes of the interest rate change.

14.5.2. The Effect of Changing Expectations on the Current Exchange Rate

A rise in the expected future exchange rate causes a rise in the current exchange rate. Similarly, a fall in the expected future exchange rate causes a fall in the current exchange rate.

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15. Money, Interest Rates, and Exchange Rates

Money is held because of its liquidity. When considered in real terms, aggregate money demand is not a demand for a certain number of currency units but is instead a demand for a certain amount of purchasing power. Aggregate real money demand depends negatively on the opportunity cost of holding money and positively on the volume of transactions in the economy.
The money market is in equilibrium when the real money supply equals aggregate real money demand. With the price level and real output given, a rise in the money supply lowers the interest rate and a fall in the money supply raises the interest rate. By lowering the domestic interest rate, an increase in the money supply causes the domestic currency to depreciate in the foreign exchange market. Similarly, a fall in the domestic money supply causes the domestic currency to appreciate against foreign currencies.

The assumption that the price level is given in the short run is a good approximation to reality in countries with moderate inflation, but it is a misleading assumption over 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 interest rate, or any relative prices.

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 to its long-run exchange rate. Exchange rate overshooting, which heightens the volatility of exchange rates, is a direct result of sluggish short-run price level adjustment and the interest parity condition.

To understand the determination of exchange rates we have to learn how interest rates themselves are determined and how expectations of future exchange rates are formed. In this and the next two chapters we examine these topics by building an economic model that links 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. Monetary developments influence the exchange rate by changing both interest rates and people's expectations about future exchange rates.
Once the theories are laid out, we use them to examine how equilibrium interest rates are determined. Then we combine our model of interest rate determination with the

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interest parity condition to study the effects of monetary shifts on the exchange rate. Finally, we take a first look at the long-term effects of monetary changes on output prices and expected future exchange rates.

15.1. Money Defined: A Brief Review

Money serves various purposes: as a medium of exchange, a unit of account, and as a store of value.

The purpose of this section and this thought experiment is to distinguish money from other assets and to describe the characteristics of money. These are central to an analysis of the demand for money.

15.1.1. Money as a Medium of Exchange

The most important function of money is to serve as a medium of exchange. Due to the fact that it is very time-consuming if we would have to trade goods and services for other goods and services, we see that a medium of exchange is necessary. Money eliminates the enormous search costs connected with a barter system because money is universally acceptable.

15.1.2. Money as a Unit of Account

Money's second role is as a unit of account. The convention of quoting prices in money terms simplifies economic calculations by making it easy to compare the prices of different commodities.

15.1.3. 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 in payment if its value in terms of goods and services evaporated immediately. Since money is readily acceptable as a means of payment, money sets the standard against with the liquidity of other assets is judged.

15.1.4. What Is Money?

Currency and bank deposits qualify as money. Assets such as real estate do not qualify as money because, unlike currency, they lack the essential property of liquidity.
When we speak in this book of the money supply, 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.

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15.1.5. How the Money Supply Is Determined

An economy's money supply is controlled by its central bank, which directly regulates the amount of currency in existence. These procedures are complex, and we assume for now that the central bank simply sets the size of the money supply at the level it desires.

15.2. The Demand for Money by Individuals

Money is held because of its liquidity. When considered in real terms, aggregate money demand is not a demand for a certain number of currency units but it is instead a demand for a certain amount of purchasing power.

Individuals base their demand for an asset on three characteristics:

1. The expected return the asset offers compared with the returns offered by other assets.
2. The riskiness of the asset's expected return.
3. The asset's liquidity.

Households and firms hold money only because of its liquidity.

15.2.1. Expected Return

Currency pays no interest. When you hold money, you therefore sacrifice the higher interest rate you could earn by holding your wealth in a government bond, a large time deposit, or some other relatively illiquid asset. The higher the interest rate, the more you sacrifice by holding wealth in the form of money.
The theory of asset 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 equal, people prefer assets offering higher expected returns. Because an increase in the interest rate is a rise in 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 nonmoney assets that pay the market interest rate. 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 interest rate measures the opportunity cost of holding money rather than interest-bearing bonds.

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15.2.2. Risk

Risk 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 money in terms of the commodities you consume. Because any change in the riskiness of money causes an equal change in the riskiness of bonds, it need not cause individuals to reduce their demand for money.

15.2.3. Liquidity

The main benefit of holding money comes from its liquidity. An individual's need for liquidity rises when the average daily value of his transactions rises. 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.

15.3. Aggregate Money Demand

Aggregate real money demand depends negatively on the opportunity cost of holding money and positively on the volume of transactions in the economy. The money market is in equilibrium when the real money supply equals aggregate real money demand.

Three main factors determine aggregate money demand:

1. The interest rate: a rise causes each individual in the economy to reduce her demand for money.
2. The price level: if the price level rises, individual households and firms must spend more money than before to purchase their products. They will therefore have to hold more money.
3. Real national income: this increase in the real value of transactions raises the demand for money, given the price level.

If P is the price level, R is the interest rate, and Y is real GNP, the aggregate demand for money, M^d, can be expressed as
$M^d = P \times L(R,Y)$,

Where the value of $L(R,Y)$ falls when R rises, and rises when Y rises. Aggregate money demand is proportional to the price level. $L(R,Y)$ can be specified as the aggregate real money demand. The ratio M^d/P is the desired money holdings measured in terms of a typical reference basket of commodities, equals the amount of real purchasing power people would like to hold in liquid form.

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15.4. The Equilibrium Interest Rate: The Interaction of Money Supply and Demand

With the price level and real output given, a rise in the money supply lowers the interest rate and a fall in the money supply raises the interest rate. A rise in real output raises the interest rate, given the price level, while a fall in real output has the opposite effect.

15.4.1. Equilibrium in the Money Market

If M^S is the money supply, the condition for equilibrium in the money market is

$M^S = M^d$.

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

$M^S/P = L(R,Y)$.

Given the price level, P, and the level of output, Y, the equilibrium interest rate is the one at which aggregate real money demand equals the real money supply.

The market always moves toward an interest rate at which the real money supply equals aggregate real money demand. If there is initially an excess supply of money, the interest rate falls, and if there is initially an excess demand, it rises.

15.4.2. Interest Rates and the Money Supply

The process through which the interest rate falls is the following; after M^S is increased by the central bank, there is initially an excess real supply of money at the old equilibrium interest rate. Since people are holding more money than they desire, they use their surplus funds to bid for assets that pay interest. The economy as a whole cannot reduce its money holdings, so interest rates are driven down as unwilling money holders compete to lend their excess cash balances.

An increase in the money supply lowers the interest rate, while a fall in the money supply raises the interest rate, given the price level and output.

15.4.3. Output and the Interest Rate

An increase in the real output raises the interest rate, while a fall in real output lowers the interest rate, given the price level and the money supply.

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15.5. The Money Supply and the Exchange Rate in the Short Run

By lowering the domestic interest rate, an increase in the money supply causes the domestic currency to depreciate in the foreign exchange market. Similarly, a fall in the domestic money supply causes the domestic currency to appreciate against foreign currencies.

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.
In this section we continue to take the price level as given, and for that reason we label the analysis of this section short run. The long-run analysis of an economic event allows for the complete adjustment of the price level and for full employment of all factors of production.

15.5.1. Linking Money, the Interest Rate, and the Exchange Rate

Let's assume once again that we are looking at the dollar/euro exchange rate, that is, the price of euros in terms of dollars.

In the below presented figure, we have combined two diagrams; the first shows equilibrium in the foreign exchange market and how it is determined given interest rates and expectations about future exchange rates. At the intersection of the two schedules (point 1'), the expected rates of return on dollar and euro deposits are equal, and therefore interest parity holds.

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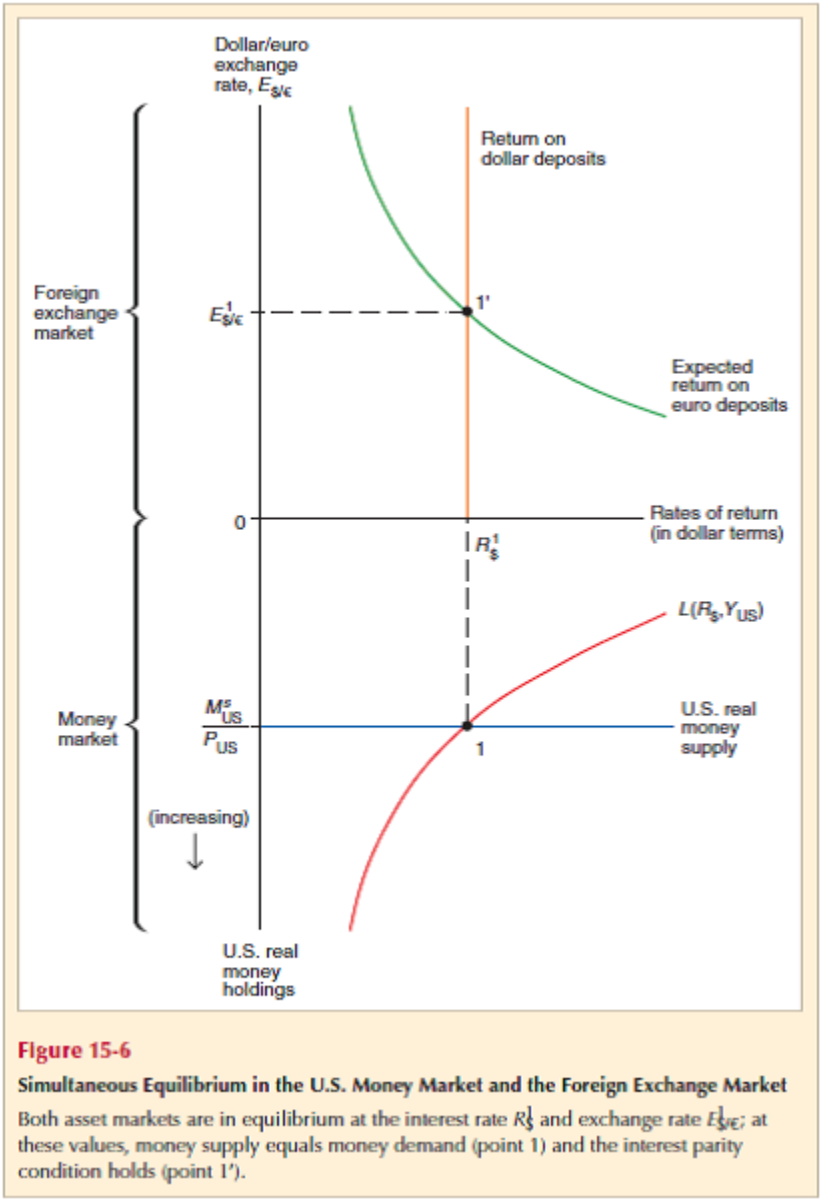

Figure 15-6

Simultaneous Equilibrium in the U.S. Money Market and the Foreign Exchange Market

Both asset markets are in equilibrium at the interest rate $R^1_\$$ and exchange rate $E^1_{\$/€}$; at these values, money supply equals money demand (point 1) and the interest parity condition holds (point 1').

The U.S. and European central banks, determine the U.S. and European money supplies. Given the price levels and national incomes of the two countries, equilibrium in national money market leads to the dollar and interest rates. These interest rates feed into the foreign exchange market, where, given expectations about the future dollar/euro exchange rate, the current rate is determined by the interest parity condition.

15.5.2. U.S. Money Supply and the Dollar/Euro Exchange Rate

We now use our model of asset market linkages to ask how the dollar/euro exchange rate changes when the Federal Reserve changes the U.S. money supply M^S_{US}. What happens when the Federal Reserve raises the U.S. money supply? This increase sets in motion the following sequence of events: (1) at the initial interest rate, there is an excess supply of money in the U.S. money market, so the dollar interest rate falls as

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the money market reaches its new equilibrium position. (2) Given the initial exchange rate and the new, lower interest rate on dollars, the expected return on euro deposits is greater than that on dollar deposits. (3) The dollar depreciates as holders of dollar deposits bid for euro deposits. We conclude that an increase in a country's money supply causes its currency to depreciate in the foreign exchange market. A reduction in a country's money supply causes its currency to appreciate in the foreign exchange market.

15.5.3. Europe's Money Supply and the Dollar/Euro Exchange Rate

The conclusions we have reached also apply when the ESCB changes Europe's money supply.

15.6. Money, the Price Level, and the Exchange Rate in 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 or the interest rate. The exchange rate's long-run equilibrium level rises in proportion to a permanent money supply increase.

An economy's long-run equilibrium is the position it would eventually reach if no new economic shocks occurred during the adjustment to full employment. 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.

15.6.1. Money and Money Prices

If the price level and output are fixed in the short run, the condition of money market equilibrium,

$M^S/P = L(R,Y)$,

determines the domestic interest rate, R. The money market always moves to equilibrium, however, even if we drop our short-run assumption. The above equilibrium condition can therefore be rearranged to give

$P = M^S/ L(R,Y)$,

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 just the value of P when the interest rate and output are at their long-run levels, that is, at 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.

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One of the most important predictions of the above equation for P concerns the relationship between a country's price level and its money supply, M^S: all else equal, an increase in a country's money supply causes a proportional increase in its price level. The economic reasoning behind this very precise prediction follows from our observation above that the demand for money is a demand for real money holdings: to keep the real money supply MS/P constant, P must rise in proportion to M^S.

15.6.2. The Long-Run Effects of Money Supply Changes

As we now argue, a change in the supply of money has no effect on the long-run values of the interest rate or real output.
The best way to understand the long-run effects of money supply on the interest rate and output is to think first about a currency reform, in which a country's government redefines the national currency unit. The redefinition of a monetary unit has no effect on real output, the interest rate, or the relative prices of goods: all that occurs is a one-time change in all values measured in a currency.

An increase in the supply of a country's currency has the same effect in the long run as a currency reform. A doubling of the money supply, for example, has the same long-run effect as a currency reform in which each unit of currency is replaced by two units of new currency. If the economy is initially full employed, every money price in the economy eventually doubles, but real GNP, the interest rate, and all relative prices return to their long-run or full-employment levels. Money supply changes do not change the long-run allocation of resources, only the absolute level of money prices.

This leads to the following conclusion: a permanent increase in the money supply causes a proportional increase in the price level's long-run value. 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.

15.6.3. Empirical Evidence on Money Supplies and Price Levels

In looking at actual data on money and prices, we should not expect to see an exactly 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. In addition, actual economies are rarely in positions of long-run equilibrium. Nonetheless, we should expect the data to show a clear-cut positive association between money supplies and price levels.

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15.6.4. 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. 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 proportional long-run appreciation of its currency against foreign currencies.

15.7. Inflation and Exchange Rate Dynamics

An increase in the money supply can cause the exchange rate to overshoot its long-run level in the short run. Exchange rate overshooting, which heightens the volatility of exchange rates, is a direct result of sluggish short-run price level adjustment and the interest parity condition.

An economy experiences inflation when its price level is rising and deflation when its price level is falling.

15.7.1. 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 does not jump immediately. This assumption cannot be exactly correct, because many commodities, such as agricultural products, are traded in markets where prices adjust sharply every day as supply or demand conditions shift. In addition, exchange rate changes themselves may affect the prices of some tradable goods and services that enter into the commodity basket defining the price level. Many prices in the economy, such as workers' wages, are written into long-term contracts and cannot be changed immediately when changes in the money supply occur. 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 sluggishness of wage movements.

We will continue to assume that the price level is given in the short run and does not make significant jumps in response to policy changes. This assumptions would not be reasonable, however, for all countries at all times. In extremely inflationary conditions, long-term contracts specifying domestic money payments may go out of use.
Our analysis assuming short-run price rigidity is nonetheless most applicable to countries with histories of comparative price level stability.

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Although the price levels appear to display short-run stickiness in many countries, a change in the money supply creates immediate demand and cost pressures that eventually lead to future increases in the price level. These pressures come from three main sources:

1. Excess demand for output and labor: an increase in the money supply has an expansionary effect on the economy, raising the total demand for goods and services.
2. Inflationary expectations: if everyone expects the price level to rise in the future, their expectation will increase the pace of inflation today.
3. Raw materials prices: many raw materials used in the production of final goods are sold in markets where prices adjust sharply even in the short run.

15.7.2. Permanent Money Supply Changes and the Exchange Rate

We now apply our analysis of inflation to study the adjustment of the dollar/euro exchange rate following a permanent increase in the U.S. money supply. We suppose that the economy starts with all variables at their long-run levels and that output remains constant as the economy adjusts to the money supply change. Due to the rise in real money supply, the interest is lowered. Because the money supply change is permanent, people expect a long-run increase in all dollar prices, including the exchange rate. A rise in the expected future dollar/euro exchange rate raises the expected dollar return on euro deposits.

15.7.3. Exchange Rate Overshooting

The exchange rate is said to overshoot when its immediate response to a disturbance is greater than its long-run response. It is an important phenomenon because it helps explain why exchange rates move so sharply from day to day.
The economic explanation of overshooting comes from the interest parity condition. It is easiest to grasp if we assume that before the money supply increase first occurs, no change in the dollar/euro exchange rate is expected.

Overshooting is a direct consequence of the short-run rigidity of the price level. In a hypothetical world where 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.

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16. Price Levels and the Exchange Rate in the Long Run

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 by the money prices of a reference commodity basket. Absolute PPP implies a second version of the PPP theory, relative PPP, which predicts that percentage changes in exchange rates equal differences in national inflation rates.
A building block of the PPP theory is the law of one price, which states that under free competition and in the absence of trade impediments, a good must sell for a single price regardless of where in the world it is sold. Proponents of the PPP theory often argue, however, that its validity does not require the law of one price to hold for every commodity.

The monetary approach to the exchange rate uses PPP to explain long-term exchange rate behavior exclusively in terms of money supply and demand. In that theory, long-run international interest differentials result from different national rates of ongoing inflation, as the Fisher effect predicts. The monetary approach thus finds that a rise in a country's interest rate will be associated with a depreciation of its currency. Relative PPP implies that the international interest differences, which equal the expected percentage change in the exchange rate, also equal the international expected inflation gap.

The empirical support for PPP and the law of one price is weak in recent date. The failure of these propositions in the real world is related to trade barriers and departures from free competition, factors that can result in pricing to market by exporters. For some products, including many services, international transport costs are so steep that these products become nontradable.

Deviations from relative PPP can be viewed as changes in a country's real exchange rate. All else equal, a country's currency undergoes a long-run real appreciation against foreign currencies when the world relative demand for its output rises. The home currency undergoes a long-run real depreciation against foreign currencies when home output expands relative to foreign output. In this case, the real exchange rate rises.

The long-run determination of nominal exchange rates can be analysed by combining two theories: the theory of the long-run real exchange rate and the theory of how domestic monetary factors determine long-run price levels. A stepwise increase in a country's money stock ultimately leads to a proportional increase in its price level

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and a proportional fall in its currency's foreign exchange value, just as relative PP predicts.
The interest parity condition equates international differences in nominal interest rates to the expected percentage change in the nominal exchange rate. If interest parity holds in this sense, a real interest parity condition equates international differences in expected real interest rates to the expected change in the real exchange rate.

We have seen that exchange rates are determined by interest rates and expectations about the future, which are, in turn, influenced by conditions in national money markets. To understand fully long-term exchange rate movements we have to extend our model in two directions. First, we must complete our account of the linkages among monetary policies, inflation, interest rates, and exchange rates. Second, we must examine factors other than money supplies and demands that also can have sustained effects on exchange rates.

In the long run, national price levels pay a key role in determining both interest rates and the relative prices at which countries' products are traded. A theory of how national price levels interact with exchange rates is thus central to understanding why exchange rates can change dramatically over periods of several years. The purchasing power parity explains movements in the exchange rate between two countries' currencies by changes in the countries' price levels.

16.1. The Law of One Price

The law of one price states that under free competition and in the absence of trade impediments, a good must sell for a single price regardless of where in the world it is sold.

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. This law states that in competitive markets free of transportation costs and official barrier to trade, identical goods sold in different countries must sell for the same price when their prices are expressed in terms of the same currency.

The law of one price is a restatement, in terms of currencies, of a principle that was important in the trade theory portion of this book: when trade is open and costless, identical goods must trade at the same relative prices regardless of where they are sold. We can state the law of one price formally as follows: let P^{I}_{US} be the dollar price of good *i* when sold in the United States, P^{I}_{E} the corresponding euro price in Europe.

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Then the law of one price implies that the dollar price of good *i* is the same wherever it is sold.

$P^{I}_{US} = (E_{\$/€})\ x\ (P^{I}_{E})$.

16.2. Purchasing Power Parity

The purchasing power parity theory asserts that the exchange rate between countries' currencies equals the ratio of their price levels. An equivalent statement of PPP is that the purchasing power of any currency is the same in any country. Absolute PPP implies a second version of the PPP theory, relative PPP, which predicts that percentage changes in exchange rates equal differences in national inflation rates.

The theory of purchasing power parity states that the exchange rate between two countries' currencies equals the ratio of the countries' price levels. It predicts that a fall in a currency's domestic purchasing power will be associated with a proportional currency depreciation in the foreign exchange market. Symmetrically, PPP predicts that an increase in the currency's domestic purchasing power will be associated with a proportional currency appreciation.

The basic idea of PPP was put forth in the writings of the 19th-century British economists, among them David Ricardo. While there has been much controversy about the general validity of PPP, the theory does highlight important factors behind exchange rate movements.

To express the PPP theory in symbols, let P_{US} be the dollar price of a reference commodity basket sold in the United States and P_E the euro price of the same basket in Europe. Then PPP predicts a dollar/euro exchange rate of

$E_{\$/€} = P_{US}/\ P_E$.

By rearranging this equation to read

$P_{US} = (E_{\$/€})\ x\ (P_E)$,

We get an alternative interpretation of PPP. The left side of this equation is the dollar price of the reference commodity basket in the U.S., the right side is the dollar price of the reference basket when purchased in Europe.

16.2.1. The Relationship Between PPP and the Law of One Price

Superficially, the statement of PPP given by the above stated equation looks like the law of one price, which says that $E_{\$/€} = P^{I}_{US}/P^{I}_{E}$ for any commodity *i*. There is a difference between PPP and the law of one price, however: the law of one price

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applies to individual commodities, while PPP applies to the general price level, which is a composite of the prices of all the commodities that enter into the reference basket.

Proponents of the PPP theory argue that its validity does not require the law of one price to hold exactly. Even when the law of one price fails to hold for each individual commodity, the argument goes, prices and exchange rates should not stray too far from the relation predicted by PPP. PPP thus asserts that even when the law of one price is not literally true, the economic forces behind it will help eventually to equalize a currency's purchasing power in all countries.

16.2.2. Absolute PPP and Relative PPP

The statement that exchange rates equal relative price levels is sometimes referred to as absolute PPP. This implies a proposition known as relative PPP, which states that the percentage change in the exchange rate between two currencies over any period equals the difference between the percentage changes in national price levels.
More formally, relative PPP between the United States and Europe would be written as

$$(E_{\$/€,\,t} - E_{\$/€,\,t-1})/\,E_{\$/€,\,t-1} = \pi_{US,\,t} - \pi_{E,\,t}$$

where π_t denotes an inflation rate. Unlike absolute PPP, relative PPP can be defined only with respect to the time interval over which price levels and the exchange rate change.

The notion of relative PPP comes in handy when we have to rely on government price level statistics to evaluate PPP. Relative PP is important also because it may be valid even when absolute PPP is not. Provided the factors causing deviations from absolute PPP are more or less stable over time, percentage changes in relative price levels can still approximate percentage changes in exchange rates.

16.3. A Long-Run Exchange Rate Model Based on PPP

The monetary approach to the exchange rate uses PPP to explain long-term exchange rate behavior exclusively in terms of money supply and demand. In that theory, long-run international interest differentials result from different national rates of ongoing inflation, as the Fisher effect predicts. The monetary approach thus finds that a rise in a country's interest rate will be associated with a depreciation of its currency.

When combined with the framework of money demand and supply, the theory of PPP leads to a useful theory of how exchange rates and monetary factors interact in the long run. Because factors that do not influence money supply or money demand play

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no explicit role in this theory, it is known as the monetary approach to the exchange rate.
We think of this approach as a long-run because it does not allow for the price rigidities that seem important in explaining short-run macro-economic developments, in particular departures from full employment.

16.3.1. The Fundamental Equation of the Monetary Approach

To develop the monetary approach's predictions for the dollar/euro exchange rate, we will assume that in the long run, the foreign exchange market sets the rate so that PPP holds

$E_{\$/€} = P_{US}/P_{E.}$

In other words, we assume the above equation would hold in a world where there are no market rigidities to prevent the exchange rate and other prices from adjusting immediately to levels consistent with full employment.

In the previous chapter, the following equations showed how we can explain domestic price levels in terms of domestic money demands and supplies. In the United States,

$P_{US} = M^S_{US}/L(R_{\$},Y_{US})$,

while in Europe,

$P_E = M^S_E/L(R_{€},Y_E)$.

As before, we have used the symbol M^S to stand for a country's money supply and $L(R,Y)$ to stand for its aggregate real money demand, which decreases when the interest rate rises and increases when real output rises.

The monetary approach makes the general prediction that the exchange rate, which is the relative price of American and European money, is fully determine din the long run by the relative supplies of those monies and the relative real demands for them. Shifts in interest rates 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 causes a proportional increase in the long-run U.S. price level. This causes a proportional long-run depreciation of the dollar against the euro.
2. Interest rates. A rise in the interest rate on dollar-denominated assets lowers real U.S. money demand.

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3. Output levels. A rise in U.S. output raises real U.S. money demand, leading to a fall in the long-run U.S. price level.

To understand these predictions, remember that the monetary approach, like any long-run theory, essentially assumes that price levels adjust as quickly as exchange rates do.

16.3.2. 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 or real output.

The reasoning in Chapter 15 suggest that continuing money supply growth will require a continuing rise in the price level – a situation of ongoing inflation. Other things equal, money supply growth at a constant rate eventually results in ongoing price level inflation at the same rate, but 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, is definitely not independent 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, continuing growth in the money supply eventually will affect the interest rate. The easiest way to show how a permanent increase in inflation affects the long-run interest rate is by combining PPP with the interest rate parity condition.

The condition of interest parity between dollar and euro asset is

$R_{\$} = R_{€} + (E^{e}_{\$/€} - E_{\$/€})/ E_{\$/€}$.

If people expect relative PPP to hold, the difference between the interest rates offered by dollar and euro deposits will equal the difference between the inflation rates expected, over the relevant horizon, in the United States and in Europe.

The following formula expresses the international interest rate difference as the difference between expected national inflation rates:

$R_{\$} - R_{€} = \pi^{e}_{US} - \pi^{e}_{E.}$

16.3.3. The Fisher Effect

The last above mentioned equation gives us the long-run relationship between ongoing inflation and interest rates that we need to explain the monetary approach's predictions about how interest rates affect exchange rates. The equation tells us that all else equal, a rise in a country's expected inflation rate will eventually cause an equal rise in the interest rate that deposits of its currency offer. Similarly, a fall in the

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expected inflation rate will eventually cause a fall in the interest rate.
This long-run relationship between inflation and interest rates is called the Fisher effect. It is another example of the general idea that in the long run, purely monetary developments should have no effect on an economy's relative prices.

The Fisher effect is behind the seemingly paradoxical monetary approach prediction that a currency depreciates in the foreign exchange market when its interest rate rises relative to foreign currency interest rates. In the long-run equilibrium assumed by the monetary approach, a rise in the difference between home and foreign interest rates occurs only when expected home inflation rises relative to expected foreign inflation.

Different assumptions about the speed of price level adjustment 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 monetary approach example of a rise in the money supply growth, however, an interest rate increase is associated with higher expected inflation and a currency that will be weaker on all future dates. An immediate currency depreciation is the result.

16.4. Empirical Evidence on PPP and the Law of One Price

The empirical support for PPP and the law of one price is weak in recent data.

All versions of the PPP theory do badly in explaining actual data on exchange rates and national price levels. PPP, however, is a key building block of exchange rate models that are more realistic than the monetary approach.
To test absolute PPP, economic researchers compare the international prices of a broad reference basket of commodities, making careful adjustments for intercountry quality differences among supposedly identical goods. These comparisons typically conclude that absolute PPP is way of the mark.
Relative PPP is sometimes a reasonable approximation to the data, but it, too usually performs poorly. Only over fairly long periods is relative PPP approximately satisfied.

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16.5. Explaining the Problems with PPP

The failure of these propositions in the real world is related to trade barriers and departures from free competition, factors that can result in pricing to market by exporters. For some products, including many services, international transport costs are so steep that these products become nontradable.

There are several immediate problems with our rational for the PPP theory of exchange rates, which was based on the law of one price:

1. Contrary to the assumption 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 and services from being traded between countries.
2. Monopolistic or oligopolistic practices in goods markets may interact with transport costs and other trade barriers to weak further the link between the prices of similar goods sold 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 offset official measures of inflation differences, even when there are no barriers to trade and all products are tradable.

16.5.1. Trade Barriers and Nontradables

Transport costs and governmental trade restrictions make it expensive to move goods between markets located in different countries and therefore weaken the law of one price mechanism underlying PPP. The greater the transport costs, the greater the range over which the exchange rate can move, given goods prices in different countries. Official trade restrictions such as tariffs have a similar effect, because a fee paid to the customs inspector affects the importer's profit in the same way as an equivalent shipping fee.

As you will recall, transport costs may be so large relative to the cost of producing some goods and services that they can never be traded internationally at a profit. The existence in all countries of nontraded goods and services, whose prices are not linked internationally, 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 broad commodity basked to change relative to the foreign price of the same basket.

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16.5.2. Departures from Free Competition

When trade barriers and imperfectly competitive market structures occur together, linkages between national price levels are weakened further. When a firm sells the same product for different prices in different markets, we say that it is practicing pricing to market. The combination of product differentiation and segmented markets, however, leads to large violations of the law of one price and absolute PPP. Shifts in market structure and demand over time can invalidate relative PPP.

16.5.3. Differences in Consumption Patterns and Price Level Measurement

Government measures of the price level differ from country to country. One reason for these differences is that people living in different countries spend their incomes in different ways. Because relative PPP makes predictions about price changes rather than price levels, it is a sensible concept regardless of the baskets used to define price levels in the countries being compared. Change in the relative prices of basket components, however, can cause relative PPP to fail tests that are based on official price indexes.

16.5.4. PPP in the Short Run and in the Long Run

The factors we have examined so far in explaining the PPP theory's poor empirical performance can cause national price levels to diverge even in the long run, after all prices have had time to adjust to their market-clearing levels.
You might suspect that short-run price stickiness and exchange rate volatility help explain a phenomenon we discussed earlier – that violations of relative PPP have been much more flagrant over period when exchange rates have floated. The economist Mussa found that floating exchange rates systematically lead to much larger and more frequent short-run deviations from relative PPP.

Recent research suggest that short-run deviations from PPP such as those due to volatile exchange rates die away over time, with only half the effect of a temporary departure from PPP remaining after four years.

16.6. Beyond Purchasing Power Parity: A General Model of Long-Run Exchange Rates

Deviations from relative PPP can be viewed as changes in a country's real exchange rate. All else equal, a country's currency undergoes a long-run real appreciation against foreign currencies when the world relative demand for its output rises.

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The long-run analysis below continues to ignore short-run complications caused by sticky prices.

16.6.1. The Real Exchange Rate

As the first step in extending the PP theory, we define the concept of a real exchange rate. The real exchange rate between two countries' currencies is a broad summary measure of the prices of one country's goods and services relative to the other country's.
As we will see, real exchange rates are important not only for quantifying deviations from PPP but also for analysing macroeconomic demand and supply conditions in open economies. When we wish to differentiate a real exchange rate – which is the relative price of two output baskets – from a relative price of two currencies, we will refer to the latter as a nominal exchange rate. We will continue to use the shorter term, exchange rate, to refer to nominal exchange rates.

Real exchange rates are defined in terms of nominal exchange rates and price levels. Let P_{US} be the price level in the United States and P_E the price level in Europe. Since we will not be assuming absolute PPP, we no longer assume that the price level can be measured by the same basket of commodities. To be concrete, you can think of P_{US} as the dollar price of an unchanging basket containing the typical weekly purchases of the U.S. households and firms; the same holds for the European price level. The point to remember is that the U.S. price level will place a relatively heavy weight on commodities produced and consumed in America, and the European price level a relatively heavy weight on commodities produced and consumed in Europe.
We can express the real exchange rate as the dollar value of Europe's price level divided by the U.S. price level, or

$$q_{\$/€} = (E_{\$/€} + P_E)/P_{US}.$$

A rise in the real dollar/euro exchange rate $q_{\$/€}$, can be thought of in several equivalent ways. Most obviously, this real depreciation is a fall in the purchasing power of a dollar within Europe's borders relative to its purchasing power within the United States.
A real appreciation of the dollar against the euro is a fall in $q_{\$/€}$. This fall indicates a decrease in the relative price of products purchased in Europe, or a rise in the dollar's European purchasing power compared with that in the United States.

16.6.2. Demand, Supply, and the Long-Run Real Exchange Rate

In a world where PPP does not hold, the long-run values of real exchange rates depend on demand and supply conditions. We focus on two specific cases that are both easy to grasp and important in practice for explaining why the long-run values of real exchange rates can change.

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1. A change in world relative demand for American products: when total world spending on American goods and services rises relative to total world spending on European goods and services, this can arise from several sources. It will cause a long-run real appreciation of the dollar against the euro. Similarly, a decrease in the world relative demand for U.S. output causes a long-run real depreciation of the dollar against the euro.
2. A change in relative output supply: a relative expansion of U.S. output causes a long-run real depreciation of the dollar against the euro. A relative expansion of European output causes a long-run real appreciation of the dollar against the euro.

16.6.3. Nominal and Real Exchange Rates in Long-Run Equilibrium

One central conclusion is that changes in national money supplies and demands give rise to the proportional long-run movements in nominal exchange rates and international price level ratios predicted by the relative purchasing power parity. Demand and supply shifts in national output markets, however, cause nominal exchange rate movements that do not conform to PPP.

The following equation gives us the nominal dollar/euro exchange rate as the real dollar/euro exchange rate times the U.S.-Europe price level ratio:

$E_{\$/€} = q_{\$/€} \times (P_{US}/P_E)$.

The equation implies that for a given real dollar/euro exchange rate, changes in money demand or supply in Europe or the United States affect the long-run nominal dollar/euro exchange rate as in the monetary approach. Changes in the long-run real exchange rate, however, also affect the long-run nominal exchange rate.

Assuming that all variables start out at their long-run levels, we can now understand the most important determinants of long-run swings in nominal exchange rates:

1. A shift in relative money supply levels: 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.
2. A shift in relative money supply growth rates: a purely monetary change brings about a long-run nominal exchange rate shift in line with relative PPP.
3. A change in relative output demand: since a change in relative output demand does not affect long-run national price levels, the long-run nominal exchange rate will change only insofar as the real exchange rate changes. A long-run nominal appreciation of the dollar against the euro must also occur.

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4. A change in relative output supply: an increase in relative U.S. output supply causes the dollar to depreciate in real terms against the euro, lowering the relative price of U.S. output.

We conclude that wen all disturbances are monetary in nature, exchange rates obey relative PPP in the long run. In the long run, a monetary disturbance affects only the general purchasing power of a currency, and this change in purchasing power changes equally the currency's value in terms of domestic and foreign goods. When disturbances occur in output markets, the exchange rate is unlikely to obey relative PPP, even in the long run.

16.7. International Interest Rate Differences and the Real Exchange Rate

The long-run determination of nominal exchange rates can be analysed by combining two theories: the theory of the long-run real exchange rate and the theory of how domestic monetary factors determine long-run price levels.

Earlier we saw that relative PPP, when combined with interest parity, implies that international interest rate differences equal differences in countries' expected inflation rates.

In this section we will show that in general, interest rate differences between countries depend not only on differences in expected inflation, but also on expected changes in the real exchange rate.
The change in $q_{\$/€}$, the real dollar/euro exchange rate, is the deviation from relative PPP; that is, the change in $q_{\$/€}$ is the percentage change in the nominal dollar/euro exchange rate less the international difference in inflation rates between the U.S. 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:

$$(q^e_{\$/€} - q_{\$/€})/q_{\$/€} = [(E^e_{\$/€} - E_{\$/€})/E_{\$/€}] - (\pi^e_{US} - \pi^e_{E}),$$

where $q^e_{\$/€}$ is the real exchange rate expected for a year from today.

Now we return to the interest parity condition between dollar and euro deposits,

$$R_{\$} - R_{€} = (E^e_{\$/€} - E_{\$/€})/ E_{\$/€}.$$

An easy rearrangement 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 difference. Combining the two equations, we thus are led to the following breakdown of the international interest rate gap:

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$R\$ - R€ = [(q^e_{\$/€} - q_{\$/€})/ q_{\$/€}] + (\pi^e_{US} - \pi^e_E)$.

In general, however, the dollar/euro interest difference is the sum of two components: (1) the expected rate of real dollar depreciation against the euro and (2) the expected inflation difference between the United States and Europe.

16.8. Real Interest Parity

The interest parity condition equates international differences in nominal interest rates to the expected percentage change in the nominal exchange rate. If interest parity holds in this sense, a real interest parity condition equates international differences in expected real interest rates to the expected change in the real exchange rate.

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. Because the latter are often uncertain, we usually will refer to expected real interest rates.

We conclude this chapter by showing that when the nominal interest parity condition equates nominal interest rate differences between currencies to expected changes in nominal exchange rates, a real interest parity condition equates expected real interest rate differences to expected changes in real exchange rates. Only when relative PPP is expected to hold are expected real interest rates in all countries identical.
The expected real interest rate, denoted r^e, is defined as the nominal interest rate, R, less the expected inflation rate, π^e:

$r^e = R - \pi^e$.

In other words, the expected real interest rate in a country is just the real rate of return a domestic resident expects to earn on a loan of his or her currency.
A useful 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:

$r^e_{US} - r^e_E = (R\$ - \pi^e_{US}) - (R€ - \pi^e_E)$.

If we rearrange and combine these equations, we get the desired real interest parity condition:

$r^e_{US} - r^e_E = (q^e_{\$/€} - q_{\$/€})/q_{\$/€}$.

Expected real interest rates are the same in different countries when relative PPP is expected to hold. More generally, however, expected real interest rates in different

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countries need not be equal, even in the long run, if continuing change in output markets is expected.
Do such real interest differences imply unnoticed profit opportunities for international investors? Not necessarily. A cross-border real interest difference does imply that residents of two countries perceive different real rates of return on wealth.

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17. Output and the Exchange Rate in the Short Run

The standard trade model derives a world relative supply curve from production possibilities and a world relative demand curve from preferences. The price of exports relative to imports, a country's terms of trade, is determined by the intersection of the world relative supply and demand curves. Other things equal, a rise in a country's terms of trade increases its welfare.

Economic growth means an outward shift in a country's production possibility frontier. Such growth is usually biased; the immediate effect of biased growth is to lead, other things equal, to an increase in the world relative supply of the goods toward which the growth is biased. This shift in the world relative supply curve in turn leads to a change in the growing country's terms of trade, which can go either direction.
The direction of the terms of trade effects depends on the nature of the growth. Growth that is export-biased worsens the terms of trade, while growth that is import-biased improves a country's terms of trade.

Import tariffs and export subsidies affect both relative supply and relative demand. A tariff raises relative supply of a country's import good while lowering relative demand. An export subsidy has the reverse effect; it hurts the terms of trade and reduces relative demand for the country's export good. This suggest that export subsidies do not make sense from a national point of view and that foreign export subsidies should be welcomed rather than countered.

International borrowing and lending can be viewed as a kind of international trade, but one that involves trade of present consumption for future consumption rather than trade of one good for another. The relative price at which this intertemporal trade takes place is 1 plus the real rate of interest.
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By completing the macroeconomic model built in the last three chapters, this chapter will sort out the complicated factors that cause output, exchange rates, and inflation to change. Chapters 15 and 16 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.

17.1. Determinants of Aggregate Demand in an Open Economy

The aggregate demand for an open economy's output consists of four components corresponding to the four components of GNP. An important determinant of the current account is the real exchange rate.

To analyze how output is determined in the short run when product prices are sticky, we introduce the concept of aggregate demand for a country's output. The economy is at full employment in the long run because wages and price level eventually adjust to ensure full employment. In the long run, domestic output therefore depends only on the available domestic supplies of factors of production such as labor and capital. These productive factors can be over- or underemployed in the short run as a result of shifts in aggregate demand that have not yet had their full long-run effects on prices.

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17.1.1. Determinants of Consumption Demand

In this chapter we view the amount a country's residents wish to consume as depending on disposable income, Y^d. With this assumption, a country's desired consumption level can be written as a function of disposable income:

$C = C(Y^d)$.

Because each consumer naturally demands more goods and services as his or her real income rises, we expect consumption to increase as disposable income increases at the aggregate level, too. However, when disposable income rises, consumption demand generally rises by less because part of the income increase is saved.

17.1.2. Determinants of the Current Account

The current account balance is determined by two main factors: the domestic currency's real exchange rate against foreign currency and domestic disposable income.
We express a country's current account balance as a function of its currency's real exchange rate, $q = EP^*/P$, and of domestic disposable income, Y^d:

$CA = CA(EP^*/P, Y^d)$.

The real exchange rate q, defined as the price of the foreign basket in terms of the domestic one is therefore EP^*/P. Real exchange rate changes affect the current account because they reflect changes in the prices of domestic goods and services relative to foreign goods and services. Disposable income affects the current account through its effect on total spending by domestic consumers.

17.1.3. How Real Exchange Rate Changes Affect the Current Account

A representative domestic expenditure basket includes some imported products 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 country. Thus a 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 output.

When EP^*/P rises, foreign products have become more expensive relative to domestic products: each unit of domestic output now purchases fewer units of foreign output. Foreign consumers will respond to this price shift by demanding more of our exports. This will tend to improve the domestic country's account. Additionally, domestic consumers respond to the price shift by purchasing fewer units of the more expensive foreign products. This, however, does not imply that IM must fall, because IM denotes the value of imports.

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Whether the current account improves or worsens depends on which effect of a real exchange rate is dominant – the volume effect of consumer spending shifts on export and import quantities, or the value effect, which changes the domestic output equivalent of a given volume of foreign imports. We assume for now that the volume effect always outweighs the value effect, so other things equal, a real depreciation of the currency improves the current account and a real appreciation of the currency worsens the current account.

17.1.4. How Disposable Income Changes Affect the Current Account

The second factor influencing the current account is domestic disposable income. Since a rise in Y^d causes domestic consumers to increase their spending on all goods, including imports from abroad, an increase in disposable income worsens the current account, other things equal.

17.2. The Equation of Aggregate Demand

A real depreciation of the home currency raises aggregate demand for home output, while a real appreciation lowers aggregate demand for home output. A rise in domestic real income raises aggregate demand for home output, and a fall in domestic real income lowers aggregate demand for home output.

We now combine the four components of aggregate demand to get an expression for total aggregate demand, denoted *D:*

$$D = C(Y - T) + I + G + CA(EP^*/P, Y - T),$$

Where we have written disposable income Y^d as output, Y, less taxes, T. This shows that aggregate demand for home output can be written as a function of the real exchange rate, disposable income, investment demand, and government spending:

$$D = D(EP^*/P, Y - T, I, G).$$

17.2.1. The Real Exchange Rate and Aggregate Demand

A rise in EP^*/P makes domestic goods and services cheaper relative to foreign goods and services and shifts both domestic and foreign spending from foreign goods to domestic goods. As a result, CA rises and aggregate demand, D, therefore goes up. A real depreciation of the home currency raises aggregate demand for home output, other things equal; a real appreciation lowers aggregate demand for home output.

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17.2.2. Real Income and Aggregate Demand

The effect of domestic real income on aggregate demand is slightly more complicated. If taxes are fixed at a given level, a rise in Y represents an equal rise in disposable income Y^d. while this rise in Y^d raises consumption, it worsens the current account by raising home spending on foreign imports. Therefore, a rise in domestic real income raises aggregate demand for home output, other things equal, and a fall in domestic real income lowers aggregate demand for home output.

17.3. How Output is Determined in the Short Run

Output is determined in the short run by the equality of aggregate demand and aggregate supply.

The output market is in equilibrium when real domestic output, Y, equals the aggregate demand for domestic output:

$Y = D(EP^*/P, Y - T, I, G)$.

The equality of aggregate supply and demand therefore determines the short-run equilibrium output level.

Our analysis of real output determination applies to the short run because we assume that the money prices of goods and services are temporarily fixed. In the short run, output settles at the intersection of aggregate demand and supply.

17.4. Output Market Equilibrium in the Short Run: The DD Schedule

The economy's short-run equilibrium occurs at the exchange rate and output level, which is an upward-sloping *DD* schedule.

To understand how output is determined for a given real exchange rate EP^*/P, we need two elements. The first element is the relationship between output and the exchange rate that must hold when the output market is in equilibrium. The second element is the relationship between output and the exchange rate that must hold when the home money market and the foreign exchange market are in equilibrium.

17.4.1. Output, the Exchange Rate, and Output Market Equilibrium

The below presented figure illustrates the relationship between the exchange rate and output implied by output market equilibrium. With fixed price levels at home and abroad, the rise in the nominal exchange rate makes foreign goods and services more expensive relative to domestic goods and services.

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The fall 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 higher.
Any rise in the real exchange rate EP^*/P, will cause an upward shift in the aggregate demand function and an expansion of output, all else equal. Similarly, any fall in EP^*/P will cause output to contract, all else equal.

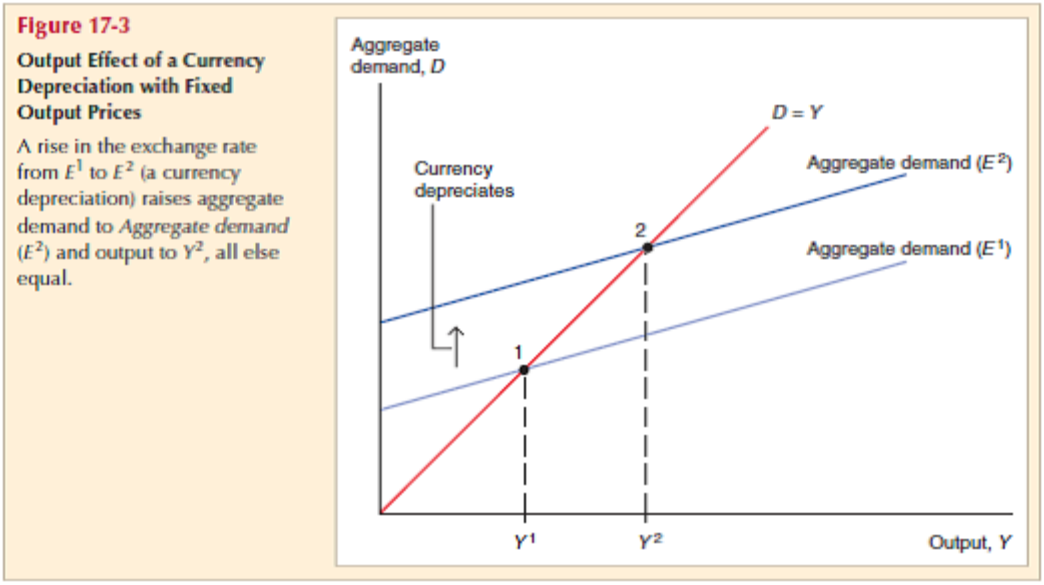

Figure 17-3
Output Effect of a Currency Depreciation with Fixed Output Prices
A rise in the exchange rate from E^1 to E^2 (a currency depreciation) raises aggregate demand to *Aggregate demand* (E^2) and output to Y^2, all else equal.

17.4.2. Deriving the DD Schedule

If we assume P^* and P are fixed in the short run, a depreciation of the domestic currency is associated with a rise in domestic output, Y, while an appreciation is associated with a fall in Y. We summarize the relationship between E and Y by the *DD* schedule, which shows all combinations of output and the exchange rate for which the output market is in short-run equilibrium.

17.4.3. Factors That Shift the DD Schedule

A number of factors affect the position of the *DD* schedule: the levels of government demand, taxes, and investment; the domestic and foreign price levels; variations in domestic consumption behavior; and the foreign demand for home output.

1. A change in *G*: an increase in *G* causes the aggregate demand schedule to shift upward. For any given exchange rate, the level of output equating aggregate demand and supply is higher after the increase in *G*. This implies that an increase in *G* causes *DD* to shift to the right, while a decrease in *G* causes *DD* to shift to the left.
2. A change in *T*: taxes affect aggregate demand by changing disposable income, and thus consumption, for any level of *Y*. An increase in taxes causes the

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aggregate demand function to shift downward given the exchange rate *E*. Thus, an increase in *T* must cause the *DD* schedule to shift leftward.

3. A change in *I*: the aggregate demand schedule shifts upward and *DD* shifts to the right. A fall in investment demand shifts *DD* to the left.
4. A change in *P*: an increase in *P* shifts the *DD* schedule to the left as aggregate demand falls. A fall in *P* makes domestic goods cheaper and causes a rightward shift of *DD*.
5. A change in P^*: a rise in P^* makes foreign goods and services relatively more expensive, thus rising aggregate demand for domestic output and shifting *DD* to the right.
6. A change in the consumption function: if the increase in consumption spending is not devoted 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* schedule.
7. A demand shift between foreign and domestic goods: if domestic spending increases, the current account will improve by raising exports and lowering imports. The aggregate demand schedule shifts upward and *DD* therefore shifts to the right.

A simple rule allows you to predict the effect on *DD* of any of the disturbances discussed: any disturbance that raises aggregate demand for domestic output shifts the *DD* schedule to the right; any disturbance that lowers aggregate demand for domestic output shifts the *DD* schedule to the left.

17.5. Asset Market Equilibrium in the Short Run: The AA Schedule

The AA schedule represents the equilibrium of the exchange rate and output combinations in the domestic money market and the foreign exchange market.

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.

17.5.1. Output, the Exchange Rate, and Asset Market Equilibrium

For a given expected future exchange rate, E^e, the interest parity condition describing foreign exchange market equilibrium is:

$$R = R^* + (E^e - E)/E,$$

Where *R* is the interest rate on domestic currency deposits and R^* is the interest rate on foreign currency deposits. The domestic interest rate satisfying the interest parity

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condition must also equate the real domestic money supply, M^s/P, to aggregate real money demand:

$M^s/P = L(R, Y)$.

Aggregate real money demand rises when the interest rate falls because a fall in R makes interest-bearing nonmoney assets less attractive to hold. A rise in real output, Y, increases real money demand by raising the volume of monetary transactions people must carry out.

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 depreciation.

17.5.2. 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. The *AA* schedule has a negative slope.

17.5.3. Factors That Shift the AA Schedule

Five factors cause the *AA* schedule to shift: changes in the domestic money supply; changes in the domestic price level; changes in the expected future exchange rate; changes in the foreign interest rate; and shifts in the aggregate real money demand schedule.

1. A change in M^s: for a fixed level of output, an increase in M^s causes the domestic currency to depreciate in the foreign exchange market, which causes *AA* to shift upward.
2. A change in P: an increase in P reduces the real money supply and drives the interest rate upward, which causes E to fall and *AA* to shift downward.
3. A change in E^e: a rise in E^e causes the domestic currency to depreciate, other things equal. *AA* shifts upward, while it shifts downward when the expected future exchange rate falls.
4. A change in R^*: a rise in R^* raises the expected return on foreign currency deposits and therefore shifts the *AA* curve upwards.
5. A change in real money demand: a reduction in money demand implies an inward shift of the aggregate real money demand function for any fixed level of Y, and it thus results in a lower interest rate and a rise in E. A reduction in money demand has therefore the same effect as an increase in the money supply, in that it shifts *AA* upward.

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17.6. Short-Run Equilibrium for an Open Economy: Putting the DD and AA Schedules Together

Short-run equilibrium occurs at the exchange rate and output level where aggregate demand equals aggregate supply and the asset markets are in equilibrium; the intersection of the upward-sloping *DD* schedule and the downward-sloping *AA* schedule.

A short-run equilibrium for the economy as a whole must lie on both schedules because such a point must bring about equilibrium simultaneously in the output and asset markets. Once again, it is the assumption that domestic output prices are temporarily fixed that makes this intersection a short-run equilibrium. Furthermore, the foreign interest rate, the foreign price level, and the expected future exchange rate also are fixed.

A 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. This leads to an immediate fall in the exchange rate. This appreciation equalizes the expected returns on domestic and foreign deposits.

17.7. Temporary Changes in Monetary and Fiscal Policy

A temporary increase in the money supply, which does not alter the long-run expected exchange rate, causes a depreciation of the currency and a rise in output. Temporary fiscal expansion also results in rise in output, but it causes the currency to appreciate.

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. The only monetary policies we will study explicitly are one-shot increases or decreases in money supplies
In this section we examine temporary policy shifts. The expected future exchange rate is now assumed to equal the long-run exchange rate that prevails once full employment is reached and domestic prices have adjusted fully to past disturbances in the output and asset markets.
We assume throughout that events in the economy we are studying do not influence the foreign interest rate of price level, and that the domestic price level is fixed in the short run.

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17.7.1. Monetary Policy

An increased money supply shifts *AA* upward, but does not affect the position of *DD*. An increase in the money supply causes a depreciation of the domestic currency, an expansion of output, and therefore an increase in employment.
To preserve interest parity in the face of a decline in *R*, the exchange rate must depreciate immediately to create the expectation that the home currency will appreciate in the future at a faster rate than was expected before *R* fell.

17.7.2. Fiscal Policy

A temporary fiscal expansion raises aggregate demand and therefore shifts the DD schedule to the right but does not move AA.
The increase in output 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 and the foreign interest rate have not changed, the domestic currency must appreciate to create the expectation of a subsequent depreciation just large enough to offset the higher international interest rate difference in favor of domestic currency deposits.

17.7.3. Policies to Maintain Full Employment

Because temporary monetary expansion and temporary fiscal expansion both raise output and employment, they can be used to counteract the effects of temporary disturbances that lead to recession.

Suppose there is a sudden, temporary shift in consumer tastes away from domestic products. This decreases aggregate demand for domestic goods, and shifts the curve *DD* leftward. The currency has depreciated, and output is below its full-employment level: the economy is in a recession. 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, and a temporary money supply increase shifts the asset market equilibrium curve upward.

17.8. Inflation Bias and Other Problems of Policy Formulation

Monetary policy and fiscal policy can be used by the government to offset the effects of disturbances to output and employment. A major practical problem is

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ensuring that the government's ability to stimulate the economy does not tempt it to gear policy to short-term political goals, thus creating an inflation bias.

The apparent ease with which full employment is maintained in our model is misleading. Here are just a few of the many problems that can arise:

1. Sticky nominal prices not only give a government the power to raise output when it is low, but also may tempt it to create a politically useful economic boom, say, just before a close election. This temptation causes problems when workers and firms anticipate it in advance. The government will then find itself in the position of having to use expansionary policy tools merely to prevent the recession that higher domestic prices otherwise would cause. As a result, macroeconomic policy will display an inflation bias.
2. In practice, it is sometimes hard to be sure whether a disturbance to the economy originates in the output or the asset markets.
3. Real-world policy choices are frequently determined by bureaucratic necessities rather than by detailed consideration of whether shocks to the economy are real or monetary.
4. Another problem with fiscal policy is its impact on the government budget. A tax cut or spending increase may lead to a larger government budget deficit, which must sooner or later be closed by a fiscal reversal.
5. Policies that appear to act swiftly in our simple model operate in reality with lags of varying lengths.

17.9. Permanent Shifts in Monetary and Fiscal Policy

Permanent shifts in the money supply alter the long-run expected exchange rate and lead to a rising price level, which ultimately reverses the effect on the real exchange rate of the nominal exchange rate's initial depreciation.
If the economy starts out in long-run equilibrium a permanent fiscal expansion has no expansionary effect at all.

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. This means that the economy starts out at full employment with the exchange rate at its long-run level and with no change in the exchange rate expected.

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17.9.1. A Permanent Increase in the Money Supply

Even a temporary increase in M^s causes the asset market equilibrium schedule to shift upward. Because the increase is now permanent, however, it also affects the exchange rate expected for the future, E^e. Because a rise in E^e accompanies a permanent increase in the money supply, the upward shift of *AA* is greater than that caused by an equal increase.

17.9.2. Adjustment to a Permanent Increase in the Money Supply

The increase in the money supply is not reversed by the central bank, so it is natural to ask how the economy is affected over time. At the short-run equilibrium, output is above its full-employment level and labor and machines 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. Over time, the inflationary pressure that follows a permanent money supply expansion pushes the price level to its new long-run value and returns the economy to full employment.
A permanent increase in money demand can be offset with a permanent increase of equal magnitude in the money supply. 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.

17.9.3. 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.
The increase in government demand for domestic goods causes *DD* to shift right and causes a long-run appreciation of the currency. This in turn pushes the asset market equilibrium schedule *AA* downward.

In some cases fiscal expansion, contrary to what you might have guessed, has no net effect on output. This case is not a special one; it is inevitable under the assumptions we have made. The argument that establishes this point requires five steps:

1. Convince yourself that because the fiscal expansion does not affect the money supply; the long-run values of the domestic interest rate; or output, it can have no impact on the long-run price level.

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2. Recall our assumption that the economy starts out in long-run equilibrium with the domestic interest rate just equal to the foreign rate, and output equal to Y^f.
3. Now imagine that output did rise above Y^f. Because M^s/P doesn't change in the short run, the domestic interest rate would have to rise above its initial level of R^* to keep the money market in equilibrium. This implies an expected depreciation of the domestic currency.
4. Notice next that there is something wrong with this conclusion. Such a real depreciation, by making domestic products relatively cheap, would only worsen the initial situation of overemployment that we have imagined to exist, and thus would prevent output from ever actually returning to Y^f.
5. Finally, conclude that the apparent contradiction is resolved only if output does not rise at all after the fiscal policy move.

We concluded that if the economy starts at long-run equilibrium, a permanent change in fiscal policy has no net 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.

17.10. Macroeconomic Policies and the Current Account

Monetary expansion causes the current account balance to increase in the short run. In contrast, expansionary fiscal policy reduces the current account balance.

Policy makers are often concerned about the level of the current account. An excessive imbalance in the current account may have undesirable long-run effects on national welfare.

The *DD-AA* model can be extended to illustrate the effects of macroeconomic policies on the current account. The *XX* curve shows combinations of the exchange rate and output at which the current account balance would be equal to some desired level, say $CA(EP^*/P, Y - T) = X$. The curve slopes upward because, other things equal, a rise in output encourages spending on imports and thus worsens the current account if it is not accompanied by a currency depreciation.
An increase in the money supply, expands output and depreciates the currency. This improves the current account. Thus, monetary expansion causes the current account balance to increase in the short run. In contrast, expansionary fiscal policy reduces the current account balance.

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17.11. Gradual Trade Flow Adjustment and Current Account Dynamcis

If exports and imports adjust gradually to real exchange rate changes, the current account may follow a J-curve pattern after a real currency depreciation, first worsening and then improving.

An important assumption underlying the *DD-AA* model is that, other things equal, a real depreciation of the home currency immediately improves the current account while a real appreciation causes the current account immediately to worsen. In reality, however, the behavior underlying trade flows may be far more complex.

17.11.1. The J-Curve

It is sometimes observed that a country's current account worsens immediately after a real currency depreciation and begins to improve only some months later, contrary to the assumption we made in deriving the DD curve. If the current account initially worsens after a depreciation, its time path has an initial segment reminiscent of a J.

The current account can deteriorate sharply after a real currency depreciation because most import and export orders are placed several months in advance. Even after the old export and import contracts have been fulfilled, it still takes time for new shipments to adjust fully to the relative price change. Empirical evidence indicates for most industrial countries a J-curve lasting more than six months but less than a year.

If expansionary monetary policy actually depresses output in the short run, the domestic interest 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 create the larger expected domestic currency appreciation required for foreign exchange market equilibrium. By introducing an additional source of overshooting, J-curve effects amplify the volatility of exchange rates.

17.11.2. Exchange Rate Pass-Through and Inflation

In reality, even the short-run correspondence between nominal and real exchange rate movements, while quite close, is less than perfect.
The domestic currency price of foreign output is the product of the exchange rate and the foreign currency price. We have assumed until now that when E rises, for example, P^* remains fixed so that the domestic currency price of goods imported from abroad rises in proportion. The percentage by which import prices rise when the home currency depreciates by 1 percent is known as the degree of pass-through from the exchange rate to import prices.

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Contrary to our initial 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 to market by charging different prices for the same product in different countries.
We thus see that while a permanent nominal exchange rate change may be fully reflected in import prices in the long run, the degree of pass-through may be far less than 1 in the short run. On the one hand, the short-run J-curve effect of a nominal currency change will be dampened by a low responsiveness of import prices to the exchange rate. On the other hand, incomplete pass-through implies that currency movements have less-than-proportional effects on the relative prices determining trade volumes.

17.12. The Liquidity Trap

The liquidity trap represents the problem of an economy's nominal interest rate that has fallen to zero, making it impossible for the central bank to reduce it further by increasing the money supply.

During the lengthy Great Depression of the 1930s, the nominal interest rate hit zero in the United States, and the country found itself caught in what economists call a liquidity trap. A liquidity trap is a trap because once an economy's nominal interest rate falls to zero, the central bank cannot reduce it further by increasing the money supply. At negative nominal interest rates, people would find money strictly preferable to bonds.

Economists thought liquidity traps were a thing of the past until Japan fell into one in the late 1990s. The dilemma a central bank faces when the economy is in a liquidity trap slowdown can be seen by considering the interest parity condition when the domestic interest rate $R = 0$,

$R = O = R^* + (E^e - E)/E.$

Assume for the moment that the expected future exchange rate, E^e, is fixed. Suppose the central bank raises the domestic money supply so as to depreciate the currency temporarily. Despite the increase in the money supply, the exchange rate remains steady at the level

$E = E^e/(1 - R^*).$

The currency cannot depreciate further.

Our earlier assumption that the expected future exchange rate is fixed is a key

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ingredient in this liquidity trap story. Suppose the central bank can credibly promise to raise the money supply permanently, so that E^e 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, output will therefore expand, and the currency will depreciate.

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18. Fixed Exchange Rates and Foreign Exchange Intervention

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 assets, the country's money supply automatically increases. Similarly, a central bank sale of foreign assets automatically lowers the money supply. The central bank balance sheet shows how foreign exchange intervention affects the money supply because the central bank's liabilities, which rise or fall when its assets rise or fall, are the base of the domestic money supply process. The central bank can negate the money supply effect of intervention through sterilization.

A central bank can fix the exchange rate of its currency against foreign currency if it is willing to trade unlimited amounts of domestic money against foreign assets at that rate. To fix the exchange rate, the central bank must intervene in the foreign exchange market whenever necessary to prevent the emergence of an excess demand or supply of domestic currency assets. In effect, the central bank adjusts its foreign assets – and thus, the domestic money supply – to ensure that asset markets are always in equilibrium under the fixed exchange rate.

A commitment to fix an exchange rate forces the central bank to sacrifice its ability to use monetary policy for stabilization. A purchase of domestic assets by the central bank causes an equal fall in its official international reserves, leaving the money supply and output unchanged.

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 that 'crowds out' aggregate demand. Instead, it forces central bank purchase of foreign assets and an expansion of the money supply. Devaluation also raises aggregate demand and the money supply in the short run. In the long run, fiscal expansion causes a real appreciation, an increase in the money supply, and a rise in the home price level.

Balance of payments crises occur when market participants expect the central bank to change the exchange rate from its current level. If the market decides a devaluation is coming, the domestic interest rate rises above the world interest rate and foreign reserves drop sharply as private capital flows abroad. Self-fulfilling currency crises can occur when an economy is vulnerable to speculation.

A system of managed floating allows the central bank to retain some ability to

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control the domestic money supply, but at the cost of greater exchange rate instability. If domestic and foreign bonds are imperfect substitutes, 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 direct effect on exchange rates.

A world system of fixed exchange rates in which countries peg the prices of their currencies in terms of a reserve currency involves a striking asymmetry: the reserve currency country, which does not have to fix any exchange rate, can influence economic activity both at home and abroad through its monetary policy. In contrast, all other countries are unable to influence their output or foreign output through monetary policy.

A gold standard, in which all countries fix their currencies' prices in terms of gold, avoids the asymmetry inherent in a reserve currency standard and also places constraints on the growth of the countries' money supplies. But the gold standard has serious drawback that make it impractical as a way of organizing today's international monetary system. Even the dollar-based gold exchange standard set up after World War II ultimately proved unworkable.

To hold the exchange rate constant, a central bank must always be willing to trade currencies at the fixed exchange rate with the private actors in the foreign exchange market. The bank must also be willing to buy any amount of dollar assets the market wants to sell for another currency at that exchange rate.
The central bank can succeed in holding the exchange rate fixed only if its financial transactions ensure that asset markets remain in equilibrium when the exchange rate is at its fixed level.

18.1. Why Study Fixed Exchange Rates?

Fixed exchange rates are studied because we need to understand the effects of managed floating, regional currency arrangements, developing countries, and the lessons of the past for the future.

There are four reasons why we must understand fixed exchange rates before analyzing contemporary macroeconomic policy problems:

1. Managed floating: central banks often intervene in currency markets to influence exchange rates. Because the present monetary system is a hybrid of the pure fixed and floating rate systems, an understanding of fixed exchange

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rates gives us insights into the effects of foreign exchange intervention when it occurs under floating rates.

2. Regional currency arrangements: some countries belong to exchange rate unions, organizations whose members agree to fix their mutual exchange rates while allowing their currencies to fluctuate in value against the currencies of nonmember countries.
3. Developing countries: many developing countries try to peg the values of their currencies, often in terms of the dollar, but sometimes in terms of a nondollar currency or some 'basket' of currencies chosen by the authorities.
4. Lessons of the past for the future: to compare the merits of fixed and floating exchange rates, we must understand the functioning of fixed rates.

18.2. Central Bank Intervention and the Money Supply

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 assets, the country's money supply automatically increases. The central bank can negate the money supply effect of intervention through sterilization.

To understand the effects of central bank intervention in the foreign exchange market, we need to look first at how central bank financial transactions affect the money supply.

18.2.1. The Central Bank Balance Sheet and the Money Supply

The main tool we use in studying central bank transactions in asset markets is the central bank balance sheet.
Foreign assets consist mainly of foreign currency bonds owned by the central bank. These assets make up the central bank's official international reserves. Domestic assets are central bank holdings of claims to future payments by its own citizens and domestic institutions. These claims usually take the form of domestic government bonds and loans to domestic private banks.
The additional assumption that net worth is constant means that the changes in central bank assets we will consider automatically cause equal changes in central bank liabilities.

An understanding of the central bank balance sheet is important because changes in the central bank's assets cause changes in the domestic money supply. This money multiplier effect, which magnifies the impact of central bank transactions on the money supply, reinforces our main conclusion: any central bank purchase of assets automatically results in an increase in the domestic money supply, while any central

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bank sale of assets automatically causes the money supply to decline.

18.2.2. Foreign Exchange Intervention and the Money Supply

To see in greater detail how foreign exchange intervention affects the money supply, let's look at an example. Suppose the Bank of Pecunia goes to the foreign exchange market and sells $100 worth of foreign bond for Pecunian money. The sale reduces official holdings of foreign assets from $1,000 to $900, causing the asset side of the central bank balance to shrink also by $100.
The payment the Bank of Pecunia receives for these foreign assets automatically reduces its liabilities by $100 as well. After the sale, assets still equal liabilities, but both have declined by $100.

18.2.3. Sterilization

Central banks sometimes carry out equal foreign and domestic asset transactions in opposite directions to nullify the impact of their foreign exchange operations on the domestic money supply. This type of policy is called sterilized foreign exchange intervention.

Suppose once again that the Bank of Pecunia sells $100 of its foreign assets and receives as payment a $100 check on the private bank Pecuniacorp. This transaction causes the central bank's foreign assets and its liabilities to decline both by $100, and there is therefore a fall in the domestic money supply. If the central bank wishes to negate the effect of its foreign asset sale on the money supply, it can buy $100 of domestic assets, such as government bonds.

18.2.4. The Balance of Payments and the Money Supply

What we have learned in this section illustrates the important connection between the balance of payments and the growth of money supplies at home and abroad. If central banks 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 home money supply. Similarly, any associated decrease in a foreign central bank's claims on the home country implies a decreased foreign money supply.

The extent to which a measured balance of payments disparity will affect home and foreign money supplies is, however, quite uncertain in practice. For one thing, we

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have to know how the burden of balance of payments adjustment is divided among central banks. This depends on various factors, such as the macroeconomic goals of the central banks and the institutional arrangements governing intervention. Second, central banks may be sterilizing to counter the monetary effects of reserve changes. Finally, some central bank transactions indirectly help to finance a foreign country's balance of payments deficit.

18.3. How the Central Bank Fixes the Exchange Rate

A central bank can fix the exchange rate of its currency against foreign currency by intervening in the foreign exchange market whenever necessary to prevent the emergence of an excess demand or supply of domestic currency assets. In effect, the central bank adjusts its foreign assets – and thus, the domestic money supply – to ensure that asset markets are always in equilibrium under the fixed exchange rate.

To hold the exchange rate constant, a central bank must always be willing to trade currencies at the fixed exchange rate with the private actors in the foreign exchange market. The bank must also be willing to buy any amount of dollar assets the market wants to sell for another currency at that exchange rate.
The central bank can succeed in holding the exchange rate fixed only if its financial transactions ensure that asset markets remain in equilibrium when the exchange rate is at its fixed level.

18.3.1. Foreign Exchange Market Equilibrium Under a Fixed Exchange Rate

The foreign exchange market is in equilibrium when the interest parity condition holds, that is, when the domestic interest rate, R, equals the foreign interest rate, R^*, plus $(E^e - E)/E$, the expected rate of depreciation of the domestic currency against foreign currency. However, when the exchange rate is fixed at E^0 and market participants expect it to remain fixed, the expected rate of domestic currency depreciation is zero. The interest parity condition therefore implies that E^0 is today's equilibrium exchange rate only if

$R = R^*$.

Because no exchange rate change is expected by participants in the foreign exchange market, they are content to hold the available supplies of domestic and foreign currency deposits only if these offer the same interest rate. To ensure equilibrium in the foreign exchange market when the exchange rate is fixed permanently at E^0, the central bank must therefore hold R equal to R^*.

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18.3.2. 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 R^* equates aggregate real domestic money demand and the real money supply:

$M^s/P = L(R^*,Y)$.

Given P and Y, the above equilibrium condition tells what the money supply must be if a permanently fixed exchange rate is to be consistent with asset market equilibrium at a foreign interest rate of R^*.

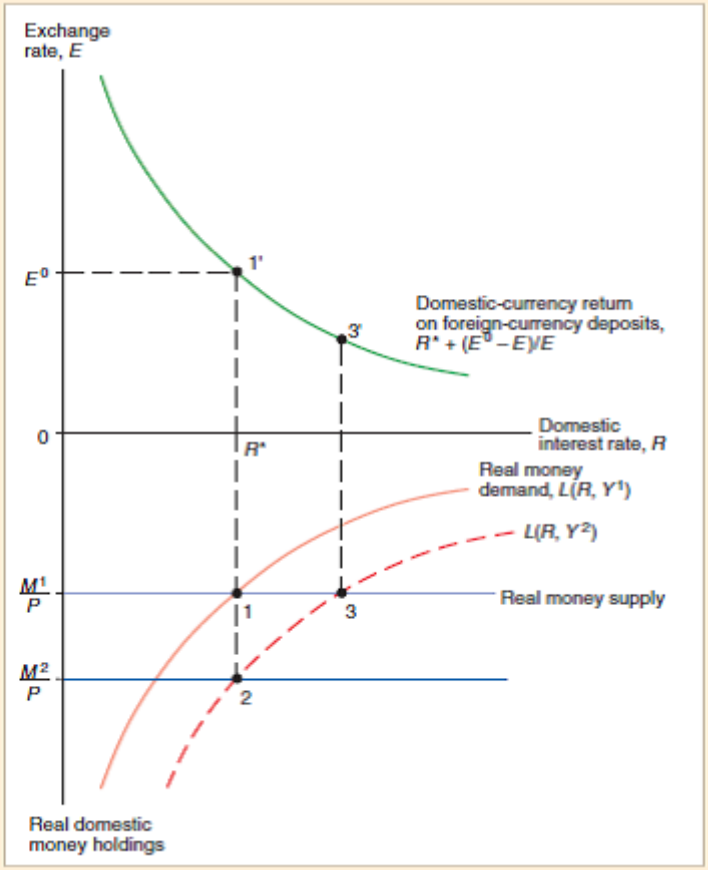
When the central bank intervenes to hold the exchange rate fixed, it must automatically adjust the domestic money supply so that money market equilibrium is maintained with $R = R^*$.
If the central bank did not satisfy the excess demand for money caused by a rise in output, the domestic interest rate would begin to rise above the foreign rate, R*, to balance the home money market.

18.3.3. A Diagrammatic Analysis

Figure 18-1

Asset Market Equilibrium with a Fixed Exchange Rate, E^0

To hold the exchange rate fixed at E^0 when output rises from Y^1 to Y^2, the central bank must purchase foreign assets and thereby raise the money supply from M^1 to M^2.



Money market equilibrium is initially at point 1 in the lower part of the figure. The

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diagram shows that for a given price level, and a given national income level, the money supply must equal M^1 when the domestic interest rate equals the foreign rate. To see how the central bank must react to macroeconomic changes to hold the exchange rate permanently at E^0, let's look again at the example of an increase in income. A rise in income raises the demand for real money holdings ate every interest rate, thereby shifting the aggregate money demand function in the figure downward. If the central bank were to take no action, the new money market equilibrium would be at point 3. Because the domestic interest rate is above R^* at point 3, the currency would have to appreciate to bring the foreign exchange market to equilibrium at point 3'.

The central bank cannot allow this appreciation of the domestic currency to occur if it is fixing the exchange rate, so it will buy foreign assets. The central bank will continue to purchase foreign assets until the domestic money supply has expanded to M^2.

18.4. Stabilization Policies with a Fixed Exchange Rate

A commitment to fix an exchange rate forces the central bank to sacrifice its ability to use monetary policy for stabilization. A purchase of domestic assets by the central bank causes an equal fall in its official international reserves, leaving the money supply and output unchanged.
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 that 'crowds out' aggregate demand. Instead, it forces central bank purchase of foreign assets and an expansion of the money supply.

We use the *DD-AA* model to describe the economy's short-run equilibrium. You will recall that the *DD* schedule shows combinations of the exchange rate and output for which the output market is in equilibrium, the *AA* schedule shows combinations of the exchange rate and output for which the asset markets are in equilibrium, and the short-run equilibrium of the economy as a whole is at the intersection of *DD* and *AA*. To apply the model to the case of a permanently fixed exchange rate, we add the assumption that the expected future exchange rate equals the rate at which the central bank is pegging its currency.

18.4.1. Monetary Policy

The money supply is at the level where a domestic interest rate equal to the foreign rate clears the domestic money market. Now suppose that, hoping to increase output, the central bank attempts to increase the money supply through a purchase of domestic assets.
Under a floating exchange rate, the increase in the central bank's domestic assets

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would push the original asset market equilibrium curve *AA* rightward and would therefore result in a currency depreciation. To prevent this depreciation, 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 curve shifts back toward its initial position.
Under a fixed exchange rate, central bank monetary policy tools are powerless to affect the economy's money supply or its output.

18.4.2. Fiscal Policy

How does central bank intervention hold the exchange rate fixed after the fiscal expansion? Initially, there is an excess demand for money because the rise in output raises money demand. To prevent the excess money demand 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.
Unlike monetary policy, fiscal policy can affect output under a fixed exchange rate. Indeed, it is even more effective than under a floating rate because then it is accompanied by an appreciation of the domestic currency.

18.4.3. 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, *E*, and a revaluation occurs when the central bank lowers *E*.

A devaluation affect the economy by making domestic goods and services cheaper, and therefore increasing output. This will result in an excess demand for money due to the rise in transactions accompanying the output increase.
The effects of devaluation illustrate the three main reasons why governments sometimes choose to devalue their currencies: (1) it allows the government to fight domestic unemployment despite the lack of effective monetary policy, (2) it results in an improvement in the current account, and (3) their effect on the central bank's foreign reserves.

18.4.4. 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 restored.

If the economy is initially at full employment, fiscal expansion raises output, and this rise in output above its full-employment level causes the domestic price level to begin

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rising. As *P* rises, home output becomes more expensive, so aggregate demand gradually falls, returning output to the initial, full-employment level. There is no real appreciation in the short run, but regardless of whether the exchange rate is floating or fixed, the real exchange rate appreciated in the long run by the same amount.

18.5. Balance of Payments Crises and Capital Flight

Balance of payments crises occur when market participants expect the central bank to change the exchange rate from its current level. If the market decides a devaluation is coming, the domestic interest rate rises above the world interest rate and foreign reserves drop sharply as private capital flows abroad. Self-fulfilling currency crises can occur when an economy is vulnerable to speculation.

In many practical situations the central bank may find it undesirable or infeasible to maintain the current fixed exchange rate, like we assumed.

The market's belief in an impending change in the exchange rate gives rise to a balance of payments crisis, a sharp change in official foreign reserves sparked by a change in expectations about the future exchange rate. The expectation of a future devaluation causes a balance of payments crisis marked by a sharp fall in reserves and a rise in the home interest rate above the world interest rate. Similarly, an expected revaluation causes an abrupt rise in foreign reserves together with a fall in the home interest rate below the world rate.

The reserve loss accompanying a devaluation scare is often labeled capital flight. Residents flee the domestic currency by selling it to the central bank for foreign exchange; they then invest the foreign currency abroad. At the same time, foreigners convert holdings of home assets into their own currencies and repatriate the proceeds. By pushing reserves even lower, capital flight may force the bank to devalue sooner and by a larger amount than planned.

What causes currency crises? Often a government is following policies that are not consistent with maintaining a fixed exchange rate over the longer term. Once market expectations take those policies into account, the country's interest rates inevitably are forced up.

In some cases, exhaustion of foreign reserves and an end of the fixed exchange rate are inevitable, given macroeconomic policies. The financial outflows that accompany a currency crisis only hasten an inevitable collapse, one that would have occurred anyway, even if private financial flows could be banned. An economy can be vulnerable to currency speculation even without being in such bad shape that a

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collapse of its fixed exchange rate regime is inevitable. Currency crises that occur in such circumstances often are called self-fulfilling currency crises.

For the rest of this chapter, we continue to assume that no exchange rate changes are expected by the market when exchange rates are fixed.

18.6. Managed Floating and Sterilized Intervention

A system of managed floating allows the central bank to retain some ability to control the domestic money supply, but at the cost of greater exchange rate instability. If domestic and foreign bonds are imperfect substitutes, the central bank may be able to control both the money supply and the exchange rate through sterilized foreign exchange intervention, although there is no empirical evidence for this.

Under managed floating, monetary policy is influenced by exchange rate changes without being completely subordinate 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.
Discussions of foreign exchange intervention in policy forums and newspapers often appear to ignore the intimate link between intervention and the money supply that we explored above. In reality, however, these discussions often assume that foreign exchange intervention is being sterilized, so that opposite domestic asset transactions prevent it from affecting the money supply.

18.6.1. 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 rational for such a policy is difficult to find using the model of exchange rate determination.
Our model also predicts that sterilization will be fruitless under a fixed exchange rate. The policy raises output but it eventually also causes inflation, which the central bank may try to avoid by sterilizing the increase in the money supply that its fiscal policy has induced. The ineffectiveness 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 called perfect asset substitutability.

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In contrast to perfect asset substitutability, imperfect asset substitutability exists when it is possible for assets' expected returns to differ in equilibrium.
In a world of perfect asset substitutability, participants in the foreign exchange market care only about expected 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, however, both risk and return matter.

18.6.2. Foreign Exchange Market Equilibrium Under Imperfect Asset Substitutability

When domestic and foreign currency bonds are perfect substitutes, the foreign exchange market is in equilibrium only if the interest parity condition holds. When domestic and foreign currency bonds are imperfect substitutes, the interest parity condition does not hold in general. Instead, equilibrium in the foreign exchange market requires that the domestic interest rate equal the expected domestic currency return on foreign bonds plus a risk premium, p, which reflects the difference between the riskiness of domestic and foreign bonds:

$$R = R^* + (E^e - E)/E + p.$$

18.6.3. The Effects of Sterilized Intervention with Imperfect Asset Substitutability

With imperfect asset substitutability, even sterilized purchases of foreign exchange cause the home currency to depreciate. Similarly, sterilized sales of foreign exchange cause the 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 as it varies the money supply to achieve domestic objective such as full employment. In effect, the exchange rate and monetary policy can be managed independently of each other in the short run when sterilized intervention is effective.

18.6.4. Evidence on the Effects of Sterilized Intervention

Little evidence has been found to support the idea that sterilized intervention exerts a major influence over exchange rates independent of the stances of monetary and fiscal policies.

Our discussion of sterilized 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 indication of where the central bank expects the exchange rate to move. This signaling effect of foreign exchange intervention, in turn, can alter the market's view

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of future monetary or fiscal policies and cause an immediate exchange rate change even when bond denominated in different currencies are perfect substitutes.
The signaling effect is most important when the government is unhappy with the exchange rate's level and declares in public that it will alter monetary or fiscal policies to bring about a change. However, a government may be tempted to exploit the signaling effect for temporary benefits even when it has no intention of changing monetary or fiscal policy to bring about a different long-run exchange rate.

18.7. Reserve Currencies in the World Monetary System

A world system of fixed exchange rates in which countries peg the prices of their currencies in terms of a reserve currency involves a striking asymmetry: the reserve currency country, which does not have to fix any exchange rate, can influence economic activity both at home and abroad through its monetary policy.

This section and the next adopt a global perspective and study the macroeconomic behavior of the world economy under two possible systems for fixing the exchange rates of all currencies against each other.
The first such fixed-rate system is very much like the one we have been studying. In it, once currency is singled out as a reserve currency, and each nation's central bank fixes its currency's exchange rate against the reserve currency by standing ready to trade domestic money for reserve assets at that rate.
The second fixed-rate system is a gold standard. Under a gold standard, central banks peg the prices of their currencies in terms of gold and hold gold as official international reserves.

Both reserve currency standards and the gold standard result in fixed exchange rates between all pairs of currencies in the world, but have very different implications.

18.7.1. 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 fixed the dollar exchange rate of its currency through foreign exchange market rates of domestic currency for dollar assets.
Because each currency's dollar price was fixed by its central bank, the exchange rate between any two currencies was automatically fixed as well through arbitrage in the foreign exchange market. Even though each central bank tied its currency exchange rate only to the dollar, market forces automatically held all other exchange rates – called cross rates – constant at the values implied by the dollar rates.

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18.7.2. The Asymmetric Position of the Reserve Center

In a reserve currency system, the country whose currency is held as reserves 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 against the reserve currency. Thus the center country need never intervene and bears none of the burden of financing its balance of payments. This set of arrangements puts the reserve-issuing country in a privileged position because it can use its monetary policy for macroeconomic stabilization even though it has fixed exchange rates.

What would be the effect of a purchase 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 their currencies from appreciating, 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 center.

18.8. The Gold Standard

A gold standard, in which all countries fix their currencies' prices in terms of gold, avoids the asymmetry inherent in a reserve currency standard and also places constraints on the growth of the countries' money supplies. But the gold standard and gold exchange standard have serious drawbacks that make it impractical.

An international gold standard avoids the asymmetry inherent in a reserve currency standard by avoiding the '*N*th currency 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.

18.8.1. 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. Under these arrangements, a gold standard, results in fixed exchange rates between all currencies.

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18.8.2. Symmetric Monetary Adjustment Under a Gold Standard

Because of the inherent symmetry of a gold standard, no country in the system occupies a privileged position by being relieved of the commitment to intervene.

Suppose the Bank of England decides to increase its 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 assets more attractive than British assets. Because central banks are obliged to trade their currencies for gold at fixed rates, unhappy holders of pounds can sell these to the Bank of England for gold, sell the gold to other central banks for their currencies, and use these currencies to purchase deposits that offer higher interest rates. This process reestablishes equilibrium in the foreign exchange market.

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.

18.8.3. Benefits and Drawbacks of the Gold Standard

Advocates of the gold standard argue that it has another desirable property besides symmetry. Because central banks throughout the world are obliged to fix the money price of gold, they cannot allow their money supplies to grow more rapidly than real money demand, since such rapid monetary growth eventually raises the money prices of all goods and services, including gold. A gold standard therefore places automatic limits on the extent to which central banks can cause increases in national price levels through monetary policies.

Offsetting this potential benefit of a gold standard are some drawbacks:

1. The gold standard places undesirable constraints on the use of monetary policy to fight unemployment.
2. Tying currencies values to gold ensures a stable overall price level only if the relative price of gold and other goods and services is stable.
3. An international payments system based on gold is problematic because central banks cannot increase their holdings of international reserves as their economies grow unless there are continual new gold discoveries.
4. The gold standard could give countries with potentially large gold production, such as Russia and South Africa, considerable ability to influence macroeconomic conditions throughout the world through market sales of gold.

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18.8.4. The Bimetallic Standard

Up until the early 1870s, many countries adhered to a bimetallic standard in which the currency was based on both silver and gold. In this system, a country's mint will coin specified amounts of gold or silver into the national currency unit.
The mint parity could differ from the market relative price of two metals, however, and when it did, one or the other might go out of circulation.

The advantage of bimetallism was that it might reduce the price level instability resulting from use of one of the metals alone. Were gold to become scarce and expensive, cheaper and relatively abundant silver would become the predominant form of money, thereby mitigating the deflation that a pure gold standard would imply.

18.8.5. The Gold Exchange Standard

Halfway between the gold standard and a pure reserve currency standard is the gold exchange standard. Under a gold exchange standard, central bank's reserves consist of gold 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. It can operate like a gold standard in restraining excessive monetary growth throughout the world, but it allows more flexibility in growth of international reserves.
The post-World War II reserve currency system centered on the dollar was, in fact, originally set up as a gold exchange standard. For reasons explained in the next chapter, President Nixon unilaterally severed the dollar's link to gold in August 1971, shortly before the system of fixed dollar exchange rates was abandoned.

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19. International Monetary Systems: An Historical Overview

The inherent interdependence of open national economies has sometimes made it more difficult for governments to achieve such policy goals as full employment and price level stability. The channels of interdependence depend, in turn, on the monetary, financial, and exchange rate arrangements that countries adopt – a set of institutions called the international monetary system.
In an open economy, macroeconomic policy has two basic goals, internal balance and external balance.

19.1. Macroeconomic Policy Goals in an Open Economy

In an open economy, policy makers try to maintain internal balance and external balance. The definition of external balance depends on a number of factors, including the exchange rate regime and world economic conditions. Because each country's macroeconomic policies have repercussions abroad, a country's ability to reach internal and external balance depends on the policies other countries choose to adopt. A country running large, persistent deficits might appear to be violating its intertemporal budget constraint, putting it in danger of facing a sudden stop in foreign lending.

In open economies, policy makers are motivated by the goals of internal and external balance.
In practice, neither of these definitions captures the full range of potential policy concerns.

19.1.1. Internal Balance: Full Employment and Price Level Stability

Under- and overemployment lead to general price level movements that reduce the economy's efficiency by making the real value of the monetary unit less certain and thus a less useful guide for economic decisions.

Inflation or deflation can occur even under conditions of full employment 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 only if the central bank fulfills expectations through continuing injections or withdrawals of money.

One particularly disruptive result of an unstable price level is its effect on the real value of loan contracts. Because loans tend to be denominated in the monetary unit, unexpected price level changes cause income to be redistributed between creditors

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and debtors.
Theoretically, a perfectly predictable trend of rising or falling prices would not be too costly, since everyone would be able to calculate easily the real value of money at any point in the future. But in the real world there appears to be no such thing as a predictable inflation rate.

To avoid price level instability, therefore, the government must prevent large fluctuations in output, which are also undesirable in themselves. In addition, it must avoid inflation and deflation by ensuring that the money supply does not grow too quickly or too slowly.

19.1.2. External Balance: The Optimal Level of the Current Account

The notion of external balance is more difficult to define than internal balance because there are no unambiguous benchmarks like full employment or stable prices to apply to an economy's external transactions. International economics textbooks often identify external balance with balance in a country's current account.
We may think of current account imbalances as providing another example of how countries gain from trade. The trade involved is what we have called intertemporal trade. A country where output drops temporarily 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 intertemporal trade that eliminates this price difference leads to mutual gains.

Insisting that all countries be in current account equilibrium makes no allowance for these important gains from trade over time. Thus, no realistic policy maker would want to adopt a balanced current account as a policy target appropriate in all circumstances.
At a given point, however, policy makers generally adopt some current account target as an objective, and this target defines their external balance goal. While the target level of the current account is generally not zero, governments usually try to avoid extremely large external surpluses or deficits unless they have clear evidence that large imbalances are justified by potential intertemporal trade gains.

Problems with Excessive Current Account Deficits
A current account deficit may pose no problem if the borrowed funds are channeled into productive domestic investment projects that pay for themselves with the revenue they generate in the future. Sometimes, however, large current account deficits represent temporarily high consumption resulting from misguided government policies or some other malfunction of the economy.
Every open economy faces an intertemporal budget constraint that limits its spending

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over time to levels that allow it to pay the interest and principal on its foreign debts. When countries begin to have trouble meeting their payments on past foreign loans, foreign creditors become reluctant to lend them new funds and may even demand immediate repayment of the earlier loans. Economists refer to such an event as a sudden stop in foreign lending. In such cases, the home government may have to take sever action to reduce the country's desired borrowing from foreigners to feasible levels, as well as to repay maturing loans that foreigners are unwilling to renew.

Problems with Excessive Current Account Surpluses

An excessive current account surplus implies that a country is accumulating assets located abroad. One potential problem stems from the fact that, for a given level of national saving, an increased current account surplus implies lower investment in domestic plant and equipment. Several factors might lead policy makers to prefer that domestic saving be devoted to higher levels of domestic investment and lower levels of foreign investment: (1) domestic investment by one firm may have beneficial technological spillover effects on other domestic producers, (2) the returns on domestic capital may be easier to tax, and (3) an addition to the home capital stock may reduce domestic unemployment.

If a large home current account surplus reflects excessive external borrowing by foreigners, the home country may in the future find itself unable to collect the money it is owed.

Summary

The goal of external balance is a level of the current account that allows the most important gains from trade over time to be realized without risking the problems discussed above.

There is a fundamental asymmetry, however, between the pressures pushing deficit and surplus countries to adjust their external imbalances downward.

19.2. Classifying Monetary Systems: The Open-Economy Trilemma

The limitations of alternative exchange rate regimes can be understood in terms of the open-economy trilemma, which states that countries must choose two of the following three features of a monetary policy system: exchange rate stability, freedom of cross-border financial flows, and monetary policy autonomy.

The world economy has evolved through a variety of international monetary systems since the q9th century. The insight we will rely on is that policy makers in an open economy face an inescapable trilemma in choosing the monetary arrangements that best enable them to attain their internal and external balance goals.

A country that fixes its currency's exchange rate while allowing free international

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capital movements gives up control over domestic monetary policy. This illustrates the impossibility of a country's having more than two items from the following list:

1. Exchange rate stability.
2. Monetary policy oriented toward domestic goals.
3. Freedom of international capital movements.

As we have seen, countries with fixed exchange rates that allow free cross-border capital mobility sacrifice item 2 above, a domestically oriented monetary policy. On the other hand, if a country with a fixed exchange rate restricts international financial flows so that the interest parity condition does not need to hold true, it is still able to change the home interest rate so as to influence the domestic economy. A country that has a floating exchange rate can use monetary policy to steer the economy even though financial flows across its borders are free.

Of course, the trilemma does not imply that intermediate regimes are impossible, only that they will require the policy maker to trade off between different objectives.

19.3. International Macroeconomic Policy Under the Gold Standard, 1870-1914

The gold standard system contained a powerful automatic mechanism for ensuring external balance, the price-specie-flow mechanism. The flows of gold accompanying deficits and surpluses caused price changes that reduced current account imbalances and therefore tended to return all countries to external balance. The system's performance in maintaining internal balance was mixed, however.

The gold standard period between 1870 and 1914 was based on ideas about international macroeconomic policy very different from those that have formed the basis of international monetary arrangements since World War II. 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 strengths of the gold standard while avoiding its weaknesses.

19.3.1. Origins of the Gold Standard

It had its origin in the use of gold coins as a medium of exchange, unit of account, and store of value. The gold standard as a legal institution dates from 1819. Later in the 19th century, the United States, Germany, Japan, and other countries also adopted the gold standard.

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19.3.2. External Balance Under the Gold Standard

The primary responsibility of a central bank was to fix the exchange rate between its currency and gold. To maintain this official gold price, the central bank needed an adequate stock of gold reserves. External balance therefore was a situation in which the central bank was neither gaining gold from abroad nor losing gold to foreigners at too rapid a rate.

To avoid large gold movements, central banks adopted policies that pushed the balance of payments toward zero. A country is said to be in balance of payments equilibrium when the sum of its current and capital accounts, less the nonreserve component of net financial flows, equals zero, so that the current plus capital account balance is financed entirely by private international lending without official reserve movements.

19.3.3. The Price-Specie-Flow Mechanism

The gold standard contains some 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 18^{th} century.
Suppose that Britain's current plus capital account surplus is greater than its nonreserve financial account balance. Because foreigners' net imports from Britain are not being financed entirely by British loans, the shortfall must be matched by flows of international reserves – that is, of gold – into Britain. These gold flows automatically reduce foreign money supplies and swell Britain's money supply, pushing foreign prices downward and Britisch prices upward.
The simultaneous rise in British prices and fall in foreign prices reduces foreign demand for British goods and services and at the same time increases British demand for foreign goods and services. These demand shifts reduce Britain's current account surplus and reduce the foreign current account deficit.

19.3.4. The Gold Standard 'Rules of the Game': Myth and Reality

In theory, the price-specie-flow mechanism could operate automatically. But the reactions of central banks to gold flows across their borders furnished another potential mechanism to help restore balance of payments equilibrium. Central banks that were persistently losing gold faced the risk of becoming unable to meet their obligations to redeem currency notes. They were therefore motivated to sell domestic assets when gold was being lost, pushing domestic interest rates upward and attracting inflows of funds from abroad.
These domestic credit measures, if undertaken by central banks, reinforced the price-specie-flow mechanism by pushing all countries toward balance of payments

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equilibrium. After World War I, the practices of selling domestic assets in the face of a deficit and buying domestic assets in the face of a surplus came to be known as the gold standard 'rules of the game'.

Later research has shown that the supposed 'rules of the game' of the gold standard were frequently violated before 1914. As noted, the incentives to obey the rules applied with greater force to deficit than to surplus countries, so in practice it was the deficit countries that bore the burden of bringing the payments balances of all countries into equilibrium.
In fact, countries often reversed the rules and sterilized gold flows, that is, sold domestic assets when foreign reserves were rising and bought domestic assets as foreign reserves fell.

19.3.5. Internal Balance Under the Golden Standard

By fixing the prices of currencies in terms of gold, the gold standard aimed to limit monetary growth in the world economy and thus to ensure stability in world price levels. While price levels within gold standard countries did not rise as much between 1870 and 1914 as over the period after World War II, national price levels moved unpredictably over shorter horizons as periods of inflation and deflation followed each other.

A fundamental cause of short-term internal instability under the pre-1914 gold standard was the subordination of economic policy to external objectives. Before World War I, governments had not assumed responsibility for maintaining internal balance as fully as they did after World War II, as a result of the worldwide economic instability of the interwar years.

19.4. The Interwar Years, 1918-1939

Attempts to return to the prewar gold standard after 1918 were unsuccessful. As the world economy moved into general depression after 1929, the restored gold standard fell apart, and international economic integration weakened. In the turbulent economic conditions of the period, governments made internal balance their main concern and tried to avoid the external balance problem by partially shutting their economies off from the rest of the world.

Governments effectively suspended the gold standard during World War I and financed part of their massive military expenditures by printing money. Further, labor forces and productive capacity were reduced sharply through war losses. Several countries experienced runaway inflation as their governments attempted to aid the

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reconstruction process through public expenditures. The result was a sharp rise in money supplies and price levels.

19.4.1. The Fleeting Return to Gold

The U.S. returned to gold in 1919. In 1922, at a conference in Genoa, many countries agreed on a program calling for a general return to the gold standard and cooperation among central banks in attaining external and internal objectives. Realizing that gold supplies might be inadequate to meet central banks' demands for international reserves, the conference sanctioned a partial gold exchange standard in which smaller countries could hold as reserves the currencies of several large countries.

In 1925, Britain returned to the gold standard by pegging the pound to gold at the prewar price. Though Britain's price level had been falling since the war, in 1925 it was still higher than in the days of the prewar gold standard. To return the pound price of gold to its prewar level, the Bank of England was therefore forced to follow contractionary monetary policies that contributed to severe unemployment. This accelerated London's decline as the world's leading financial center. The onset of the Great Depression in 1929 was shortly followed by bank failures throughout the world. Britain left gold in 1931 when foreign holders of sterling lost confidence in Britain's promise to maintain its currency's value.

19.4.2. International Economic Disintegration

As the depression continued, many countries renounced the gold standard and allowed their currencies to float in the foreign exchange market.
Major economic harm was done by restriction on international trade and payments, which proliferated as countries attempted to discourage imports and keep aggregate demand bottled up at home. The Smoot-Hawley tariff imposed by the U.S. had a damaging effect on employment abroad; thus being a beggar-thy-neighbor policy.

Uncertainty about government policies led to sharp reserve movements for countries with pegged exchange rates and sharp exchange rate movements for those with floating rates. Many countries imposed prohibitions on private financial account transactions to limit these effects of foreign exchange market developments.

In the face of the Great Depression, most countries resolved the choice between external and internal balance by curtailing their trading links with the rest of the world and eliminating the possibility of any significant external imbalance. All countries would have been better off in a world with freer international trade, provided international cooperation had helped each country preserve its external balance and financial stability without sacrificing internal policy goals. It was this realization that

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inspired the blueprint for the postwar international monetary system, the Bretton Woods agreement.

19.5. The Bretton Woods System and the International Monetary Fund

The architects of the IMF hoped to design a fixed 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 charter provided financing facilities for deficit countries and allowed exchange rate adjustments under conditions of fundamental disequilibrium. All countries pegged their currencies to the dollar.

In July 1944 representatives of 44 countries meeting in Bretton Woods, drafted and signed the Articles of Agreement of the International Monetary fund. The countries hoped to design an international monetary system that would foster full employment and price stability while allowing individual countries to attain external balance without restrictions on international trade.
The system called for fixed exchange rates against the U.S. dollar and an unvarying dollar price of gold. The system was thus a gold exchange standard with the dollar as its principal reserve currency.

19.5.1. Goals and Structure of the IMF

The IMF Articles of Agreement, through a mixture of discipline and flexibility, hoped to avoid a repetition of the turbulent interwar experience. The major discipline on monetary management was the requirement that exchange rates be fixed to the dollar, which in turn, was tied to gold. Fixed exchange rates were viewed as more than a device for imposing monetary discipline on the system. Rightly or wrongly, the interwar experience had convinced the IMF's architects that floating exchange rates were a cause of speculative instability and were harmful to international trade.

The interwar experience had shown also that national governments would not be willing to maintain both free trade and fixed exchange rates at the price of long-term domestic unemployment. Two major features of the IMF Articles helped promote this flexibility in external adjustment. First, members of the IMF contributed their currencies and gold to form a pool of financial resources that the IMF could lend to countries in need. Second, although exchange rates against the dollar were fixed, these parities could be adjusted with the agreement of the IMF; this was supposed to be infrequent and only in cases of an economy in fundamental disequilibrium.

How did the Bretton Woods system resolve the trilemma? In essence, the system was based on the presumption that movements of private financial capital could be restricted, allowing some degree of independence for domestically oriented monetary

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policies. The architects of the Bretton Woods system hoped to ensure that countries would not be forced to adopt contractionary monetary policies for balance of payments reasons in the face of an economic downturn.

19.5.2. Convertibility and the Expansion of Private Financial Flows

Just as the general acceptability of national currency eliminates the costs of barter within a single economy, the use of national currencies in international trade makes the world economy function more efficiently. To promote efficient multilateral trade, the IMF Articles of Agreement urged members to make their national currencies convertible as soon as possible. A convertible currency is one that may be freely exchanged for foreign currencies.
The early convertibility of the U.S. dollar, together with its special position in the Bretton Woods system and the economic and political dominance of the United States, helped to make the dollar the postwar world's key currency. Because dollars were freely convertible, much international trade tended to be invoiced in dollars.

The restoration of convertibility in Europe in 1958 gradually began to change the nature of policy makers' external constraints. As foreign exchange trading expanded, financial markets in different countries became more tightly integrated. After 1958, central banks had to be attentive to foreign financial conditions or take the risk that sudden reserve losses might leave them without the resources needed to peg exchange rates.
The restoration of convertibility did not result in immediate and complete international financial integration. On the contrary, most countries continued to maintain restrictions on financial account transactions, a practice that the IMF explicitly allowed. But the opportunities for disguised capital flows increased dramatically.

19.5.3. Speculative Capital Flows and Crises

Current account deficits and surpluses took on added significance under the new conditions of increasingly mobile private financial flows. A country with a large and persistent current account deficit might be suspected of being in fundamental disequilibrium under the IMF Articles of Agreement, and thus ripe for a currency devaluation. Anyone holding pound deposits during 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.

Similarly, countries with large account surpluses might be viewed by the market as candidates for revaluation. In this case, their central banks would find themselves swamped with official reserves, the result of selling the home currency in the foreign exchange market to keep the currency from appreciating.

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Balance of payments crises became increasingly frequent and violent throughout the 1960s and early 1970s. These crises became so massive by the early 1970s that they eventually brought down the Bretton Woods structure of fixed exchange rates. The possibility of a balance of payments crisis therefore lent increased importance to the external goal of a current account target.

19.6. Analyzing Policy Options for Reaching Internal and External Balance

After currency convertibility was restored in Europe, countries' financial markets became more closely integrated, monetary policy became less effective, and movements in international reserves became more volatile. These changes revealed a key weakness in the system. To reach internal and external balance at the same time, expenditure-switching as well as expenditure-changing policies were needed. But the possibility of expenditure-switching policies could give rise to speculative financial flows that would undermine fixed exchange rates.

In line with the approximate conditions later in the Bretton Woods system, we will assume a high degree of financial capital mobility across borders, so that the domestic interest rate cannot be set independently of the exchange rate.

19.6.1. Maintaining Internal Balance

First consider internal balance, which requires that aggregate demand equal the full-employment level of output, Y^f.
Recall that total domestic spending is denoted by $A = C + I + G$. We will express the current account as a decreasing function of spending and an increasing function of the real exchange rate, $CA(EP^*/P, A)$. Under this new notation, the condition of internal balance is therefore

$$Y^f = C + I + G + CA(EP^*/P, A) = A + CA(EP^*/P, A).$$

This suggest the policy tools that affect aggregate demand, and therefore, output in the short run. The government can directly influence total spending A through fiscal policy. Fiscal expansion stimulates aggregate demand and causes output to rise. Similarly, a devaluation of the currency makes domestic goods and services cheaper relative to those sold abroad and thereby increases demand and output.

Notice that monetary policy is not a policy tool under fixed exchange rates. This is because an attempt by the central bank to alter the money supply by selling or buying domestic assets will cause an offsetting change in foreign reserves, leaving the

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domestic money supply unchanged.

19.6.2. Maintaining External Balance

We have seen how domestic spending and exchange rate changes influence output and thus help the government achieve its internal goal of full employment. The goal of external balance requires the government to manage domestic spending and the exchange rate so that the following equation is satisfied

$CA(EP^*/P, A) = X$.

Given *P and P**, a rise in *E* makes domestic goods cheaper and improves the current account. A rise in domestic spending, *A*, however, has the opposite effect on the current account, because it causes imports to rise. To maintain its current account at *X* as it devalues the currency, the government must enact policies that raise domestic spending.

19.6.3. Expenditure-Changing and Expenditure-Switching Policies

These two schedules divide the diagram into the four zones of economic discomfort. Each of these zones represents the effects of different policy settings.
If the economy is initially away from the intersection of the two schedules, appropriate adjustments in domestic spending and the exchange rate are needed to bring about internal and external balance. A change in fiscal policy that influences spending so as to move the economy back in equilibrium is called an expenditure-changing policy because it alters the level of the economy's total demand for goods and services. The accompanying exchange rate adjustment is called an expenditure-switching policy because it changes the direction of demand, shifting it between domestic output and imports. In general, both are needed to reach internal and external policy.

Under the Bretton Woods rules, exchange rate changes were supposed to be infrequent. This left fiscal policy as the main policy tool for moving the economy toward internal and external balance. As a result of the exchange rate's inflexibility during the Bretton Woods period, policy makers sometimes found themselves in difficult situations.
In practice, countries did sometimes use changes in their exchange rates to move closer to internal and external balance, although the changes were typically accompanied by balance of payment crises.

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19.7. The External Balance Problem of the United States Under Bretton Woods

As the main reserve currency country, the U.S. faced a unique external balance problem: the confidence problem, which would arise as foreign official dollar holdings inevitably grew to exceed U.S. gold holdings. A series of international crises led in stages to the abandonment in 1973 of both the dollar's link to gold and fixed dollar exchange rates for the industrialized countries.

The external balance problem of the U.S. was different from the one faced by the other countries in the Bretton Woods system. As the issuer of the *N*th currency, the U.S. was not responsible for pegging dollar exchange rates.
Because the U.S. was required to trade gold for dollars with foreign central banks, the possibility that other countries might convert their dollar reserves into gold was a potential external constraint on U.S. macroeconomic policy. In practice, however, foreign central banks were willing to hold on to the dollars they accumulated, since these paid interest and represented and international money par excellence.

In an influential book that appeared in 1960, economist Triffin called attention to a fundamental long-run problem of the Bretton Woods system, the confidence problem. Triffin realized that as central banks' international reserve needs grew over time, their holdings of dollars would necessarily grow until they exceeded the U.S. gold stock. Since the U.S. had promised to redeem at $35 an ounce, it would no longer have the ability to meet its obligations should all dollar holders simultaneously try to convert their dollars into gold. This would lead to a confidence problem; central banks, knowing that their dollars were no longer 'as good as gold' might become unwilling to accumulate more dollars and might even bring down the system by attempting to cash in the dollars they already held.
One possible solution at the time was an increase in the official price of gold in terms of the dollar and all other currencies. But such an increase would have been inflationary and would have had the politically unattractive consequence of enriching the main gold-supplying countries.

19.8. The Mechanics of Imported Inflation

An inflation abroad will strand the economy with overemployment and a high surplus in its curernt account. Without government interference, there will be upward pressure on the domestic price level, which will gradually shift back into the original position.

For now we will assume that P^* rises as a result of inflation abroad. If the economy starts out at the intersection of the two schedules, a rise in P^* given the fixed exchange rate and the domestic price level therefore strands the economy with

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overemployment and an undesirably high surplus in its current account. The factor that causes this outcome is a real currency depreciation that shifts world demand toward the home country. If nothing is done by the government, overemployment puts upward pressure on the domestic price level, and this pressure gradually shifts the two schedules back to their original positions.

The rise in domestic prices that occurs when no revaluation takes place requires a rise in the domestic money supply, since prices and the money supply move proportionally in the long run. The mechanism that brings this rise about is foreign exchange intervention by the home central bank.

19.8.1. Assessment

The collapse of the Bretton Woods system was partly due to the lopsided macroeconomic power of the U.S., which allowed it to generate global inflation. But it was also due in large measure to the fact that the key expenditure-switching tool needed for internal and external balance inspired speculative attacks that made both internal and external balance progressively more difficult to achieve.

19.9. The Case for Floating Exchange Rates

Before 1973, the weaknesses of the Bretton Woods system led many economists to advocate floating exchange rates. They made four main arguments in favor of floating. First, they argued that floating rates would give national macroeconomic policy makers greater autonomy in managing their economies. Second, they predicted that floating rates would remove the asymmetries of the Bretton Woods arrangements. Third, they pointed out that floating exchange rates would quickly eliminate the fundamental disequilibrium that had led to parity changes and speculative attacks under fixed rates. Fourth, they claimed that these same exchange rate movements would prevent large, persistent departures from external balance.

As international currency crises of increasing scope and frequency erupted in the late 1960s, most economist began advocating greater flexibility of exchange rates. The case for floating exchange rates rested on at least four 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 reach internal and external balance.
2. Symmetry: under a system of floating rates, the inherent asymmetries of Bretton Woods would disappear and the United States would no longer be able to set world monetary conditions all by itself.
3. Exchange rates as automatic stabilizers: even in the absence of an active monetary policy, the swift adjustment of market-determined exchange rates

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would help countries maintain internal and external balance in the face of changes in aggregate demand.

4. Exchange rates and external balance: market-determined exchange rates would move automatically so as to prevent the emergence of big current account deficits and surpluses.

19.9.1. Monetary Policy Autonomy

Under the Bretton Woods fixed-rate system, countries other than the United States had little scope to use monetary policy to attain internal and external balance. Countries could hold their dollar exchange rates fixed only if they kept the domestic interest rate in line with that of the U.S.

Advocates of floating rates pointed out that removal of the obligation to peg currency values would restore monetary control to central banks. Enhanced control over monetary policy would allow countries to dismantle their distorting barriers to international payments.
Consistent with this view, advocates of floating also argued that floating rates would allow each country to choose its own desired long-run inflation rate rather than having to import passively the inflation rate established abroad. One of the most telling arguments in favor of floating rates was their ability, in theory, to bring about automatically exchange rate changes that insulate economies from ongoing foreign inflation.

The mechanism behind this insulation is purchasing power parity; exchange rates eventually move to offset exactly national differences in inflation. A money-induced increase in U.S. prices also causes an immediate appreciation of foreign currencies against the dollar when the exchange rate floats. In the short run, the size of this appreciation can differ from what PPP predicts. In contrast, countries operating under the Bretton Woods rules were forced to choose between matching U.S. inflation to hold their dollar exchange rates fixed or deliberately revaluing their currencies in proportion to the rise in U.S. prices.

19.9.2. Symmetry

The second argument put forward by the advocates of floating was that abandonment of the Bretton Woods system would remove the asymmetries that caused so much international disagreement in the 1960s and early 1970s. There were two main asymmetries; first, because central banks pegged their currencies to the dollar and accumulated dollars as international reserves, and second any foreign country could devalue its currency against the dollar in conditions of fundamental disequilibrium, but the system's rules did not give the U.S. the option to devalue against foreign currencies.

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A system of floating exchange rates would do away with these asymmetries. All countries' exchange rates would be determined symmetrically by the foreign exchange market, not by government decisions.

19.9.3. Exchange Rates as Automatic Stabilizers

The third argument in favor of floating rates concerned their ability, theoretically, to promote swift and relatively painless adjustment to certain types of economic changes.

A fall in demand for the home country's exports reduces aggregate demand for every level of the exchange rate and thus shifts the *DD* schedule leftward. Because the demand shift is assumed to be temporary, it does not change the long-run expected exchange rate and so does not move the asset market equilibrium schedule *AA*. As demand and output fall, reducing the transactions demand for money, the home interest rate must also decline to keep the money market in equilibrium. This fall in the home interest rate causes the domestic currency to depreciate in the foreign exchange market, and the exchange rate therefore rises.

Under the Bretton Woods system, a fall in export demand, if permanent, have led to a situation of fundamental disequilibrium calling for a devaluation of the currency or a long period of domestic unemployment as wages and prices fell. Uncertainty about the government's intentions would have encouraged speculative capital outflows, further worsening the situation by depleting central bank reserves and contracting the domestic money supply at a time of unemployment.

19.9.4. Exchange Rates and External Balance

A final benefit claimed for floating exchange rates was that they would prevent the emergence of persistently large current account deficits or surpluses. Because a country with a large current account deficit is borrowing from foreigners and thereby increasing its foreign debt, it will eventually have to generate larger surpluses of exports over imports to pay the interest on that debt. Those larger surpluses will require a depreciated currency.

A consequence of this view is that floating exchange rates would not be too volatile, because stabilizing speculators would constantly drive them toward levels consistent with external balance.

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19.10. Macroeconomic Interdependence Under a Floating Rate

In the early years of floating, floating rates seemed, on the whole, to function well. In particular, it is unlikely that the industrial countries could have maintained fixed exchange rates in the face of the stagflation caused by two oil shocks. The dollar suffered a sharp depreciation after 1976, however, as the U.S. adopted macroeconomic policies more expansionary than those of other industrial countries.

Up until now, our modeling of the open economy has focused on the relatively simple case of a small country that cannot affect foreign output, price levels, or interest rates through its own monetary and fiscal policies. We now must also think about the transmission of policies between countries linked by a floating exchange rate.

Imagine a world economy made up of two large countries, Home and Foreign. Our goal is to evaluate how Home's macroeconomic policies affect Foreign. The main complication is that neither country can be thought of any longer as facing a fixed external interest rate or a fixed level of foreign export demand.
Let's look first at a permanent monetary expansion by Home. Because Home is experiencing a real currency depreciation, Foreign must be experiencing a real currency appreciation, which makes Foreign goods relatively expensive and thus a depressing effect on Foreign output.

We summarize our discussion of macroeconomic interdependence between large countries as follows:

1. Effect of a permanent monetary expansion by Home: Home output rises, Home's currency depreciates, and Foreign output may rise or fall.
2. Effect of a permanent fiscal expansion by Home: Home output rises, Home's currency appreciates, and Foreign output rises.

19.11. What Has Been Learned Since 1973?

One unambiguous lesson of these experiences seems to be that no exchange rate system functions well when international economic cooperation breaks down. Severe limits on exchange rate flexibility among the major currencies are unlikely to be reinstated in the near future. But increased consultation among international policy makers should improve the performance of the international monetary system.

19.11.1. 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 trend inflation. As a result, floating

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exchange rates allowed a much larger international divergence in inflation.
While the inflation insulation part of the policy autonomy argument is broadly supported as a long-run proposition, economic analysis and experience both show that in the short run, the effects of monetary as well as fiscal changes are transmitted across national borders under floating rates. Skeptics of floating where right in claiming that floating rates would not insulate countries completely from foreign policy shocks.

19.11.2. Symmetry

Because central banks continued to hold dollar reserves and intervene, the international monetary system did not become symmetric after 1973.
Economist Ronald McKinnon has argued that the current floating-rate system is similar in some ways to the asymmetric reserve currency system underlying the Bretton Woods arrangements. He suggest that changes in the world money supply would have been dampened under a more symmetric monetary adjustment mechanism.

19.11.3. The Exchange Rate as an Automatic Stabilizer

The world economy has undergone major structural changes since 1973. Because these shifts changed relative national output prices, it is doubtful that any pattern of fixed exchange rates would have been viable without some significant parity changes. Permanent changes in goods market conditions require eventual adjustment in real exchange rates that can be speeded by a floating-rate system. Foreign exchange intervention to peg nominal exchange rates cannot prevent this eventual adjustment because money is neutral in the long run and thus is powerless to alter relative prices permanently. The events of the 1980s show, however, that if it is costly for factors of production to move between sectors of the economy, there is a case for pegging rates in the face of temporary output market shocks.

19.11.4. External Balance

Under floating, external imbalances have persisted for years before exchange rates have adjusted. Long swings in real exchange rates that leave countries far from external balance are called misalignments, and they frequently inspire political pressures for protection from imports.Under floating, external imbalances have persisted for years before exchange rates have adjusted. Long swings in real exchange rates that leave countries far from external balance are called misalignments, and they frequently inspire political pressures for protection from imports.

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19.11.5. The Problem of Policy Coordination

Problems of international policy coordination clearly have not disappeared under floating exchange rates. The problem of resolving global imbalances provides a good example, in the sense that unilateral action by deficit countries to reduce their imbalances would lead to global deflation, while surplus countries have little incentive to avoid that outcome by pumping up their internal demand and appreciating their currencies.

19.12. Are Fixed Exchange Rates Even an Option for Most Countries?

No exchange rate system functions well when international economic cooperation breaks down. Severe limits on exchange rate flexibility among the major currencies are unlikely to be reinstated in the near future.

The post-Bretton Woods experience suggest a stark hypothesis: durable fixed exchange rate arrangements may not even be possible. In a financially integrated world in which funds can move instantly between national financial markets, fixed exchange rates cannot be credibly maintained over the long run unless countries are willing to maintain controls over capital movements, or, move to a shared single currency with their monetary
partners.
The pessimistic view of fixed exchange rates is based on the theory that speculative currency crises can be self-fulfilling events.
At the turn of the 21st century, speculative attacks on fixed exchange rate arrangements were occurring with seemingly increasing frequency. The number and circumstances of those crises lent increasing plausibility to the argument that it is impossible to peg currency values for long while maintaining open capital markets and national policy sovereignty.

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20. Optimum Currency Areas and The European Experience

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 assets, the country's money supply automatically increases. Similarly, a central bank sale of foreign assets automatically lowers the money supply. The central bank balance sheet shows how foreign exchange intervention affects the money supply because the central bank's liabilities, which rise or fall when its assets rise or fall, are the base of the domestic money supply process. The central bank can negate the money supply effect of intervention through sterilization.

A central bank can fix the exchange rate of its currency against foreign currency if it is willing to trade unlimited amounts of domestic money against foreign assets at that rate. To fix the exchange rate, the central bank must intervene in the foreign exchange market whenever necessary to prevent the emergence of an excess demand or supply of domestic currency assets. In effect, the central bank adjusts its foreign assets – and thus, the domestic money supply – to ensure that asset markets are always in equilibrium under the fixed exchange rate.

A commitment to fix an exchange rate forces the central bank to sacrifice its ability to use monetary policy for stabilization. A purchase of domestic assets by the central bank causes an equal fall in its official international reserves, leaving the money supply and output unchanged.

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 that 'crowds out' aggregate demand. Instead, it forces central bank purchase of foreign assets and an expansion of the money supply. Devaluation also raises aggregate demand and the money supply in the short run. In the long run, fiscal expansion causes a real appreciation, an increase in the money supply, and a rise in the home price level.

Balance of payments crises occur when market participants expect the central bank to change the exchange rate from its current level. If the market decides a devaluation is coming, the domestic interest rate rises above the world interest rate and foreign reserves drop sharply as private capital flows abroad. Self-fulfilling currency crises can occur when an economy is vulnerable to speculation.

A system of managed floating allows the central bank to retain some ability to

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control the domestic money supply, but at the cost of greater exchange rate instability. If domestic and foreign bonds are imperfect substitutes, 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 direct effect on exchange rates.

A world system of fixed exchange rates in which countries peg the prices of their currencies in terms of a reserve currency involves a striking asymmetry: the reserve currency country, which does not have to fix any exchange rate, can influence economic activity both at home and abroad through its monetary policy. In contrast, all other countries are unable to influence their output or foreign output through monetary policy.

A gold standard, in which all countries fix their currencies' prices in terms of gold, avoids the asymmetry inherent in a reserve currency standard and also places constraints on the growth of the countries' money supplies. But the gold standard has serious drawback that make it impractical as a way of organizing today's international monetary system. Even the dollar-based gold exchange standard set up after World War II ultimately proved unworkable.

To hold the exchange rate constant, a central bank must always be willing to trade currencies at the fixed exchange rate with the private actors in the foreign exchange market. The bank must also be willing to buy any amount of dollar assets the market wants to sell for another currency at that exchange rate.
The central bank can succeed in holding the exchange rate fixed only if its financial transactions ensure that asset markets remain in equilibrium when the exchange rate is at its fixed level.

20.1. How the European Single Currency Evolved

The European Monetary System of fixed intra-EU exchange rates was inaugurated in March 1979 and originally included 11 countries. Capital controls and frequent realignments were essential ingredients in maintaining the system until the mid-1980s, but since then, controls have been abolished as part of the European Union's wider program of market unification.
In practice, all EMS currencies were pegged to Germany's former currency. As a result, Germany was able to set monetary policy for the EMS. The credibility theory of the EMS holds that participating governments profited from the German Bundesbank's reputation as an inflation fighter. In fact, inflation rates in EMS

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countries ultimately tended to converge around Germany's generally low inflation rate.

Until its demise in 1973, the Bretton Woods system fixed every member country's exchange rate against the U.S. dollar and as a result also fixed the exchange rate between every pair of nondollar currencies.

20.1.1. What Has Driven European Monetary Cooperation?

Two main motives inspired the EU countries to seek closer coordination of monetary policies and have remained major reasons for the adoption of the euro:

1. To enhance Europe's role in the world monetary system: by speaking with a single voice on monetary issues, EU countries hoped to defend more effectively their own economic interest in the face of an increasingly self-absorbed United States.
2. To turn the European Union into a truly unified market: European officials believed that exchange rate uncertainty was a major factor reducing trade within Europe.

The key to understanding how Europe has come so far in both market and monetary unification lies in the continent's war-torn history. After the end of World War II many European leaders agreed that economic cooperation and integration would be the best guarantee against wars.

20.1.2. The European Monetary System, 1979-1998

The first significant institutional step on the road to European monetary unification was the European Monetary System. The eight original participants – France, Germany, Italy, Belgium, Denmark, Ireland, Luxembourg, and the Netherlands – began operating a formal network of mutually pegged exchange rates in 1979. The prospects for a successful fixed-rate area in Europe seemed bleak in early 1979, when recent yearly inflation rates ranged from 2.7 percent to 12.1 percent.

The EMS's operation was aided by several safety valves that initially helped reduce the frequency of such crises. Most exchange rates fixed by the EMS could fluctuate up or down as much as 2.25 percent relative to an assigned par value. As another crucial safety valve, the EMS developed generous provisions for the extension of credit from strong- to weak-currency members. Finally, during the system's initial years of operation several members reduced the possibility of speculative attack by maintaining capital controls that directly limited domestic residents' sales of home for foreign currencies.

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The EMS went through periodic currency realignments. In all, 11 realignments occurred between the start of the EMS in 1979 and January 1987. Starting in 1987, a phase removal of capital controls greatly reduced member countries' monetary independence, but freedom of payments and capital movements within the EU had always been a key element of the EU countries' plan to turn Europe into a unified single market.

The result of the reunification of Germany was a boom in Germany and higher inflation, which Germany's very inflation-averse central bank resisted through sharply higher interest rates. Other countries, who were not simultaneously booming, pushed their own economies into deep recession by matching the high German interest rates.

20.1.3. German Monetary Dominance and the Credibility Theory of the EMS

Europe's experience of high inflation in the 1970s suggest and additional purpose that the EMS grew to fulfil. By fixing their exchange rates against the DM, the other Ems countries in effect imported the German Bundesbank's credibility as an inflation fighter and thus discouraged the development of inflationary pressures at home. This view, the credibility theory of the EMS, holds that the political costs of violating an international exchange rate agreement may be useful. They can restrain governments from depreciating their currencies to gain the short-term advantage of an economic boom at the long-term cost of higher inflation.

Policy makers in inflation-prone EMS countries clearly gained credibility by placing monetary policy decisions in the hands of the inflation-fearing German central bank. Added support for the credibility theory comes from the behavior of inflation rates relative to Germany's; annual inflation rates gradually converged toward the low German levels.

20.1.4. Market Integration Initiatives

The EU countries have tried to achieve greater internal economic unity not only by fixing mutual exchange rates, but also through direct measures to encourage the free flow of goods, services, and factors of production. The process of market unification that began when the original EU members formed their customs union in 1957 was still incomplete 30 years later. In a number of industries trade within Europe was discouraged by government-imposed standards and registration requirements. In the Single European Act of 1986 EU members took the crucial political steps to remove remaining internal barriers to trade, capital movements, and labor migration. Most important, they dropped the Treaty of Rome's requirement of unanimous consent for measures related to market completion.

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20.1.5. European Economic and Monetary Union

Countries can link their currencies together in many ways. The early EMS, characterized by frequent currency realignments and widespread government control over capital movements, left some scope for national monetary policies. In 1989 a committee headed by the president of the European Commission recommended a three-stage transition to a goal at the extreme end of the policy spectrum just described. That goal was an economic and monetary union.

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. Included in the 250-page Maastricht Treaty was a provision calling for the introduction of a single European currency and a European Central Bank no later than 1999.
Why did the EU countries move away from the EMS and toward the much more ambitious goal of a single shared currency? There were four reasons:

1. They believed a single EU currency would produce a greater degree of European market integration than fixed exchange rates by removing the threat of EMS currency realignments and eliminating the costs to traders of converting one currency into another.
2. Some EU leaders thought that 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.
3. Given the move 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 parities rather than irrevocably locking parities through a single currency.
4. As previously noted, all of the EU countries' leaders hoped the Maastricht Treaty's provisions would guarantee the political stability of Europe.

The Maastricht Treaty's critics denied that EMU would have these positive effects and opposed the treaty's provisions for vesting stronger governmental powers with the European Union.

20.2. The Euro and Economic Policy in the Euro Zone

The Maastricht Treaty specified a set of macroeconomic convergence criteria that EU countries would need to satisfy in order to qualify for admission to EMU. A major purpose of the convergence criteria was to reassure voters 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, devised by EU leaders at Germany's insistence, had the potential to restrict the flexibility of EMU

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members to carry out fiscal policy at national level. The SGP and EMU together might therefore have deprived individual countries in the euro zone of national fiscal as well as monetary policy, but the SGP has not been enforced in practice.

How were the initial members of EMU chosen, how are new members admitted, and what is the structure of the complex of financial and political institutions that govern economic policy in the euro zone?

20.2.1. The Maastricht Convergence Criteria and the Stability and Growth Pact

The Maastricht Treaty requires EU countries to satisfy several macroeconomic convergence criteria prior to admission to EMU. Among these criteria are:

1. The country's inflation rate in the year before admission must be no more than 1.5 percent above the average rate of the three EU member states with the lowest inflation.
2. The country must have maintained a stable exchange rate within the ERM without devaluing on its own initiative.
3. The country must have a public-sector deficit no higher than 3 percent of its GDP.
4. The country must have a public debt that is below or approaching a reference level of 60 percent of its GDP.

In addition, a supplementary Stability and Growth Pact negotiated by European leaders in 1997 tightens the fiscal straitjacket further. It sets out the medium-term budgetary objective of positions close to balance or in surplus. What explains the macroeconomic convergence criteria, the fear of high public debts, and the SGP? Before they would sign the Maastricht Treaty, low-inflation countries such as Germany wanted assurance that their EMU partners had learned to prefer an environment of low inflation and fiscal restraint. As EMU came closer in 1997, German public opinion remains opposed to the euro. The German government demanded the SGP as a way of convincing domestic voters that the new eurosystem would indeed produce low inflation.
By May 1998, it was clear that 11 EU countries had satisfied the convergence criteria and would be the founding members of EMU: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain.

20.2.2. 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 plus the 17 national central banks, which

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now play a role analogues to the regional Federal Reserve banks in the United States.

The authors of the Maastricht Treaty hoped to create an independent central bank free of the political influences that might lead to inflation. The treaty gives the ESCB an overriding mandate to pursue price stability and included many provisions intended to insulate monetary policy decisions from political influence.

20.2.3. The Revised Exchange Rate Mechanism

20.3. The Theory of Optimum Currency Areas

The theory of optimum currency areas implies that countries will wish to join fixed exchange rate areas closely linked to their own economies through trade and factor mobility. A country's decision to join an exchange rate area is determined by the difference between the monetary efficiency gain from joining and the economic stability loss from joining. Only when economic integration passes a critical level is it beneficial to join.

There is little doubt that the European monetary integration process has helped advance the political goals of its founders by giving the European Union a stronger position in international affairs. The survival and future development of the European monetary experiment depend more heavily on its ability to help countries reach their economic goals.

We saw in Chapter 19 that by changing its exchange rate, a country may succeed in cushioning the disruptive impact of various economic shocks. On the other hand, exchange rate flexibility can have potentially harmful effects, such as making relative prices less predictable or undermining the government's resolve to keep inflation in check.
In this section we show that a country's costs and benefits from joining a fixed exchange rate are such as the EMS depend on how integrated its economy is with those of its potential partners. The optimum currency areas, predicts that fixed exchange rates are most appropriate for areas closely integrated through international trade and factor movements.

20.3.1. Economic Integration and the Benefits of a Fixed Exchange Rate Area: The GG Schedul

Consider how an individual country might approach the decision of whether to join an area of fixed exchange rates. Our goal is to develop a simple diagram that clarifies this country's choice. Let us assume that Norway is considering pegging its currency, the

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crone, to the euro.

A major economic benefit of fixed exchange rates is that they simplify economic calculations and, compared to floating rates, provide a more predictable basis for decisions that involve international transactions. The monetary efficiency gain from joining the fixed exchange rate system equals the joiner's savings from avoiding the uncertainty, confusion, and calculation and transaction costs that arise when exchange rates float. The efficiency gain from a fixed crone/euro rate is greater when trade between Norway and the euro zone is extensive than when it is small. Thus, a high degree of economic integration between a country and a fixed exchange rate area magnifies the monetary efficiency gain the country reaps when it fixes its exchanges rate against the area's currencies.

When the economy of the pegging country is well integrated with that of the low-inflation area, however, low domestic inflation is easier to achieve. The reason is that close economic integration leads to international price convergence and therefore lessens the scope for independent variation in the pegging country's price level.

20.3.2. Economic Integration and the Costs of a Fixed Exchange Rate Area: The LL Schedule

Membership in an exchange rate area may involve costs as well as benefits, even when the area has low inflation. These costs arise because a country that joins an exchange rate area gives up its ability to use the exchange rate and monetary policy for the purpose of stabilizing output and employing. The economic stability loss is related to the country's economic integration with its exchange rate partners.

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.

20.3.3. The Decision to Join a Currency Area: Putting the GG and LL Schedules Together

The figure shows that when the degree of economic integration is either smaller or larger than equilibrium, Norway would suffer either from a loss or have additional gains. This 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. Other things equal, increased variability in their product markets makes countries less willing to enter fixed exchange rate areas.

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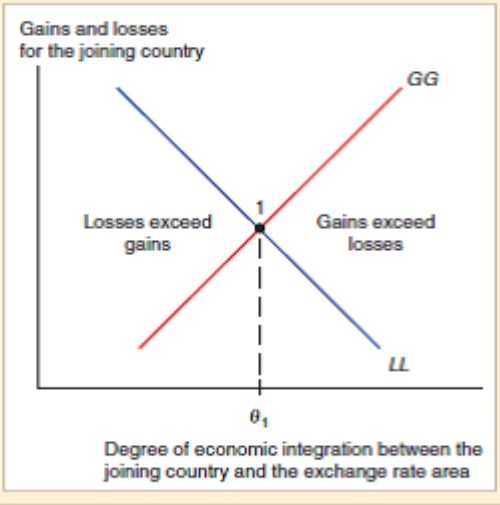
Figure 20-5

Deciding When to Peg the Exchange Rate

The intersection of *GG* and *LL* at point 1 determines a critical level of economic integration, θ_1, between a fixed exchange rate area and a country considering whether to join. At any level of integration above θ_1, the decision to join yields positive net economic benefits to the joining country.



20.3.4. What Is an Optimum Currency Area?

Optimum currency areas are groups of regions with economies closely linked by trade in goods and services and by factor mobility. This follows from our finding that a fixed exchange rate are 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.

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.

20.4. The Future of EMU

The EU does not appear to satisfy all of the criteria for an optimum currency area. Although many barriers to market integration within the EU have been removed and the euro appears to have promoted intro-EU trade, the level of trade still is not very extensive. In addition, labor mobility between and even within EU countries appears more limited than that within other large currency areas. Finally, the level of fiscal federalism in the European Union is too small to cushion member countries from adverse economic events.

Europe's single currency experiment is the boldest attempt ever to reap the efficieny gains from using a single currency over a large and diverse group of sovereign states. If EMU succeeds, it will promote European political as well as economic integration, fostering peace and prosperity in a region.
What problems will EMU face in the coming years?

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1. Europe is not an optimum currency area. Therefore, asymmetric economic developments within different countries of the euro zone will be hard to handle through monetary policy.
2. A related potential problem is that the single currency project has taken economic union to a level far beyond what the EU has been able to do in the area of political union.
3. In most of the larger EU countries, labor markets remain highly unionized and subject to employment taxes and regulations that impede labor mobility between industries and regions. The result has been persistently high levels of unemployment.
4. It remains to be seen if the EU will develop more elaborate institutions for carrying out fiscal transfers from country to country within the euro zone.
5. In the 2000s the EU carried out a large-scale expansion of its membership into Easter Europe and the Mediterranean. That change raises numerous far-reaching challenges for the EU.

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21. Financial Globalization: Opportunity and Crisis

When people are risk averse, 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.

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 head offices are based. Regulatory and political factors have encouraged offshore banking. The same factors have encouraged offshore currency trading, that is, trade in bank deposits denominated in currencies of countries other than the one in which the bank is located. Such Eurocurrency trading received a major stimulus from the absence of reserve requirements on deposits in Eurobanks. Creation of a Eurocurrency deposit does not occur because that currency leaves its country of origin; rather, all that is required is that a Eurobank accept a deposit liability denominated in the currency. Eurocurrencies therefore pose no threat to central banks' control over their domestic monetary bases.

Offshore banking is largely unprotected by the safeguards that national governments have imposed to prevent domestic bank failures. In addition, the opportunity that banks have to shift operations offshore has undermined the effectiveness of national bank supervision. The Basel Committee of industrial-country bank supervisors has worked to enhance regulatory cooperation in the international area, releasing a third generation of proposed prudential regulations. There is still uncertainty, however, about a central bank's obligations as an international lender of last resort. That uncertainty may reflect an attempt by international authorities to reduce moral hazard. The trend toward securitization has increased the need for international cooperation in monitoring and regulation nonbank financial institutions. So has the rise of emerging markets and of large shadow banking systems.

The losses caused by financial crises must be evaluated against the gains that international capital markets potentially offer. The international capital market has contributed to an increase in international portfolio diversification, but the extent of diversification still appears incomplete compared with what economic theory would predict. Similarly, some observers have claimed that the extent of intertemporal trade, as measured by countries' current account balances, has been too small. Less

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ambiguous evidence comes from international interest rate comparisons.

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The market in which residents of different countries trade assets is called the international capital market. It is a group of closely interconnected markets in which asset exchanges with some international dimension take place. International currency trades take place in the foreign exchange market, which is an important part of the international capital market.

21.1. The International Capital Market and the Gains from Trade

When people are risk averse, 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

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21.1.1. Three Types of Gain from Trade

All transactions between the residents of different countries fall into one of three categories: trade of goods or services for goods or services, trade of goods or services for assets, and trades of assets for assets.
Countries can gain by concentrating on the production activities in which they are most efficient and using some of their output to pay for imports of other products from abroad. A second set of trade gains results from intertemporal trade, which is the exchange of goods and services for claims to future goods and services.

21.1.2. Risk Aversion

When individuals select assets, an important factor in their decisions is the riskiness of each asset's return. Other things equal, people dislike risk.
If people are risk averse, they value a collection of assets not only on the basis of its expected return 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. In general, a portfolio whose return fluctuates widely from year to year is less desirable than one that offers the same average return with only mild year-to-year fluctuations.

21.1.3. Portfolio Diversification as a Motive for International Asset Trade

International trade in assets can make both parties to the trade better off by allowing them to reduce the riskiness of the return on their wealth. Trade accomplishes this reduction in risk by allowing both parties to diversify their portfolios – to divide their wealth among a wide spectrum of assets and thus reduce the amount of money they have riding on each individual asset. This is called portfolio diversification.

21.1.4. The Menu of International Assets: Debt versus Equity

International asset trades can be exchanges of many different types of assets. In thinking about asset trades, it is frequently useful to make a distinction between debt instruments and equity instruments. Bonds and bank deposits are debt instruments, since they specify that the issuer of the instrument must repay a fixed value regardless of economic circumstances. In contrast, a share of stock is an equity instrument: it is a claim to a firm's profits and its payoff will vary according to

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circumstances.
The dividing line between debt and equity is not a neat one in practice. Even if an instrument's money payout is the same in different states of the world, its real payout in a particular state will depend on national price levels and exchange rates.

21.2. International Banking and the International Capital Market

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 head offices are based.
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Since the number of assets available in the real world is enormous, specialized institutions have sprung up to bring together buyers and sellers of assets located in different countries.

21.2.1. The Structure of the International Capital Market

The main actors in the international capital market include:

1. Commercial banks: they are at the center of the international capital market, not only because they run the international payment mechanism but also because of the broad range of financial activities they undertake.
2. Corporations: corporations – particularly those with multinational operations – routinely finance their investments by drawing on foreign sources of funds.
3. Nonbank financial institutions: insurance companies, pension funds, mutual funds, and hedge funds have become important players in the international capital market as they have moved into foreign assets to diversify their portfolios. Of particular importance are investments banks.
4. Central banks and other government agencies: they are routinely involved in the international financial markets through foreign exchange intervention. In addition, other government agencies frequently borrow abroad.

On any measure, the scale of transactions in the international capital market has grown much more quickly than world GDP since the early 1970s. One major factor in this development is that countries have progressively dismantled barriers to private

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capital flows across their borders. An important reason for that development is related to exchange rate systems.

21.2.2. Offshore Banking and Offshore Currency Trading

One of the most pervasive features of today's commercial banking industry is that banking activities have become globalized as banks have branched out from their home countries into foreign financial centers.
The term offshore banking is used to describe the business that banks' foreign offices conduct outside of their home countries. Banks may conduct foreign business through any of three types of institutions:

1. An agency office located abroad, which arranges loans and transfers funds but does not accept deposits.
2. A subsidiary bank located abroad. This differs from a local bank only in that a foreign bank is the controlling owner.
3. A foreign branch, which is simply an office of the home bank in another country. Branches carry out the same business as local banks and are usually subject to local and home banking regulations. Often, however, branches can take advantage of cross-border regulatory differences.

The growth of offshore currency trading has gone hand in hand with that of offshore banking. An offshore deposit is simply a bank deposit denominated in a currency other than that of the country in which the bank resides. Offshore currency deposits are usually referred to as Eurocurrencies. Dollar deposits located outside the United States are called Eurodollars. Banks that accept deposits denominated in Eurocurrencies are called Eurobanks.

One motivation 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. World trade growth alone, however, cannot explain the growth of international banking since the 1960s. Another factor is the banks' desire to escape domestic government regulations on financial activity by shifting some of their operations abroad and into foreign currencies.

21.2.3. The Growth of Eurocurrency Trading

Eurodollars were born in the late 1950s, a response to the needs generated by a growing volume of international trade. While the convenience of dealing with local banks was a key factor inspiring the invention 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.

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With the move to floating exchange rates in 1973, the United States and other countries began to dismantle controls on capital flows across their borders, removing an important impetus to the growth of Eurocurrency markets in earlier years. But at that point, the political factor once again came into play in a big way.

21.2.4. The Importance of Regulatory Asymmetries

The history of Eurocurrencies shows how the growth of world trade, financial regulations, and political considerations all helped form the present system. The major factor behind the continuing profitability of Eurocurrency trading is, however, regulatory: in formulating bank regulations, governments in the main Eurocurrency centers discriminate between deposits denominated in the home currency and those denominated in others and between transactions with domestic customers and those with foreign customers.
Regulatory asymmetries explain why those financial centers whose governments historically imposed the fewest restrictions on foreign currency banking became the main Eurocurrency centers.

21.2.5. The Shadow Banking System

In recent decades, a major regulatory asymmetry has arisen between banks and what is often referred to as the shadow banking system. Shadow banks have usually been minimally regulated compared to banks. Historically, monetary policy makers have viewed banks as the prime focus of concern because of their centrality to the payments system and to the implementation of monetary policy.

Shadow banks are closely intertwined with banks as both creditors and borrowers. As a result, the stability of the shadow banking network cannot easily be divorced from that of the banks: if the shadow bank gets into trouble, so may the banks that have loaned it money.

21.3. Regulating International Banking

Offshore banking is largely unprotected by the safeguards that national governments have imposed to prevent domestic bank failures. In addition, the opportunity that banks have to shift operations offshore has undermined the effectiveness of national bank supervision. The Basel Committee of industrial-country bank supervisors has worked to enhance regulatory cooperation in the international area, releasing a third generation of proposed prudential regulations. The trend toward securitization has

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increased the need for international cooperation in monitoring and regulation nonbank financial institutions. So has the rise of emerging markets and of large shadow banking systems.

Many observers believe that the free-wheeling nature of global banking activity up until now left the world financial system vulnerable to bank failure on massive scale.

21.3.1. The Problem of Bank Failure

A bank fails when it is unable to meet its obligations to its depositors and other creditors. Banks use borrowed funds to make loans and to purchase other assets, but some of a bank's borrowers may find themselves unable to repay their loans.

A peculiar feature of banking is that a bank's financial health depends on depositors' confidence in the value of its assets. If depositors come to believe that many of the bank's assets have declined in value, each has an incentive to withdraw his or her funds and place them in a different bank.

Bank failures obviously inflict serious financial harm on individual depositors who lose their money, but they can also harm the economy's macroeconomic stability. A rash of bank failures can bring a drastic reduction in the banking system's ability to finance investment, consumer-durable expenditure, and thus reducing aggregate demand. Because the potential consequences of a banking collapse are so harmful, governments attempt to prevent bank failures through extensive regulation of their domestic banking systems. Many of the precautionary bank regulation measures taken by governments today are a direct result of their countries' experiences during the Great Depression.
In most countries, an extensive 'safety net' has been set up to reduce the risk of bank failure. The main safeguards are:

1. Deposit insurance: one legacy of the Great Depression of the 1930s. In the U.S., the FDIC insures bank depositors against losses of up to a current limit of $250,000. Banks are required to make contributions to the FDIC to cover the cost of this insurance.
2. Reserve requirements: they influence the relation between the monetary base and monetary aggregates.
3. Capital requirements and asset restrictions: bank capital is the equity that the bank's shareholders acquire when they buy the bank's stock, and gives the bank an extra margin of safety in case some of its assets go bad.
4. Bank examination: government supervisors have the right to examine a bank's books to ensure compliance with bank capital standards and other regulations.
5. Lender of last resort facilities: banks can borrow from the central bank's discount window or from other facilities. Since a central bank has the ability to

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create currency, it can lend to banks facing massive deposit outflows as much as they need to satisfy their depositors' claims; it then acts as a lender of last resort.
6. Government-organized bailouts: failing all else, the central bank or fiscal authorities may organize the purchase of a failing bank by healthier institutions.

21.3.2. Difficulties in Regulating International Banking

Banking regulations of the type used in the U.S. and other countries become even less effective in an international environment where banks can shift their business among different regulatory jurisdictions.

1. Deposit insurance is essentially absent in international banking. National deposit insurance systems may protect domestic and foreign depositors alike, but the amount is too small.
2. The absence of overseas reserve requirements was historically a major factor in the growth of Eurocurrency trading.
3. Bank examination to enforce capital requirements and asset restrictions becomes more difficult in an international setting.
4. There is uncertainty over which central bank, if any, is responsible for providing LLR assistance in international banking. Central banks are reluctant to extend the coverage of their LLR responsibilities.
5. When a bank has assets and liabilities in many countries, several governments may have to share operational and financial responsibility for a rescue. The resulting uncertainties can slow down or even impede the rescue operation.

21.3.3. 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 involves a tremendous volume of interbank deposits – roughly 80 percent of all Eurocurrency deposits are owned by private banks. A high level of interbank depositing implies that problems affecting a single bank could be highly contagious and spread quickly to banks with which it is through to do business. In response to this threat, central bank heads from 11 industrialized countries in 1974 set up a group called the Basel Committee, whose job is to achieve a better coordination of surveillance exercised by national authorities over the international banking system.
In 1975, the Basel Committee reached an agreement, called the Concordat, which allocates responsibility for supervising multinational banking establishments between parent and host countries.

A major change in international financial relations has been the rapidly growing

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importance of new emerging markets as sources and destinations for private capital flows. Emerging market financial institutions have, however, often proven to be weak. Thus, the need to extent internationally accepted best practice regulatory standards to emerging market countries became a priority for the Basel Committee.

The international activities of nonbank financial institutions are another potential trouble spot. The failure of a major actor in the shadow banking system, like the failure of a bank, could seriously disrupt national payments and credit networks. Increasing securitization and trade in options and other derivative securities have made it harder for regulators to get an accurate picture of global financial flows by examining bank balance sheets alone.

21.4. How Well Have International Financial Markets Allocated Capital and Risk?

The foreign exchange market's record in communicating appropriate price signals to international traders and investors is mixed. Tests based on the interest parity condition seem to suggest that the market ignores readily available information in setting exchange rates; but because the interest parity theory ignores risk aversion and the resulting risk premiums, the theory may be an oversimplification of reality.

The present structure of the international capital market involves risks of financial instability that can be reduced only through the close cooperation of bank and financial supervisors in many countries. But the same profit motive that leads multinational financial institutions to innovate their way around national regulations can also provide important gains for consumers.

21.4.1. The Extent of International Portfolio Diversification

Since accurate data on the overall portfolio positions of a country's residents are sometimes impossible to assemble, it can be difficult to gauge the extent of international portfolio diversification by direct observation.
In 1970, the foreign assets held by U.S. residents were equal in value to 6.2 percent of the U.S. capital stock. Nowadays, the percentages have grown but still seem too small. With full international portfolio diversification, we would expect them to reflect the size of the U.S. economy relative to that of the rest of the world.
However, international asset trade has increased substantially as a result of the growth of the international capital market. Still, the data remind us that there is no foolproof measure of the socially optimal extent of foreign investment.

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21.4.2. The Extent of Intertemporal Trade

An alternative way of evaluating the performance of the world capital market was suggested by economists Feldstein and Horioka. A smoothly working international capital market allows countries' domestic investment rates to diverge widely from their saving rates. In such an idealized world, saving seeks out its most productive uses 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 have not been large since World War II. Feldstein and Horioka concluded from this evidence that cross-border capital mobility is low. The main problem with this argument is that it is impossible to gauge whether the extent of intertemporal trade is deficient without knowing if there are unexploited trade gains, and knowing this requires more knowledge about actual economies.

21.4.3. Onshore-Offshore Interest Differentials

A quite different barometer of the international capital market's performance is the relationship between onshore and offshore interest rates on similar assets denominated in the same currency. If the world capital market is doing its job of communicating information, these interest rates should move closely together and not differ too greatly.

21.4.4. The Efficiency of the Foreign Exchange Market

The foreign exchange market is a central component of the international capital market, and the exchange rates it sets help determine the profitability of international transactions of all types. Exchange rates therefore communicate important economic signals to households and firms engaged in international trade and investment. If these signals do not reflect all available information, a misallocation of resources will result. We examine three types of tests: test based on interest parity, tests based on modelling risk premiums, and tests for excessive exchange rate volatility.

Studies Based on Interest Parity

The interest parity condition that was the basis of the discussion of exchange rate determination has been used to study whether market exchange rates incorporate all available information. Statistical studies of the relationship between interest rate differences and later depreciation rates show that the interest difference has been a very bad predictor, in the sense that it has failed to catch any of the large swings in exchange rates.

The Role of Risk Premiums

One explanation of the research results described above is that the foreign exchange

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market simply ignores easily available information in setting exchange rates. If bonds denominated in different currencies are imperfect substitutes for investors, the international interest rate difference equals expected currency depreciation plus a risk premium. Thus, under imperfect asset substitutability, the empirical results just discussed cannot be used to draw inferences about the foreign exchange market's efficiency in processing information.

The mixed empirical record leaves the following two possibilities: either risk premiums are important in exchange rate determination, or the foreign exchange market has been ignoring the opportunity to profit from easily available information. The second alternative seems unlikely in light of foreign exchange traders' powerful incentives to make profits.

Tests for Excessive Volatility

One of the most worrisome findings is that statistical forecasting models of exchange rates based on standard fundamental variables like money supplies, government deficits, and output perform badly. 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. A basic problem underlying tests for excessive volatility is the impossibility of quantifying exactly all the variables that convey relevant news about the economic future.

The Bottom Line

The ambiguous evidence on the foreign exchange market's performance warrants an open-minded view. A judgement 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 judgement of market failure might imply a need for increased foreign exchange intervention by central banks and a reversal of the global trend toward external financial liberalization.

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22. Developing Countries: Growth, Crisis, and Reform

There are vast differences in per capita income and in well-being among 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. However, some developing countries, notably several in East Asia, have seen dramatic increases in living standard since the 1960s.

Developing countries form a heterogeneous group, especially since many have embarked on wide-ranging economic reform in recent years. Most have at least some of the following features: heavy government involvement in the economy; a track record of high inflation, usually reflecting government attempts to extract seigniorage from the economy; weak credit institutions and undeveloped capital markets; pegged exchange rates and exchange or capital controls; a heavy reliance on primary commodity exports. Corruption seems to increase as a country's relative poverty rises.
Because many developing economies offer potentially rich opportunities for investment, it is natural for them to have current account deficits and to borrow from richer countries. In principle, developing-country borrowing can cause gains from trade that make both borrowers and lenders better off. In practice, however, borrowing by developing countries has sometimes led to default crises that generally cause currency and banking crises.

In the 1970s, as the Bretton Woods system collapsed, countries in Latin America entered an era of distinctly inferior macroeconomic performance with respect to growth and inflation. Uncontrolled external borrowing led, in the 1980s, to a generalized developing-country debt crisis, its greatest impact being in Latin America and Africa. Starting with Chile, some large Latin American countries started to undertake more thorough economic reform, including not just disinflation but also control of the government budget, vigorous privatization, deregulation, and trade policy reform. Argentina adopted a currency board in 1991, which collapsed after ten years.

Despite their astoundingly good records of high output growth and low inflation and budged deficits, several key developing countries in East Asia were hit by sever panics and devastating currency depreciation in 1997. In retrospect, the affected countries had several vulnerabilities, most of them related to widespread moral hazard in domestic banking and finance linked to the original sin of foreign currency denominated debts. The effects of the crisis spilled over to countries as distant as

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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 few apparent problems before their crises struck, has given rise to demands for rethinking the international financial architecture.
Proposals to reform the international architecture can be grouped as preventive measures or as ex post measures, with the latter applied once safeguards have failed to stop a crisis. Among preventive measures are greater transparency concerning countries' policies and financial positions; enhanced regulation of domestic banking; and more extensive credit lines. Ex post measures that have been suggest include more extensive and flexible lending by the IMF. In the years to come, developing countries will no doubt experiment with capital controls, dollarization, floating exchange rates, and other regimes.

Recent research on the ultimate determinants of economic growth in developing countries has focused on geographical issues such as the disease environment, institutional features such as government protection of property rights, and human capital endowments. The flow of capital from rich to poor countries also depends on these factors. While economist agree that all of these determinants are important, it is less clear where policy should focus first in its attempts to lift poor countries out of their poverty.

Several times since the 1980s, the macroeconomic problems of the world's developing countries have been at the forefront of concerns about the stability of the entire international economy. Since the 1960s, some countries that once were poos have increased their living standards dramatically, while many of them have fallen even further behind the industrial world.

22.1. Income, Wealth, and Growth in the World Economy

There are vast differences in per capita income and in well-being among 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. However, some developing countries, notably several in East Asia, have seen dramatic increases in living standard since the 1960s.

Poverty is the basic problem that developing countries face, and escaping from poverty is their overriding economic and political challenge. Most developing countries are poor in the factors of production essential to modern industry; often due to political instability, insecure property rights, and misguided economic policies.

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22.1.1. The Gap Between Rich and Poor

The world's economies can be divided into four main categories according to their annual per capita income levels: low-income economies (including Nepal, Haiti, and Afghanistan); lower middle-income economies (including China, the Philippines, and Indonesia); upper middle-income economies (including Turkey, some Caribbean countries, and Lithuania); and high-income economies.
Average national income per capita in the riches economies is 76 times that of the average in the poorest developing countries. The life expectancy figures generally reflect income differences: average life spans fall as relative poverty increases.

22.1.2. Has the World Income Gap Narrowed Over Time?

Explaining the income differences among countries is one of the oldest goals of economies. Over the period of 1960 to 2007 the United States grew at roughly 2 to 2.5 percent annual per capita rate. Ireland's catching-up process illustrates the tendency for differences among industrial countries' living standards to narrow over the postwar era. The theory behind this observed convergence in per capita incomes is deceptively simple. If trade is free, if capital can move to countries offering the highest returns, and if knowledge itself moves across political borders so that countries always have access to cutting-edge production technologies, then there is no reason for international income gaps to persist for long.

Despite the appeal of a simple convergence theory, no clear tendency for per capita incomes to converge characterizes the world as a whole. We see vast discrepancies in long-term growth rates among different regional country groupings, but no general tendency for poorer countries to grow faster. Growth has been relatively slow in Latin America. In contrast, East Asian countries have tended to grow at rates far above those of the industrialized world, as the convergence theory would predict. The structural features of developing countries have also helped to determine their success in pursuing key macroeconomic goals other than rapid growth, such as low inflation, low unemployment, and financial-sector stability.

22.2. Structural Features of Developing Countries

Developing countries form a heterogeneous group, especially since many have embarked on wide-ranging economic reform in recent years. Most have at least some of the following features: heavy government involvement in the economy; a track record of high inflation, usually reflecting government attempts to extract seigniorage from the economy; weak credit institutions and undeveloped capital markets; pegged exchange rates and exchange or capital controls; a heavy reliance on primary commodity exports. Corruption seems to increase as a country's relative poverty rises.

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Developing countries differ widely among themselves these days, and no single list of typical features would accurately describe all developing countries. In the early 1960s, these countries were much more similar to each other in their approaches to trade policy, macroeconomic policy, and other government interventions in the economy. While many developing countries have reformed their economies to come closer to the structures of the successful industrial economies, the process remains incomplete and most developing countries tend to be characterized by at least some of the following features:

1. There is a history of extensive direct government control of the economy, including restrictions on international trade, government ownership or control of large industrial firms, direct government control of internal financial transactions, and a high level of government consumption as a share of GNP.
2. There is a history of high inflation. Seigniorage is the name economists give to real resources a government earns when it prints money that it spends on goods and services.
3. Where domestic financial markets have been liberalized, weak credit institutions often abound.
4. Where exchange rates are not pegged outright, they tend to be managed more heavily by developing-country governments.
5. Natural resources or agricultural commodities make up an important share of exports for many developing countries.
6. Attempts to circumvent government controls, taxes, and regulations have helped to make corrupt practices such as bribery and extortion a way of life in many if not most developing countries.

For a large sample of developing and industrial countries there is a strong positive relationship between annual real per capita output and an inverse index of corruption. Several factors underlie this strong positive relationship, such as government regulations and a lack of resources.

Cut off from traditional suppliers of manufactures during World War II, developing countries encouraged new manufacturing industries of their own. Political pressure to protect these industries was one factor behind the popularity of import-substituting industrialization in the first postwar decades. In the 1950s, some influential economists argued that developing countries would suffer continually declining terms of trade unless they used commercial policy to move resources out of primary exports and into import substitutes. These forecasts turned out to be wrong, but they did influence developing countries' policies in the first postwar decades.

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22.3. Developing-Country Borrowing and Debt

Because many developing economies offer potentially rich opportunities for investment, it is natural for them to have current account deficits and to borrow from richer countries. In principle, developing-country borrowing can cause gains from trade that make both borrowers and lenders better off. In practice, however, borrowing by developing countries has sometimes led to default crises that generally cause currency and banking crises.

One further feature of developing countries is crucial to understanding their macroeconomic problems: many rely heavily on financial inflows from abroad to finance domestic investment. In the decades after World War II, developing countries tapped the savings of richer countries and built up a substantial debt to the rest of the world. That debt was at the center of several international lending crises.

22.3.1. The Economics of Financial Inflows to Developing Countries

Recall the identity that links national saving, domestic investment, and the current account balance, $S-I = CA$. If national saving falls short of domestic investment, the difference equals the current account deficit. By running a deficit in its current account, a country can obtain resources from abroad to invest even if its domestic saving level is low. However, a deficit in the current account implies that the country is borrowing abroad.

Thus, much developing-country borrowing could potentially be explained by the incentives for intertemporal trade. 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, many productive investment opportunities have been exploited already but saving levels are relatively high. Notice that when developing countries borrow to undertake productive investments that they would not otherwise be able to carry out, both they and the lenders reap gains from trade. While this provides a rational for developing countries' external deficits and debt, it does not imply that all loans from developed to developing countries are justified.

22.3.2. 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 said to be in default when the borrower, without the agreement of the lender, fails to repay on schedule according to the loan contract. Both social and political instability in developing countries make it much more risky to lend to developing than to industrial countries. And indeed, the

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history of financial flows to developing countries is strewn with the wreckage of financial crises and defaulted loan contracts:

1. In the early 19th century, a number of American states defaulted on European loans.
2. Throughout the 19th century, Latin American countries ran into repayment problems.
3. In 1917, the new communist government of Russia repudiated the foreign debts that had been incurred by previous rulers.
4. During the Great Depression of the 1930s, world economic activity collapsed and developing countries found themselves shut out of industrial-country export markets by a wall of protection.
5. A number of developing countries have defaulted in recent decades.

Sharp contractions in a country's output and employment invariably occur after a sudden stop in which the country suddenly loses access to all foreign sources of funds. Even if the country were not on the verge of default initially – imagine that foreign lenders were originally seized by a sudden irrational panic – the harsh contraction in output that the country would suffer would make default a real possibility.

Indeed, foreign lenders will not only withhold new loans if they fear default, they will naturally also try to get as much money out of the country as possible by demanding the full repayment on any loans for which principal can be demanded on short notice. When the developing country repays the principal on debt, it is increasing its net foreign wealth. Thus, in a sudden stop crisis, the country will not only have to run a current account of zero, it will also actually be called upon to run a surplus. Because each of these crises reinforces the others, a developing country's financial crisis is likely to be sever, to have widespread negative effects on the economy and to snowball very likely.

When a government defaults on its obligations, the event is called a sovereign default. A conceptually different situation occurs when a large number of private domestic borrowers cannot pay their debts to foreigners.

Default crises were rare in the first three decades after World War II: debt issue by developing countries was limited, and the lenders typically were governments or official international agencies.

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22.3.3. Alternative Forms of Financial Inflow

When a developing country has a current account deficit, it is selling assets to foreigners to finance the difference between its spending and its income. Different types of financial inflows have predominated in different historical periods. Because different obligations to foreign lenders result, an understanding of the macroeconomic scene in developing countries requires a careful analysis of the five major channels through which these countries have financed their external deficits.

1. Bond finance: bond finance was dominant in the period up to 1914 and in the interwar years, and regained popularity after 1990.
2. Bank finance: between the early 1970s and the late 1980s, developing countries borrowed extensively from commercial banks in the advanced economies.
3. Official lending: developing countries sometimes borrow from official foreign agencies such as the World Bank. Such loans can be made on a concessional basis, that is, at interest rates below market levels.
4. Foreign direct investment: since World War II, foreign direct investment has been a consistently source of developing-country capital.
5. Portfolio investment in ownership of firms: since the early 1990s, investors in developed countries have shown an increased appetite for purchasing shares of stock in developing countries' firms. The trend has been reinforced by many developing countries' efforts at privatization.

These five types of finance can be classified into two categories: debt finance and equity finance. This distinction between debt and equity finance is useful in analyzing how developing-country payments to foreigners adjust to unforeseen events such as recessions or terms of trade changes. Equity rather than debt financing of its investments leaves a developing country much less vulnerable to the risk of a foreign lending crisis.

22.3.4. The Problem of 'Original Sin'

When developing countries incur debts to foreigners, those debts are overwhelmingly denominated in terms of a major foreign currency. In general, lenders from richer countries, fearing the extreme devaluation and inflation that have occurred so often in the past, insist that poorer countries promise to repay them in the lenders' own currencies.

A country that can borrow abroad in its own currency can reduce the real resources it owes to foreigners, without triggering a default, simply by depreciating its currency. A developing country forced to borrow in foreign currency lacks this option, and can reduce what it owes to foreigners only through some form of default.

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Economists Eichengreen and Hausmann coined the phrase original sin to describe developing countries' inability to borrow in their own currencies. In these economists' view, that inability of poor countries is a structural problem caused primarily by features of the global capital market. Other believe that the sin of developing countries is not particularly original but instead derives from their own histories of ill-advised economic policies.
A related but distinct phenomenon is the large scale of private, internal borrowing in dollars or other major foreign currencies in many developing countries. As a result, foreign currency debtors may find themselves in considerable difficulty when the domestic currency depreciates.

22.3.5. The Debt Crisis of the 1980s

In 1981-1983, the world economy suffered a steep recession, which made it hard for developing countries to make payments on their foreign loans.

The crisis began in August 1982 when Mexico announced that its central bank had run out of foreign reserves and that it could no longer meet payments on its foreign debt. Seeing potential similarities between Mexico and other large Latin American debtors, banks in the industrial countries scrambled to reduce their risks by cutting off new credits and demanding repayment on earlier loans.
The results were a widespread inability of developing countries to meet prior debt obligations and a rapid move to the edge of a generalized default. By the end of 1986 more than 40 countries had encountered severe external financing problems. Growth had slowed sharply in much of the developing world, and developing-country borrowing slowed dramatically. Initially, industrial countries, with heavy involvement by the IMF, attempted to persuade the large banks to continue lending, arguing that a coordinated lending response was the best assurance that earlier debts would be repaid. The crisis didn't end until 1989 when the United States, fearing political instability to its south, insisted that American banks give some form of debt relief to indebted developing countries.

22.3.6. Reforms, Capital Inflows, and the Return of Crisis

The early 1990s saw a renewal of private capital flows into developing countries, includ9ing some of the highly indebted Latin American countries at the center of the previous decade's debt crisis.
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 resulted in what many commentators have called a lost decade of Latin American

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growth. Recent economic reforms have taken different shapes in different Latin American countries, and some have made significant progress.

Argentina

suffered under military rule between 1976 and 1983, but the economy remained a shambles even after the return of democracy. Following years marked by banking crises, fiscal instability, and even hyperinflation. The most daring component of Argentina's program, was the new Convertibility Law making Argentina's currency fully convertible into U.S. dollars at a fixed rate of exactly one peso per dollar. It represented an extreme version of the exchange rate-based approach to reducing inflation that had been tried many times in the past.

However, continuing inflation in the first years of the convertibility plan, despite a fixed exchange rate, implied a steep real appreciation of the peso, which led to unemployment and a growing current account deficit. This process ended in the mid-1990s, but unemployment remained high because of rigidities in labor markets.

Brazil

Like Argentina, Brazil suffered runaway inflation in the 1980s as well as multiple failed attempts at stabilization accompanied by currency reforms. In 1994, the Brazilian government introduced a new currency, the real, pegged to the dollar. Economic growth remained unimpressive, however. A good part of the problem was the very high interest rate the government had to pay on its debt, a rate that reflected scepticism in markets that the limited upward crawl of the real against the dollar could be maintained.

Finally, in 1999, Brazil devalued the real by 8 percent and then allowed it to float. Very quickly, it lost 40 percent of its value against the dollar, and recession followed. Nowadays, economic growth has been healthy and Brazil has become a power in the emerging world.

Chile

Having learned the lessons of deep unemployment and financial collapse at the start of the 1980s, Chile implemented more consistent reforms later in the decade. Very importantly, the country instituted a tough regulatory environment for domestic financial institutions and removed an explicit bailout guarantee that had helped to worsen Chile's earlier debt crisis. Another new policy required all capital inflows to be accompanied by a one-year, non-interest-bearing deposit equal to as much as 30 percent of the transaction.

Chile's policies have paid off handsomely. The country enjoyed GDP growth rates averaging better than 8 percent per year, and inflation dropped to only 6 percent by 1997.

Mexico

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Mexico introduced a broad stabilization and reform program in 1987, combining an aggressive reduction in public-sector deficits and debt with exchange rate targeting and wage-price guidelines negotiated with representatives of industry and labor unions.
Mexico fixed its peso's exchange rate against the U.S. dollar at the end of 1987. Despite the potential flexibility, the Mexican authorities held the exchange rate near its appreciation ceiling. The peso therefore appreciated sharply in real terms, and a large current account deficit emerged. Over the following years, default loomed several times.
Inflation, which had dropped to only 7 percent in 1994, soared as the peso depreciated. By 1996, inflation was falling and the economy was recovering as the peso continued to float. A major achievement of Mexico has been expanding its democratic institutions and moving away from the virtual one-party rule.

22.4. East Asia: Success and Crisis

Despite their astoundingly good records of high output growth and low inflation and budged deficits, several key developing countries in East Asia were hit by sever panics and devastating currency depreciation in 1997. In retrospect, the affected countries had several vulnerabilities, most of them related to widespread moral hazard in domestic banking and finance linked to the original sin of foreign currency denominated debts. 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.

Until 1997 the countries of East Asia were the envy of the developing world. Their rapid growth rates were bringing them far up the development scale, putting several in striking distance of advanced-country status. The speed with which East Asia's economic success turned into economic chaos came as a rude shock to most observers.

22.4.1. The East Asian Economic Miracle

In the 1960s, South Korea was a desperately poor nation with little industry and apparently few economic prospects. In 1963, however, the country launched a series of sweeping economic reforms, shifting from inward-looking, import-substitution development strategy to one that emphasized exports. Remarkable was that South Korea was not alone. Its economic rise was paralleled by that of a number of other East Asian economies.

There remains considerable dispute about the reasons for this economic miracle. In the early 1990s, it was fashionable among some commentators to ascribe Asia's

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growth to a common Asian system of industrial policy and business-government cooperation. However, even a cursory look at the economies involved makes the claim of a common system dubious.
What the high-growth economies did have in common were high rates of saving and investment; rapidly improving educational levels among the work force; and if not free trade, at least a high degree of openness to and integration with world markets.

Perhaps surprisingly, before 1990 most rapidly growing Asian economies financed the bulk of their high investment rates out of domestic savings. In the 1990s, however, the growing popularity of emerging markets among investors in the advanced world led to substantial lending to developing Asia; several of the Asian countries began running large current account deficits as a share of GDP.

22.4.2. Asian Weaknesses

As it turned out, in 1997 Asian economies did indeed experience a severe financial crisis. Three issues in particular stood out:

1. Productivity: although the rapid growth of East 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 appearing; there had been relatively little increase in productivity.
2. Banking regulation: of more immediate relevance to the crisis was the poor state of banking regulation in most Asian economies. Domestic depositors and foreign investors regarded Asian banks as safe, because of the strength of their economies. But banks were not subject to effective government supervision.
3. Legal framework: one important weakness of Asian economies became apparent only after they'd stumbled: the lack of a good legal framework for dealing with companies in trouble.

22.4.3. 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 itself is a small economy. However, the sharp 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. In each case, governments were faced with awkward dilemmas, stemming partly form the dependence of their economies on trade and partly form the fact that domestic banks and companies had large debts denominated in dollars.
All of the afflicted countries except Malaysia turned to the IMF for assistance and received loans in return for implementation of economic plans that were supposed to

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contain the damage: higher interest rates to limit the exchange rate depreciation, efforts to avoid large budget deficits, and structural reforms. Despite this aid, however, the result of the currency crisis was a sharp economic downturn.

As a consequence of a collapse in confidence, the troubled Asian economies were also forced into a dramatic reversal of their current account positions. Currencies eventually stabilized throughout Asia and interest rates decreased, but the direct spillover from the region's slum caused slowdowns or recessions in several neighboring countries.
Fortunately, after the sharp output contraction in 1998, growth returned as depreciated currencies spurred higher exports. In general, investment rates have remained depressed however, and current accounts have remained in surplus, sometimes substantially so.

22.4.4. Spillover to Russia

Asia's problems sparked a general flight by investors from emerging markets, putting severe pressure on the economic policies of distant developing nations, including Russia.
Starting in 1989, the countries of the Soviet bloc shook off communist rule and embarked on transitions from centrally planned economic allocation to the market. These transitions were traumatic, involved rapid inflation, steep output declines, and unemployment.
By the end of the 1990s, a handful of Eastern European economies had made successful transitions to the capitalist order.

Over the course of the 1990s, Russia's weak government was unable to collect taxes or even to enforce basic laws; the country was riddled with corruption and organized crime. Despite Russia's failure to abide by earlier IMF stabilization programs, the Fund nonetheless entered into a new agreement with Russia's government and provided billions to back up the ruble's exchange rate, fearing that a Russian collapse could lead to renewed turbulence in the developing world. In 1998, however, the Russian government abandoned its exchange rate target; at the same time as it devalued, it defaulted on its debts and froze international payments. In response, the U.S. Federal Reserve lowered dollar interest rates sharply, possibly averting a worldwide financial collapse.

22.5. Lessons of Developing-Country Crises

The emerging market crisis produced what might be called an orgy of finger-pointing. Additionally, almost everyone criticized the IMF, although some were saying that it was wrong to tell countries to limit the depreciation of their currencies, others that it

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was wrong to allow the currencies to depreciate at all.
Nonetheless, some very clear lessons emerge from a careful study of the Asian crisis and earlier developing-country crises in Latin America:

1. Choosing the right exchange rate regime: it is perilous for a developing country to fix its exchange rate unless it has the means and commitment to do so, come what may.
2. The central importance of banking: wise governments should devote a great deal of attention to shoring up their banking systems to minimize moral hazard, in the hope of becoming less vulnerable to financial catastrophes.
3. The proper sequence of reform measures: the order in which liberalization measures are taken really does matter. Economists argue that trade liberalization should preceded financial account liberalization.
4. The importance of contagion: the vulnerability of even seeming healthy economies to crises of confidence generated by events elsewhere in the world – a domino effect that has come to be known as contagion.

22.6. Reforming the World's Financial 'Architecture'

Proposals to reform the international architecture can be grouped as preventive measures or as ex post measures, with the latter applied once safeguards have failed to stop a crisis. Among preventive measures are greater transparency concerning countries' policies and financial positions; enhanced regulation of domestic banking; and more extensive credit lines. Ex post measures that have been suggest include more extensive and flexible lending by the IMF. In the years to come, developing countries will no doubt experiment with capital controls, dollarization, floating exchange rates, and other regimes.

Economic difficulties lead, inevitably, to proposals for economic reforms. The Asian economic crisis and its repercussion suggested to many people that the international financial and monetary system was in need for change.
One reason for this was that the Asian countries' problems seemed to stem primarily from their connections with the world capital market. A country can be vulnerable to a currency crisis even if its own position looks healthy by normal measures. The second reason for rethinking international finance was the apparent strength of contagion through the international capital markets.

22.6.1. Capital Mobility and the Trilemma of the Exchange Rate Regime

One effect of the Asian crisis was to dispel any illusions we may have had about the availability of easy answers to the problems of international macroeconomics and finance. Chapter 19 spelled out the basic macroeconomic policy trilemma for open economies. Exchange rate stability is more important for the typical developing

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country than for the typical developed country. To achieve one of them, a country must give up one of the two other objectives.

In the last two decades of the 20th century, capital became substantially more mobile, largely because controls were lifted, but also because of improved communications technology. This new capital mobility made adjustable peg regimes extremely vulnerable to speculation. The result has been to drive developing countries toward either rigidly fixing exchange rates and a renunciation of monetary autonomy, or flexibly managed exchange rates. But despite the lesson of experience that intermediate positions are dangerous, developing countries have been uncomfortable with both extremes.

Several economists, including Bhagwati and Stiglitz, have argued that developing countries should keep or reinstate restrictions on capital mobility to be able to exercise monetary autonomy while enjoying stable exchange rates.

22.6.2. 'Prophylactic' Measures

Since the risk of financial crisis is what makes the decisions surrounding the choice of exchange rate regime so difficult, some recent proposals focus on ways to reduce that risk. Typical proposals include calls for the following:

- More transparency: a better provision of financial information. The hope is that increased transparency will reduce both the tendency of too much money rushing into a country when things are going well, and the rush for the exits when the truth turns out to be less favorable.
- Stronger banking systems: through both closer regulation of the risks they take and increased capital requirements, which ensure that substantial amounts of the owners' own money is at risk.
- Enhanced credit lines: nations could draw on these in the event of a currency crisis, in effect adding to their foreign exchange reserves.
- Increased equity capital inflows relative to debt inflows: reduces the probability of default.

How effective these various measures might be remains a matter of dispute. The international community recognizes that developing countries play increasingly important roles, as lenders as well as borrowers, in world financial markets.

22.6.3. Coping with Crisis

Even with the proposed prophylactic measures, crises would still surely happen. Thus there have also been proposals to modify the way the world responds to such crises. Many of these proposals relate to the role and policies of the IMF. Some conservative critics believe that the IMF should simply be abolished, arguing that is very existence

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encourages irresponsible lending by making borrowers and lenders believe that they will always be saved from the consequences of their actions. Others argue that the IMF is necessary, but that it has misconstrued its role. Finally, defenders of the IMF argue that the agency has simply been underfunded for its task, tat in a world of high capital mobility, it needs to have the ability to provide much larger loans much more quickly than it presently can.
Another set of proposals is based on the idea that sometimes a country simply cannot pay its debts, and that international contracts should therefore be structured so as to speed renegotiation between creditors and debtors.

22.7. Understanding Global Capital Flows and the Global Distribution of Income: Is Geography Destiny?

Recent research on the ultimate determinants of economic growth in developing countries has focused on geographical issues such as the disease environment, institutional features such as government protection of property rights, and human capital endowments. The flow of capital from rich to poor countries also depends on these factors. While economist agree that all of these determinants are important, it is less clear where policy should focus first in its attempts to lift poor countries out of their poverty.

In contradiction of a simple theory of convergence, there is no systematic tendency for poorer countries' income levels to converge, even slowly, to those of richer countries. Ultimately, if they have access to the same technologies used in richer countries, poor countries will themselves become rich.
In practice, however, this happy story is the exception rather than the rule. Furthermore, relatively little capital flows to developing countries, despite the prediction of the simple convergence theory that the marginal product of capital, and therefore the returns to foreign investment, should be high there.

In fact, the risks of investing in several of the developing countries limit their attractiveness for investors, both foreign and domestic alike; and those risks are closely related to the countries' poor economic growth performances. What explains the fact that some countries have grown very rich while some attract little or no foreign investment and remain in extreme poverty? Two main schools of thought focus, alternatively, on countries' geographical features and on their institutions of government.

In one version of the geography view, aspects of a country's physical environment such as climate, soil type, diseases, and geographical accessibility determine its long-run economic performance. For these reasons, Jared Diamond argues, it was the Europeans who conquered the inhabitants of the New World and not vice versa.

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Another factor stressed in some geographical theories is access to international trade. Countries that are landlocked and mountainous trade less with the outside world.

In contrast, those favoring the institutions of government as the decisive factor for economic prosperity focus on the success of government in protecting private property rights, thereby encouraging private enterprise, investment, innovation, and ultimately economic growth. According to this view, a country that cannot protect its citizens from arbitrary property confiscation will be a country in which people do not find it worthwhile to exert effort in the pursuit of wealth.

How can we hope to distinguish among the various statistical possibilities? One strategy is to find some measurable factor that influences the institutions governing private property but is otherwise unrelated to current per capital income levels. Economists Acemoglu and Johnson suggest an imaginative approach to this dilemma. They propose historical mortality rates of early European settles in former colonies as an instrument for institutional quality. Their case that this provides a useful instrument rests on two arguments. (1) They argue that the level of settler mortality determined the later institutions governing property rights. (2) They argue that it otherwise does not affect today's per capita incomes.
Some critics have suggested that Acemoglu and Johnson measures of institutional quality are inadequate; others argue that their mortality data are faulty or even that historical mortality rates could be related directly to productivity today.

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