

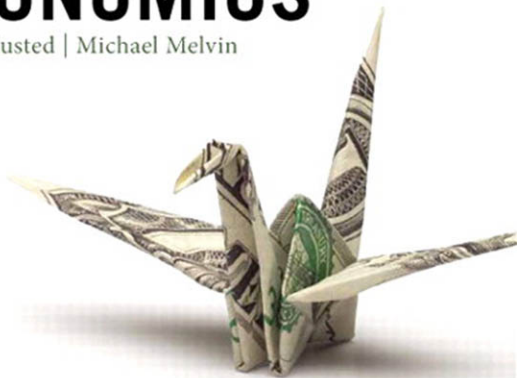
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Steven Husted

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To Marie and Bettina

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PREFACE

As we have stated in previous editions of this book, our goal in writing this text is simple: We hope to provide the student with a guide to the study of international economics that is accessible, comprehensive, relevant, and up-to-date. Judging by the many favorable reviews we have received from students and professors who have used this book, we feel that we have been generally successful in accomplishing our goal. Our purpose remains unchanged. To that end, we have substantially revised this edition in order to cover all of the basics as well as many other topics that have recently been the subject of substantial debate.

New to This Edition

In addition to updating data and examples, we have made a number of revisions to this edition. The most substantial revisions to the first half of the book are as follows:

- In Chapter 1 we have added discussion of the collapse of international trade in 2009 and its subsequent rebound. Also in this chapter we focus in greater detail on the rise of China as a major participant in international trade flows.
- In Chapter 8 we have updated U.S. commercial policy initiatives and added a trade policy case study on a dispute between the United States and China over tire imports into the United States.
- In Chapter 9 we have provided details on newly concluded and approved free-trade agreements between the United States and several countries. We have also provided a discussion of a recent initiative between the United States and a number of Pacific region countries, known as the TransPacific Partnership.

Changes in the second half of the book represent the most extensive revisions in the history of this manuscript. The overriding goal of these changes is to improve the consistency of voice between the first and second halves of the text. The revisions include the following:

- A reorganization of the material, with the elimination of the introductory chapter found in earlier editions and the movement of the chapter on the international monetary system to an earlier spot in the text. In addition, the two chapters on exchange rates and interest rates found in earlier editions have been combined into a single chapter in this edition. In addition, the chapter on open economy macroeconomics has been simplified to make the material more accessible to students with limited exposure to macroeconomic modeling, and the presentation of the Mundell-Fleming model has been moved to an appendix.
- Chapter 13 of this text covers the international monetary system, past and present. Included in this discussion is a much expanded treatment of the gold standard and the Bretton Woods system.
- Chapter 14 provides a discussion of and develops a model to understand short-run exchange behavior. At the center of this discussion is uncovered interest rate parity. Chapter 15 focuses on longer-run exchange rate behavior, offering extensive treatment of purchasing power parity and the monetary approach to exchange rates.
- Chapter 16 deals with theories of the current account balance, including a discussion of the elasticities model as well as an introduction to the intertemporal model.
- Chapter 17 is devoted to open economy macroeconomics. The body of this chapter shows how a simple open economy Keynesian model can be used to understand some

of impacts of the recent financial crisis on economic activity and on the current account balance.

- Chapter 18 concludes with a treatment of international debt. Included in this chapter is a new Global Insight on the eurozone crisis.

Level of Presentation

We have sought to write a text that covers current developments in international economics but at the same time is accessible to students who may have had only one or two courses in the principles of economics. To that end, we have minimized mathematics and relegated more difficult extensions to appendixes. The book contains a wide range of helpful learning aids, including a marginal glossary that defines new concepts, boxed Global Insights and case studies that present “real-world” counterparts to the ideas being developed in the main text, and a set of exercises at the end of each chapter. Going beyond the text presentation, we have incorporated interesting and timely material from Internet Web sites into exercises that build upon chapter material. At the end of each chapter a WWW icon identifies a reference to the *International Economics* companion Web site, where Internet exercises may be found. The exercises allow a dynamic relevancy not possible in standard textbook approaches. In addition to these features, a *Study Guide* is available to accompany the book. This guide offers a variety of problems and questions aimed at helping the student explore and learn the text material.

Coverage and Emphasis

To give the student a better feel for the issues discussed in the text, we have incorporated an extensive amount of data from the real world. For instance, Chapter 1 is devoted almost entirely to describing national economies and the patterns and directions of international trade. Other tables appear throughout the book. To every extent possible, we have sought to provide the most up-to-date statistics currently available.

Chapter 2 is one of the more unusual chapters to be found in a textbook on international economics. Its purpose is to provide a review of basic general equilibrium analysis, and, in particular, to introduce students to the logic and method of economic model building. The chapter begins with a straightforward analysis of the general equilibrium of a closed economy, using simple production possibility frontier diagrams. It then proceeds to the first description of what it means for an economy to engage in international trade. The next two chapters of the text detail the classical and Heckscher-Ohlin (HO) models of trade, using production possibility frontiers as the chief analytical tool.

Chapter 5 is devoted to empirical tests of the classical and HO trade models. It then goes on to deal briefly with new trade theories, including models involving imperfect competition and increasing returns to scale. Chapter 6 introduces a four-chapter sequence of material on commercial policy with a discussion of tariffs. Strategic trade policy and protection of the environment as justifications for trade protection are discussed in Chapter 7. Chapter 8 provides considerable detail on U.S. trade policy, including trade policy case studies that deal with environmental issues, the recent trade dispute with the European Union (EU) over bananas, and the recent imposition of tariffs on tire imports from China. Also in this chapter is an extended discussion of the WTO and the collapse of the Doha Round talks.

Chapter 9 is devoted entirely to the economics of regional trade agreements. The chapter begins with a standard discussion of the costs and benefits of such arrangements. It then turns to consider both NAFTA and the EU. Chapter 10 completes this section of the book with a treatment of trade and growth and international flows of factors of production.

Chapter 11 covers the balance of payments and uses the national income accounts to illustrate the links between national saving, investment, and the current account. The description of the foreign-exchange market in Chapter 12 goes well beyond the traditional detail found in other texts. A description of the 24-hour nature of the market, including local trading times and trading volumes, is included. Chapter 13 is devoted to a discussion of the international monetary system,

past, present, and future. Chapters 14 and 15 provide solid grounding in the fundamentals with links between interest rates and exchange rates and between prices and exchange rates discussed in the context of current examples and data. Chapter 16 covers theories of the balance of payments. Chapter 17 focuses on using a simple open economy macro model to understand the impacts of various macroeconomic policies on output and the balance of payments. Chapter 18 covers international banking, sovereign debt, and country risk analysis.

It is our hope that these changes will contribute to a further enhancement of the learning process for our readers. International economics is a dynamic field, and the world is rapidly changing. Our duty as authors is to ensure that our text incorporates all relevant changes at a level suitable for the student.

Alternative Course Emphases

The text is designed to provide sufficient flexibility to be used for a one-term survey of international economics or two separate terms devoted to a more comprehensive study of international trade and international finance. Realizing that individual instructors may have unique preferences regarding material to be presented, we offer the following suggestions:

- For a one-term overview of international economics: Chapters 1–4, 6–9, 11–13, and 17
- For a one-term course in international trade theory: Chapters 1–10
- For a one-term course in international finance: Chapters 11–18

An online *Instructor's Manual* is available to accompany the text, and it provides suggested answers to the end-of-chapter questions. An online *Test Bank* and a *Computerized Test Bank* offer a variety of testing material. The *PowerPoint* presentations incorporate lecture outlines with figures and tables from the book. These resources are available for download from the Instructor's Resource Center at www.pearsonhighered.com.

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An Introduction to International Trade

Topics to Be Covered

Characteristics of National Economies
The Direction of International Trade
What Goods Do Countries Trade?

Key Words

| | |
|------------------------------|-------------------|
| Gross national product (GNP) | Index of openness |
| Gross domestic product (GDP) | Trade deficits |
| Exports | Trade surpluses |
| Imports | |

International economists study fascinating questions. What impact will the global financial crisis have on world trade? Has the recent growth of world trade exacerbated the impact of the crisis? Does growing reliance on international trade lead to a loss of “good” jobs for Americans? Can U.S. firms compete against firms in low-wage countries? What influence does the World Trade Organization (WTO) have over U.S. policy? Why does the United States have such a large trade deficit, and is this deficit harmful to the economy? What is the appropriate value of the dollar? In other words, international economists are concerned with a variety of real-world topics that appear in the news almost every day.

This book provides a comprehensive introduction to international economics. We discuss all of the issues just mentioned. We show you how economists go about investigating these issues. We provide you with a large amount of information on the extent and nature of international commercial transactions. Along the way we attempt to relate the many issues and concepts we encounter to real-world events. Finally, and most important, we attempt to provide you with a simple analytical tool kit that will allow you to study issues such as those mentioned in the preceding paragraph and to weigh future events as they occur.

Recall that when you took Principles of Economics, the course material was divided into two main parts: microeconomics and macroeconomics. In international economics in general, and in this

book in particular, there is a similar division of material. The first ten chapters of this book deal with the theory of international trade (international microeconomics). Of central importance in these chapters is the international exchange of goods and services. Questions of particular interest include the following: Why do nations engage in international trade? What goods do nations trade? How does international trade affect the amount and distribution of jobs and the level of earnings in the economy? Should international trade be regulated by tariffs, quotas, or other barriers, and, if so, to what extent should the regulation occur? And how are countries affected by international flows of labor and capital? In addition to these questions, this part of the book discusses how trade policies are formulated in the United States and elsewhere and describes the various currently existing forms of trading arrangements between countries.

Chapters 11 through 18 are concerned with international finance (or international macroeconomics). The subject matter in these chapters tends to focus on the international exchange of financial assets. Issues that are studied include the balance of payments; the determination of exchange rates; the relationships among exchange rates, prices, and interest rates; international banking, debt, and risk; and the interaction of macroeconomic policies between various nations. Also discussed in these chapters are the evolution of the world's international monetary system and the role of international organizations, such as the International Monetary Fund, in today's international economy.

The purpose of economics is to develop an understanding of the patterns of commercial transactions as well as many of the personal and social interactions that we observe in the real world. International economics focuses its analysis on the commercial interactions between the countries of the world. The goal of international economics is to fashion a theoretical framework that is sufficiently general to allow one to offer explanations of phenomena and to make predictions about the likely outcome of changes in the international environment. Thus, much of the discussion in this book is devoted to developing theories about economic behavior. But theorizing should not be done in a vacuum. It is important to know the facts before we begin. How important is international trade to the nations of the world? Which countries trade with which other countries? What goods do countries trade? The remainder of this chapter is devoted to presenting the factual answers to questions such as these.

CHARACTERISTICS OF NATIONAL ECONOMIES

There are more than 190 countries in the world today. They come in all shapes and sizes. There are large countries with large populations (China, India) and large countries with small populations (Australia, Canada). There are small countries with large populations (Japan) and small countries with small populations (Jamaica, Singapore). No matter what their size, however, there are certain characteristics that are common to all. In each, for instance, there is economic activity. Goods and services are produced, exchanged, and consumed.

The extent of economic activity in a country can be measured in many ways. The two most common measures are the **gross national product (GNP)** and the **gross domestic product (GDP)** of a country.* Both GNP and GDP provide estimates of the total value of sales of final goods and services for a given country. And, because sales of goods and services constitute income to those selling these products, GNP and GDP can also be thought of as indicators of total national income. The difference between GNP and GDP has to do with who is producing the goods, and where. GDP refers to production within a country, no matter whether the factors of production (e.g., labor and capital) are domestic or foreign. GNP refers to production by domestic factors, no matter where they are located. Thus, goods produced by Canadians working in factories in the United States would count as part of U.S. GDP but would also be part of Canadian GNP. For most countries there are only very small differences between GNP and GDP.

Gross national product (GNP)

The value of final goods and services produced by domestic factors of production.

Gross domestic product (GDP)

The value of final goods and services produced within a country.

* World Bank publications now refer to GNP as gross national income (GNI).

That there is any difference at all is because some factors of production (e.g., labor, capital) are internationally mobile. In Chapter 10 we discuss some of the economic implications of international factor mobility.

A crude measure of the standard of living in a country is obtained by the ratio of that country's GNP (or GDP) to its population. This measure is known as the country's *income per capita*, or *per capita GNP (or GDP)*. In essence, it tells us how much each resident of a country would have if the value of that country's production was equally divided among all members of society. By this standard, some countries are low or middle income (even though some residents may be rich) while other countries are high income (even though some residents may be poor). In this book countries classified as low or middle income are referred to as *developing or emerging market countries*. Richer countries are identified as *developed or industrialized*.

All countries participate in international trade. That is, some goods and services produced within every country are sold to economic agents (e.g., individuals, firms, governments) in other countries; these products are known as **exports**. Some goods and services consumed within a country have been purchased from economic agents in other countries; these goods are known as **imports**.

Countries differ in how much they participate in international trade. A measure of this participation (again, a very crude measure) is given by the ratio of exports to GDP (or GNP) multiplied by 100. This measure is known as the **index of openness**. In general, this number will vary between 0 and 100, although values greater than 100 are possible.* Countries with high values of this index trade a lot with the rest of the world and are said to be relatively *open*. Countries with low values of the index are said to be relatively *closed*, because international trade is only a small part of their economic activity.

To understand better the concepts we have presented so far, let's consider some numbers from the real world. Table 1.1 shows the data for a large set of countries. Information is presented on country size in terms of population and area. Also shown are data on GNP per capita (measured in two ways), indexes of openness (exports of goods and services as a percentage of GDP) for 1980 and 2009, and merchandise trade figures (imports and exports for 2009).

Let's explore some of the facts contained in the table. First, note that for each country category, the data are arranged by ascending order of GNP per capita. The poorest countries of the world tend to be located in Africa and Asia. The richest countries tend to be the industrialized countries of Western Europe, North America, and the Pacific Rim. Except for China and India, physical size (land area) and population size appear to have little role in explaining income per capita.

According to the numbers in column 3 of the table, most of the low- and middle-income countries are desperately poor. GNP per capita in some of these countries is less than \$500, compared with an average GNP per capita in excess of \$34,000 in the high-income countries. In India, for instance, per capita GNP was calculated to be \$1,180 in 2009. You may wonder how anyone could survive for one year with such a low income level. Part of the answer to this question lies in the fact that differences in productivity levels and government policies mean that individuals in these countries pay much lower prices for many of the goods and services they consume than people pay in the United States or other developed countries. For example, middle-income citizens of India currently pay about \$100 per month to rent an apartment in most cities, and the average man pays between 50¢ and \$1.00 for a haircut. Both of these prices are significantly lower than the prevailing prices in the United States. Because standard measures of GNP are based on valuing goods in terms of prevailing market prices, there will be a tendency for GNP measures to be biased downward in countries where prices measured in dollar terms are so low.

* A value greater than 100 means that the country's exports are bigger than its overall level of production (GDP or GNP). Such a situation could occur if much of the economic activity of the country in question involved the assembly and export of final products made from imported raw or partially assembled materials. The value in excess of 100 comes about from the fact that output is (always) measured in terms of value added—the value of capital and labor services devoted in this case to the assembly of goods—while exports are measured in terms of the total value of goods—including the value of the imported parts. Clearly, in such circumstances it is quite likely for exports to be greater than value added.

Exports

Goods sold by economic agents located in one country to economic agents located in another.

Imports

Goods purchased by economic agents located in one country from economic agents located in another.

Index of openness

A measure of the importance of international trade to an economy, calculated as the ratio of exports over total domestic production.

TABLE 1.1 Basic Characteristics of Selected Countries

| | 2009 Population (millions) | Area (1,000s sq. km.) | GNP per capita | | | Index of Openness | | Goods & Services | |
|--------------------------------|----------------------------------|--------------------------|----------------|-----------------|--------------------------------------|-------------------|-------------|-------------------------------------|-------------------------------------|
| | | | 2009 (\$) | PPP Estimate | Avg. Yearly % Growth 2000–2009 | 1980 | 2009 | Exports 2009 (millions of \$) | Imports 2009 (millions of \$) |
| Low-income Economies | | | | | | | | | |
| Burundi | 8.0 | 28 | 150 | 390 | 0.2 | 9.0 | 4.9 | 65 | 410 |
| Malawi | 15.0 | 118 | 280 | 760 | 2.1 | 25.0 | 19.3 | 960 | 1,600 |
| Ethiopia | 83.0 | 1,104 | 330 | 930 | 5.9 | 11.0 | 5.2 | 1,490 | 7,310 |
| Niger | 15.0 | 1,267 | 340 | 660 | 0.8 | 25.0 | 16.7 | 900 | 1,550 |
| Sierra Leone | 6.0 | 72 | 340 | 790 | 6.2 | 18.0 | 10.6 | 205 | 505 |
| Guinea | 10.6 | 246 | 370 | 940 | 0.5 | n.a. | 23.9 | 980 | 1,400 |
| Madagascar | 20.0 | 587 | 420 | 1,050 | 1.1 | 13.0 | 12.7 | 1,150 | 2,900 |
| Mozambique | 23.0 | 802 | 440 | 880 | 5.4 | 11.0 | 19.9 | 1,950 | 3,750 |
| Nepal | 29.0 | 147 | 440 | 1,180 | 1.7 | 12.0 | 5.4 | 680 | 3,550 |
| Togo | 7.0 | 57 | 440 | 850 | −0.1 | 51.0 | 27.3 | 780 | 1,400 |
| Central African Republic | 4.0 | 623 | 450 | 750 | −1 | 25.0 | 5.5 | 110 | 300 |
| Rwanda | 10.0 | 26 | 460 | 1,060 | 4.3 | 14.0 | 4.0 | 205 | 1,750 |
| Uganda | 33.0 | 241 | 460 | 1,190 | 4.3 | 19.0 | 22.6 | 3,560 | 4,410 |
| Tanzania | 44.0 | 945 | 500 | 1,350 | 4 | n.a. | 13.7 | 2,970 | 6,347 |
| Burkina Faso | 16.7 | 274 | 510 | 1,170 | 2.1 | 10.0 | 9.8 | 800 | 1,900 |
| Bangladesh | 159.0 | 144 | 590 | 1,580 | 4.3 | 4.0 | 16.9 | 15,081 | 21,833 |
| Chad | 11.0 | 1,284 | 610 | 1,230 | 7.2 | 17.0 | 40.4 | 2,700 | 2,100 |
| Mali | 13.0 | 1,240 | 680 | 1,190 | 2.9 | 15.0 | 23.3 | 2,100 | 2,600 |
| Ghana | 24.8 | 239 | 700 | 1,480 | 3.4 | 8.0 | 35.4 | 5,530 | 8,140 |
| Benin | 9.0 | 113 | 750 | 1,510 | 0.7 | 23.0 | 15.0 | 1,000 | 1,800 |
| Kenya | 40.0 | 580 | 770 | 1,570 | 1.8 | 28.0 | 14.4 | 4,335 | 9,670 |
| Mauritania | 3.0 | 1,026 | 960 | 1,960 | 2.1 | 37.0 | 44.9 | 1,360 | 1,410 |
| Group Average | | | 500 | 1,112 | 2.7 | 18.8 | 17.8 | 2,223 | 3,938 |
| Middle-income Economies | | | | | | | | | |
| Pakistan | 170.0 | 796 | 1,020 | 2,710 | 3 | 12.0 | 10.6 | 17,695 | 31,720 |
| Senegal | 13.0 | 197 | 1,030 | 1,790 | 1.6 | 27.0 | 16.7 | 2,180 | 5,210 |
| Côte d'Ivoire | 21.0 | 322 | 1,060 | 1,640 | −1.4 | 35.0 | 40.4 | 9,300 | 6,500 |
| Nigeria | 155.0 | 924 | 1,140 | 1,980 | 4 | 29.0 | 31.1 | 52,500 | 3,900 |
| Cameroon | 20.0 | 475 | 1,170 | 2,200 | 1.1 | 28.0 | 14.2 | 3,100 | 3,800 |
| India | 1,155.0 | 3,288 | 1,180 | 3,260 | 6.4 | 6.0 | 11.8 | 155,249 | 243,636 |
| Papua New Guinea | 7.0 | 463 | 1,180 | 2,270 | 0.9 | 43.0 | 57.4 | 4,530 | 3,480 |
| Bolivia | 10.0 | 1,099 | 1,620 | 4,260 | 2.2 | 25.0 | 28.0 | 4,850 | 4,410 |
| Philippines | 92.0 | 300 | 1,790 | 3,540 | 3 | 24.0 | 23.9 | 38,335 | 45,802 |
| Honduras | 7.0 | 112 | 1,820 | 3,730 | 2.9 | 36.0 | 35.8 | 5,235 | 7,830 |
| Congo, Rep. | 4.0 | 342 | 1,830 | 2,940 | 1.7 | 60.0 | 65.6 | 5,700 | 2,700 |
| Sri Lanka | 20.0 | 66 | 1,990 | 4,720 | 4.6 | 32.0 | 17.5 | 7,360 | 9,883 |
| Egypt | 82.0 | 1,001 | 2,070 | 5,690 | 3 | 31.0 | 11.2 | 21,150 | 44,946 |
| Indonesia | 230.0 | 1,905 | 2,230 | 4,060 | 4 | 34.0 | 22.2 | 119,776 | 91,720 |
| Paraguay | 6.0 | 407 | 2,270 | 4,430 | 1.5 | 15.0 | 21.3 | 3,191 | 6,940 |
| Guatemala | 14.0 | 109 | 2,620 | 4,590 | 1.3 | 22.0 | 20.0 | 7,360 | 11,521 |
| Morocco | 32.0 | 447 | 2,790 | 4,450 | 3.8 | 17.0 | 15.2 | 13,848 | 32,804 |
| El Salvador | 6.0 | 21 | 3,370 | 6,360 | 2.2 | 34.0 | 17.1 | 3,797 | 7,255 |
| China | 1,336.0 | 9,597 | 3,590 | 6,770 | 10.3 | 6.0 | 24.1 | 1,201,534 | 1,005,688 |
| Tunisia | 10.0 | 164 | 3,720 | 7,820 | 3.9 | 40.0 | 36.5 | 14,449 | 19,100 |
| Jordan | 6.0 | 89 | 3,740 | 5,840 | 4.7 | 40.0 | 27.9 | 6,366 | 14,075 |
| Thailand | 68.0 | 513 | 3,760 | 7,640 | 3.7 | 24.0 | 57.8 | 152,498 | 133,801 |
| Ecuador | 15.0 | 284 | 3,920 | 8,040 | 3.9 | 25.0 | 24.0 | 13,724 | 15,093 |
| Peru | 29.0 | 1,285 | 4,150 | 8,140 | 4.7 | 22.0 | 21.2 | 26,885 | 21,706 |
| Algeria | 35.0 | 2,382 | 4,420 | 8,130 | 2.5 | 34.0 | 31.1 | 43,689 | 39,103 |
| Dominican Republic | 10.0 | 49 | 4,510 | 8,100 | 4 | 19.0 | 11.7 | 5,460 | 12,230 |

| | 2009 Population (millions) | Area (1,000s sq. km.) | GNP per capita | | | Index of Openness | | Goods & Services | |
|------------------------------|----------------------------------|--------------------------|----------------|-----------------|--------------------------------------|-------------------|-------------|-------------------------------------|-------------------------------------|
| | | | 2009 (\$) | PPP Estimate | Avg. Yearly % Growth 2000–2009 | 1980 | 2009 | Exports 2009 (millions of \$) | Imports 2009 (millions of \$) |
| Colombia | 45.0 | 1,139 | 4,930 | 8,500 | 3.2 | 16.0 | 14.2 | 32,853 | 32,898 |
| Bulgaria | 8.0 | 111 | 5,770 | 12,290 | 6 | 36.0 | 34.9 | 16,435 | 23,300 |
| South Africa | 49.0 | 1,221 | 5,770 | 10,060 | 2.8 | 36.0 | 21.9 | 62,627 | 71,950 |
| Costa Rica | 5.0 | 51 | 6,230 | 10,940 | 3.4 | 26.0 | 30.0 | 8,777 | 11,395 |
| Panama | 3.0 | 76 | 6,710 | 12,530 | 5.2 | 51.0 | 3.6 | 885 | 7,785 |
| Malaysia | 27.0 | 330 | 7,230 | 13,530 | 3.3 | 58.0 | 82.2 | 157,433 | 123,832 |
| Argentina | 40.0 | 2,780 | 7,570 | 14,120 | 4.4 | 5.0 | 18.1 | 55,750 | 38,771 |
| Brazil | 203.0 | 8,547 | 8,040 | 10,260 | 2.4 | 9.0 | 9.7 | 152,995 | 133,609 |
| Romania | 21.0 | 238 | 8,330 | 14,460 | 6.1 | 35.0 | 25.1 | 40,500 | 54,075 |
| Turkey | 75.0 | 775 | 8,730 | 13,730 | 3.6 | 5.0 | 16.6 | 102,139 | 140,869 |
| Mexico | 107.0 | 1,958 | 8,920 | 14,110 | 1.2 | 11.0 | 26.3 | 229,707 | 241,515 |
| Uruguay | 3.0 | 177 | 9,360 | 12,910 | 4 | 15.0 | 14.9 | 5,386 | 6,907 |
| Russia | 142.0 | 17,075 | 9,370 | 18,390 | 6.2 | n.a. | 24.7 | 303,978 | 191,868 |
| Chile | 17.0 | 757 | 9,420 | 13,430 | 3 | 23.0 | 32.4 | 53,024 | 42,378 |
| Venezuela | 28.0 | 912 | 10,150 | 12,370 | 3.2 | 29.0 | 17.6 | 57,595 | 42,220 |
| Group Average | | | 4,403 | 7,725 | 3.5 | 26.9 | 26.0 | 78,533 | 72,884 |
| High-income Economies | | | | | | | | | |
| Poland | 38.0 | 323 | 12,260 | 18,440 | 4.5 | 28.0 | 31.3 | 134,452 | 146,626 |
| Hungary | 10.0 | 93 | 12,980 | 18,570 | 3.1 | 39.0 | 65.1 | 83,965 | 77,550 |
| Slovak Republic | 5.0 | 49 | 16,130 | 21,600 | 5.7 | n.a. | 63.8 | 55,933 | 55,186 |
| Czech Republic | 10.0 | 79 | 17,310 | 23,610 | 3.9 | n.a. | 59.6 | 113,319 | 104,982 |
| Korea | 49.0 | 99 | 19,830 | 27,310 | 3.7 | 34.0 | 43.7 | 363,534 | 323,085 |
| Portugal | 11.0 | 92 | 20,940 | 22,870 | 0.3 | 25.0 | 19.0 | 43,192 | 69,238 |
| Israel | 7.0 | 21 | 25,740 | 27,040 | 1.6 | 44.0 | 24.5 | 47,670 | 49,150 |
| Greece | 11.0 | 132 | 28,630 | 28,440 | 3.2 | 16.0 | 6.0 | 19,886 | 59,398 |
| New Zealand | 4.0 | 271 | 28,830 | 26,430 | 1.7 | 30.0 | 19.9 | 24,936 | 25,583 |
| Hong Kong | 7.0 | 1 | 31,420 | 44,070 | 4.6 | 90.0 | 153.1 | 329,739 | 352,688 |
| Spain | 46.0 | 506 | 31,870 | 31,630 | 1.3 | 16.0 | 14.9 | 218,027 | 290,240 |
| Italy | 59.0 | 301 | 35,080 | 31,330 | -0.1 | 22.0 | 19.2 | 404,653 | 410,385 |
| Singapore | 5.0 | 1 | 37,220 | 49,850 | 4.1 | 215.0 | 148.1 | 269,832 | 245,785 |
| Japan | 128.0 | 378 | 37,870 | 33,280 | 1 | 14.0 | 11.5 | 580,845 | 550,679 |
| United Kingdom | 62.0 | 245 | 41,520 | 37,360 | 1.4 | 27.0 | 16.1 | 350,728 | 479,890 |
| Canada | 34.0 | 9,971 | 42,170 | 37,590 | 1.5 | 28.0 | 23.6 | 315,552 | 330,268 |
| Germany | 82.0 | 357 | 42,560 | 36,960 | 0.9 | n.a. | 33.5 | 1,120,927 | 931,434 |
| France | 63.0 | 552 | 42,680 | 33,980 | 0.8 | 22.0 | 17.9 | 474,972 | 551,092 |
| Australia | 22.0 | 7,741 | 43,770 | 38,210 | 1.8 | 19.0 | 16.7 | 154,043 | 165,471 |
| Ireland | 4.0 | 70 | 44,310 | 33,280 | 2.3 | 48.0 | 50.5 | 114,662 | 61,871 |
| Belgium | 11.0 | 33 | 45,310 | 36,520 | 1.1 | 57.0 | 78.9 | 369,760 | 351,035 |
| Finland | 5.0 | 338 | 45,680 | 34,430 | 2.2 | 33.0 | 26.4 | 62,586 | 60,037 |
| Austria | 8.0 | 84 | 46,850 | 38,850 | 1.5 | 36.0 | 35.6 | 137,217 | 143,527 |
| United States | 307.0 | 9,364 | 47,240 | 46,730 | 1.2 | 10.0 | 7.4 | 1,056,895 | 1,603,768 |
| Sweden | 9.0 | 321 | 48,930 | 38,560 | 1.8 | 29.0 | 32.2 | 130,742 | 118,758 |
| Netherlands | 17.0 | 41 | 49,350 | 40,510 | 1.3 | 51.0 | 63.0 | 498,648 | 445,802 |
| Switzerland | 8.0 | 41 | 56,370 | 41,830 | 1.2 | 35.0 | 34.5 | 172,742 | 155,595 |
| Denmark | 6.0 | 43 | 58,930 | 37,720 | 0.8 | 33.0 | 30.0 | 93,102 | 82,893 |
| Norway | 5.0 | 324 | 86,440 | 56,050 | 1.3 | 43.0 | 31.6 | 120,710 | 68,506 |
| Group Average | | | 37,870 | 34,243 | 2.1 | 40.2 | 40.6 | 271,147 | 286,570 |

Source: World Bank, *World Development Report 2011* (Washington, D.C.: World Bank) various tables.

Over the past several decades, several international agencies have begun publishing new measures of standards of living that take into account international differences in prices paid for goods and services. In essence, what these numbers do is answer the question, How many dollars would it take in the United States to buy what the average citizen of a country can buy in his or her country at prevailing local prices? At the heart of these measures is an exchange rate concept known as purchasing power parity (PPP); 2009 values of per capita GNP based on PPP exchange rates appear in column 4.* Notice that for the poorest countries in the table, the numbers in column 4 tend to be substantially larger than those in column 3. This indicates that international differences in average standards of living, while still quite large, are not as extreme as the column 3 numbers would seem to indicate. For instance, the conventional measure of India's per capita GNP is \$1,180 per year. Using the PPP measure, the standard of living of the typical Indian citizen is \$3,260.

Economic Growth

The Great Recession began in the United States in late 2007 and ended in 2009, although unemployment has remained at abnormally high levels into 2012. Since 2007 a number of other countries, primarily in Europe, have also seen economic downturns. Despite this, for most of the countries in Table 1.1, the period 2000–2009 represented an era of relatively strong growth in standards of living. The low-income countries in the table averaged an annual increase in per capita GNP of 2.7 percent (see column 5).† Within this group, growth rates varied considerably, with both negative average annual rates (as low as –1 percent in the Central African Republic) and large positive rates (7.2 percent in Chad, 6.2 percent in Sierra Leone, and 5.9 percent in Ethiopia). Indeed, the most highly populated of the low-income countries (Bangladesh, Ethiopia, and Kenya) all experienced positive annual average growth over the decade. During this period, middle-income countries had the strongest growth rates, averaging 3.5 percent, almost twice the average per capita growth rate in the high-income countries.

Among the low-income and middle-income economies, the most severe negative annual growth rates over the period between 2000 and 2009 occurred in Côte d'Ivoire and the Central African Republic, where per capita GNP fell at rates of 1 percent or more per year. None of the high-income countries experienced negative growth rates over this period, although late in the decade many of the high-income countries in the world saw per capita income levels fall for a year or more. Negative growth in per capita income means that, on average, each individual in society has less income than he or she had in the previous year.

A variety of factors can produce sustained periods of declining standards of living. In 2008, the downturn in the world economy was brought on by a financial crisis that originated in the United States and rapidly spread to many other countries of the world as banks and other financial institutions cut back on lending to businesses and households. With the fall in lending, households reduced purchases and businesses found it increasingly difficult to continue normal activities. In the end, this led to a downward spiral in economic activity, a rise in unemployment, and a loss in income. The slump in the United States began to reverse in 2010 and per capita incomes there have been rising, albeit at a relatively slow pace ever since. As of early 2012, however, many European economies, especially those in the eurozone,

* For more on the concept of purchasing power parity, see Chapter 15. For more on the use of PPP exchange rates to measure income, see Paul Schreyer and Francette Koechlin, "Purchasing Power Parities—Measurement and Uses," OECD Statistics Brief, March 2002. Available online at www.oecd.org/dataoecd/32/34/2078177.pdf.

† Column 5 reports percentage changes in the ratio of GNP to population. Throughout this text, we will use the notation " \hat{x} " to denote the percentage change in a variable. For instance, \hat{x} denotes the percentage change in x . If x equals the ratio of two numbers such as per capita GNP (i.e., $x = y/z$ where $y = \text{GNP}$ and $z = \text{population}$), a simple approximation rule allows one to determine the rate of growth of x : $\hat{x} = \hat{y} - \hat{z}$. We will make use of this approximation from time to time. In this particular circumstance, the formula states that growth in per capita GNP depends positively on GNP growth but negatively on population growth. If, for instance, GNP is rising by 1 percent but population is growing at 3 percent, then per capita GNP will be falling at 2 percent.

appear to be heading into recession. It is too early to determine whether or not a European recession will spread to the rest of the world.

In some countries, falling per capita GNP is brought on by war (or civil war) in which factories and economic infrastructure (e.g., harbors, public utilities, railroads, airports) are destroyed. In other countries, it may result from declining prices for the commodities (e.g., coffee, copper, cocoa, sugar) on which these economies depend, possibly coupled with misguided government policies aimed at encouraging rapid industrialization. In some countries, negative growth may simply reflect a stagnant economy combined with rapid population growth. No matter the cause, negative growth—especially over long periods—is symptomatic of terrible economic distress.

In contrast, other countries exhibited strong growth over the 2000–2009 period. Several of these countries are located in Eastern Europe, including Bulgaria, Russia, Romania, Poland, and the Slovak Republic. Over the past 20 years, these countries have undergone a remarkable transition, as economic systems that relied on central planning of the production have been dismantled and replaced with private-sector firms. Other countries with strong growth (in excess of 4 percent per year) over this period include Algeria, Argentina, China, Greece, Hong Kong, India, Jordan, Korea, Panama, Peru, Singapore, Sri Lanka, and Thailand.

Why is there a difference in growth rates both within various country groups and between low-income developing economies and high-income developed economies? Economies grow over time because their endowments of factors of production (e.g., labor, capital, and technology) grow, not only in number but in quality. Many economists argue that the main engine of growth is the accumulation of knowledge and skills by workers.* This growth in human capital takes place in schools, in laboratories, and on the job. Investment in plant and equipment that increases physical capital is also important. But what appears to be crucial is that workers function in an environment that requires them to face new challenges and thus to acquire new skills. Such an environment is provided in countries where exports represent a large share of output. The twin challenges of producing goods that will be desired in the global market and competing with producers from other countries for this market place a premium on growth in inventiveness and the continuing acquisition of entrepreneurial, managerial, and technical skills. Without the pressure from outside competitive forces, acquisition of human capital, and thus overall economic growth, may be slow. Hence, it is no surprise that a number of the faster-growing countries in Table 1.1 tend to be more open.

International Trade

International trade has become increasingly important for the world economy. Consider Figure 1.1. There we plot total exports and commodity output (world GDP), measured in real (volume) terms, between 1950 and 2010.† To preserve space, each series of values has been converted into an index number equal to 100 in 1950. As the plot shows, output and exports expanded at roughly the same rates between 1950 and 1960. Beginning in the early 1960s, world exports began to rise much more rapidly than output. In 1973, world exports had risen 500 percent over their level in 1950, while world output was about 200 percent higher. By 1989, world exports were 1,000 percent higher than in 1950, while world output had risen more than 400 percent. As the figure shows, world trade exploded in the 1990s. Between 1990 and 2007, world exports more than doubled. During the same period, world output rose by 56 percent.

What has caused this explosion of world trade? There is no simple answer to the question. One factor that has certainly played an important role has been the reduction in barriers to international trade that has occurred during this period. Barriers to trade include transportation and communication costs. With improvements in technology in these areas, such as

* The argument presented in the remainder of this paragraph is developed more completely in Robert E. Lucas, Jr., “Making a Miracle,” *Econometrica* (1993).

† Not included in the export statistics are levels of international trade in commercial services.

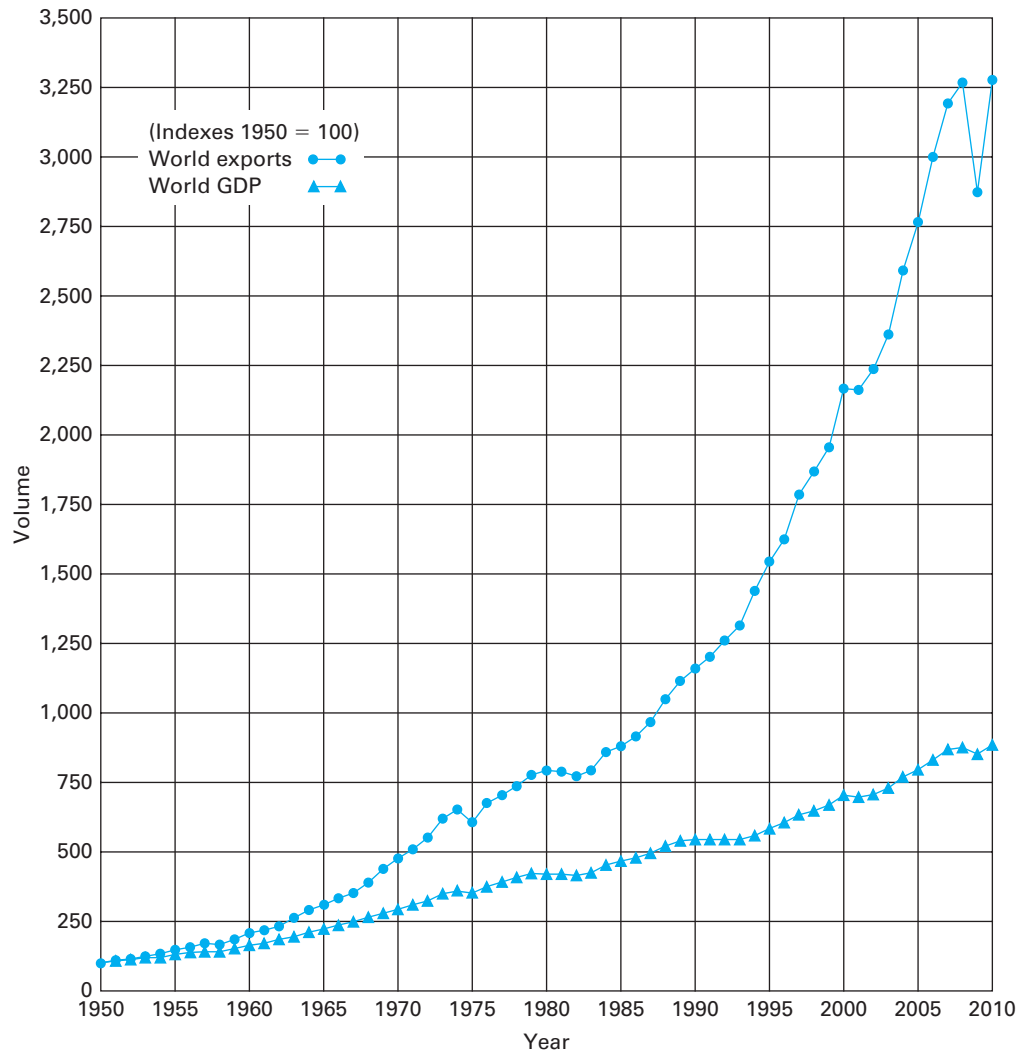


FIGURE 1.1 World Exports and Output in Real Terms: 1950–2010 Source: World Trade Organization, *International Trade Statistics 2011*, Table A1.

container ships, supertankers, and satellite telecommunications networks, it is now much easier for sellers in one country to contact consumers in another and to deliver goods to them in a timely fashion.

Barriers to trade also include government-imposed limits on trade, including tariffs and quotas on imports and exports. During the past 40 years, governments around the world, especially in industrialized economies, have entered into a series of multilateral agreements to lower government-imposed barriers to trade. Some of these agreements have been between small groups of countries, such as the formation in 1957 of what is now called the European Union (EU), which has brought virtual free trade across most of Europe. Other agreements, such as the tariff reduction agreements that were reached in the Kennedy Round talks held in the 1960s, the Tokyo Round talks held in the 1970s, and the Uruguay Round talks of the 1980s and early 1990s, have been between a much broader set of countries. These agreements resulted in three successive cuts of over 40 percent in tariff levels of the major industrialized countries. In Chapters 6 and 7 we discuss how tariffs and other policies affect international trade. In Chapters 8 and 9 we

describe this movement to lower trade barriers as well as the creation of several other regional trade agreements and current U.S. trade policy measures.*

As Figure 1.1 shows, world trade has grown virtually every year over the past six decades. Nonetheless, real-world exports did fall in several years, most notably in the mid-1970s, in the early 1980s, in 2001, and most spectacularly in 2009, when real trade volume fell by almost 13 percent from its level in 2008. There is a common feature of all four of these periods: Each marked a time when recessions occurred, especially in the United States and other major industrialized economies. As is discussed more fully in the following section, major economies purchase most of the world's exports. If these countries experience economic downturns, their purchases tend to fall.

As the figure highlights, the behavior of trade in 2009 represents a much different pattern than seen in the three other downturn periods. Indeed, this behavior is so unique that it has been dubbed the *Great Trade Collapse*. Several theories have been offered to explain the collapse. Alessandria, Kaboski, and Midrigan argue that the fall in trade can be explained by a sharp decline in orders for goods that in normal times would have been held as inventory items.[†] A number of studies blame the trade collapse on the drying up of trade credit.[‡] A third group of studies attributes the collapse to the rise of a vertical network of production across countries.** It is unclear if any one of these theories can explain the magnitude of the downturn and its subsequent reversal. All three factors, or possibly others, have probably been responsible.^{††}

The importance of international trade for the countries of the world differs considerably. In columns 6 and 7 of Table 1.1, we present values of the index of openness for the years 1980 and 2009. Let's consider the values for 1980 first. For most countries, the ratio of exports to GDP was between 10 and 40. In other words, for most countries exports accounted for between 10 percent and 40 percent of GDP. The average for all of the countries reported was 29.

The most open country of all was Singapore, with a value of 215 (i.e., exports were more than double its GDP!). Other highly open economies included Hong Kong (index of openness 90), the Congo (60), Malaysia (58), Belgium (57), Togo (51), Jamaica (51), Panama (51), and the Netherlands (51). The most closed economies included Brazil (9), China (6), India (6), and the United States (10). This pattern of behavior for the index of openness points out the fact that larger economies (as measured by area and population) tend to be more closed, while smaller economies tend to be more open. The commonsense explanation of this fact is that smaller economies tend not to be able to produce the many types of products that people want to consume. Thus, there is a need for exports, which can be sold to other countries in exchange for goods not available domestically. Larger countries are better able to diversify their production, especially if these countries possess a wide variety of resources and large endowments of various factors of production.

Between 1980 and 2007, most countries became more open. The average value of the index of openness rose from 29 to 33. However, due largely to the collapse in trade in 2009, the index of openness for many countries was not significantly different in 2009 from what it had been in 1980. Throughout the previous 30 years, virtually all countries in the world had been increasing their openness to trade. As with economic growth, however, changes in openness differed considerably across income groups. On average, low-income economies remained the most closed.

* For a statistical analysis of some of the factors that have caused trade to rise faster than output, see Mark Dean and Maria Sebastia-Barriel, "Why Has World Trade Grown Faster Than World Output?" *Bank of England Quarterly Bulletin* (Autumn 2004).

[†] See George Alessandria, Joseph P. Kaboski, and Virgiliu Midrigan, "The Great Trade Collapse of 2008–09: An Inventory Adjustment?" *IMF Economic Review* (2010).

[‡] See, for instance, Mary Amity and David E. Weinstein, "Exports and Financial Shocks," *Quarterly Journal of Economics* (2011); and Davin Chor and Kalina Manova, "Off the Cliff and Back? Credit Conditions and International Trade during the Global Financial Crisis," *Journal of International Economics* (forthcoming).

** Julian di Giovanni and Andrei Levchenko, "International Trade, Vertical Production Linkages, and the Transmission of Shocks," *VoxEU*, <http://voxeu.org/index.php?q=node/4185> (2009).

^{††} For more on the Trade Collapse, see Richard Baldwin, ed., *The Great Trade Collapse: Causes, Consequences, and Prospects*, *Vox EU*, <http://www.voxeu.org/index.php?q=node/4297> (2009).

Hong Kong (153), Singapore (148), and Malaysia (82) remained among the most open. Other highly open economies included Belgium (79), the Congo (66), the Netherlands (63), the Slovak Republic (64), and Hungary (65).

In general, countries that were closed in 1980 tended to be more open in 2009. Argentina's index rose from 5 to 18; China's from 6 to 24; Ghana's from 8 to 35; and Mexico's from 11 to 26. By contrast, India (12), Ethiopia (5), Japan (12), and the United States (7) remained relatively closed. It is interesting to note that even though the United States and Japan were two of the most closed economies according to the index of openness, they ranked third and fourth in the value of their exports in 2009 (see column 8). This illustrates the massive size of these two economies relative to other countries in the world. Even though the United States and Japan sell enormous amounts of goods and services on world markets, their exports are small relative to overall economic activity, and hence their indices of openness are very low.

Columns 8 and 9 of Table 1.1 provide data on exports and imports of the various countries listed in the table. A quick comparison of the group averages of the two columns suggests that *on average* there is a rough equality between exports and imports. That is, for some countries (during some years) exports are higher than imports, and vice versa in the remaining cases. However, looking over broader groups of countries for one year or the average trade flows of a typical country over several years (this is not shown in the table), exports and imports have a tendency to balance out. This rough equality between exports and imports is no accident. It illustrates that the revenue earned from selling exports is the primary means countries have for purchasing imports. Without sufficient export sales, imports can be purchased by borrowing. And just as individuals cannot borrow indefinitely, neither can countries. Thus, in some years countries will have to export more than they import to repay their past debts or to build up assets that can be used in future years to purchase imports.

Countries whose imports exceed exports are said to run **trade deficits**. The magnitude of the deficit provides an approximation of the amount of borrowing that a country has undertaken to purchase its imports. Countries with higher levels of exports than imports are said to run **trade surpluses**. The size of a country's trade surplus offers a measure of the amount by which that country has reduced its debt to foreigners or expanded its asset holdings. The trade balance is one measure of a country's balance of payments. In Chapter 11, we will discuss measures of the balance of payments in more detail.

As previously noted, in 2009 the United States was the world's third largest exporter. It was also the world's largest importer and had the world's largest trade deficit. In 2009, Japan was the world's fourth largest exporter, following China, Germany, and the United States. The remainder of the top ten exporters in 2009 were the Netherlands, France, Italy, Belgium, Korea, and the United Kingdom.

The fact that China is now the leading exporting country in the world is one of the most remarkable features of the modern world. China now accounts for more than 10 percent of world exports. Its share of world exports has risen from essentially zero in 1980. In 1995 it held about 2.5 percent of world exports. This growth in world trade shares in such a short period of time is unprecedented. Much of what China exports represents goods that go through various stages of processing in multiple countries, most of which are located in Asia. This vertical network of production chains is one of the major features of modern economic activity.*

THE DIRECTION OF INTERNATIONAL TRADE

We have established that international trade is on the rise. Has trade expanded for all countries at an equal rate? Which countries trade with each other? Have these patterns changed over time? We turn now to addressing these questions. Figure 1.2 provides data on the geographic distribution

Trade deficits and surpluses

A country has a trade deficit (surplus) if its imports (exports) exceed its exports (imports).

* For more on the growth of Chinese exports since 1995, see Steven Husted and Shuichiro Nishioka, "The Rise of Chinese Exports," unpublished working paper, University of Pittsburgh (2012).

1965 World Exports: \$162.2 billion

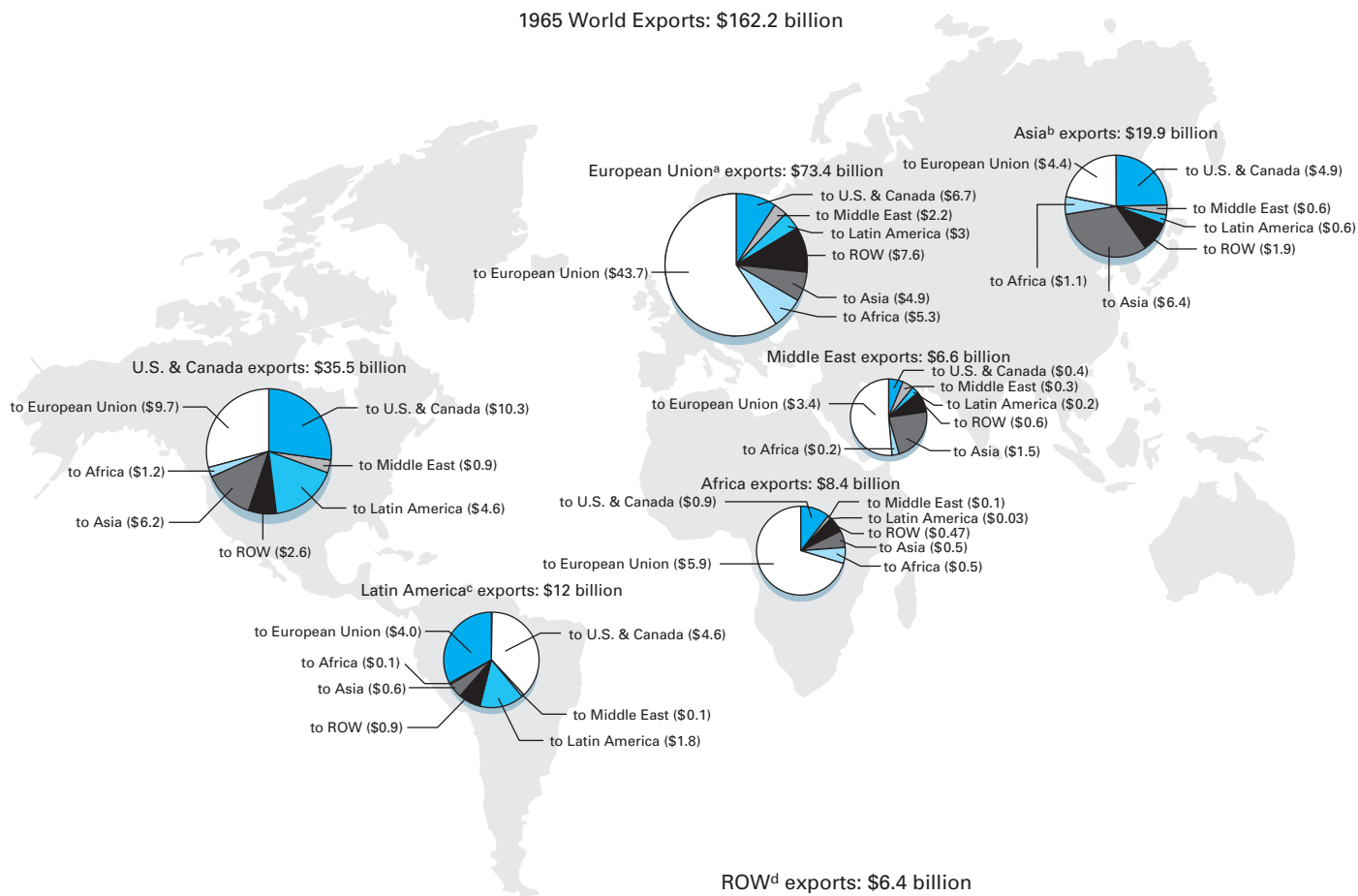


FIGURE 1.2 Geographic Pattern of Merchandise Trade: 1965 and 2010 *Source: International Monetary Fund, Direction of Trade Statistics Yearbook* (Washington, D.C.: International Monetary Fund, Bureau of Statistics) and WTO *International Trade Statistics* 2011, Table A2.

NOTE: ^a European Union: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, United Kingdom.

^b Asia includes Australia and New Zealand.

^c Latin America includes Mexico.

^d ROW: Rest of World.

2010 World Exports: \$14,851.0 billion

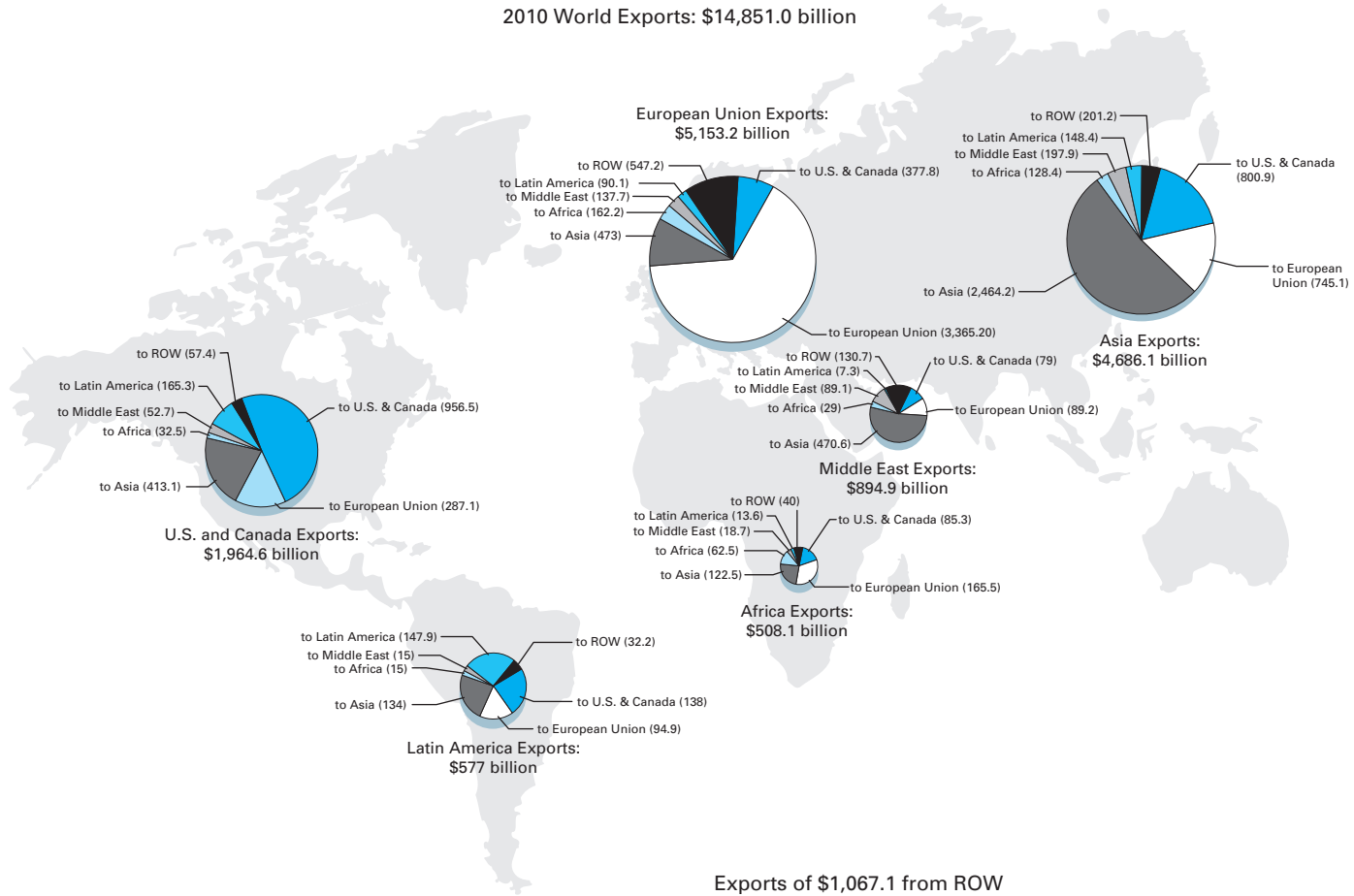


FIGURE 1.2 (Continued)

of international trade by region for 1965 and 2010 as well as the overall size of export flows in these two years. Trade is measured in billions of U.S. dollars. Exports from six regions are shown in the figure. These regions include both groups of industrialized countries (e.g., the United States and Canada and the EU) and groups of developing countries (e.g., Latin America, Africa, and the Middle East). Asia includes three traditional industrialized countries—Japan, Australia, and New Zealand—several newly industrialized countries—Hong Kong, Korea, and Singapore—and a number of developing countries, including China, India, Indonesia, and Pakistan.

The data in the figure offer a number of stylized facts about trade patterns.* First, they confirm that industrialized countries account for the bulk of world trade. In 1965, the United States, Canada, and the 25 countries of the EU produced 63 percent of world exports. If we include the exports of Australia, Japan, and New Zealand, industrialized country exports made up 70 percent of world exports during that year.† In 2010, the exports of these 30 countries constituted 55 percent of the world total.

Not only are industrialized countries the largest exporters in the world, but the data indicate that they are also the largest importers. The United States, Canada, and the EU served as primary markets for the exports of all regions in both years.

A remarkable feature of the figure is the growth in importance of Asia as a producer of exports. The value of world exports was 92 times higher in 2010 than it was in 1965, but exports from Asia in 2010 were 235 times greater in value terms than they had been in 1965. The share of Asian exports in total world trade rose from 12 percent to 32 percent in 46 years. As noted previously, the countries chiefly responsible for this phenomenal growth were China, Japan, and the newly industrialized countries (NICs).

While Asia was growing in importance as a producer of exports, Latin America and Africa saw their positions erode. Latin America's share of world exports declined from 7 percent to 4 percent. Africa's share fell from almost 5 percent to about 3 percent. North America's export share also fell over this period, from more than 20 percent to about 13 percent.

Table 1.2 lists the major trading partners of a selected set of countries for the year 2010. For each country, its top ten trading partners in terms of merchandise exports are presented. The table reveals several common patterns. First, the United States is the major trading partner for many countries. This reflects the size of the U.S. economy and the high income levels found in America relative to other markets in the world. Second, there is considerable evidence that distance plays a role in trade patterns. Canada and the United States are each other's largest trading partner.

The United Kingdom, France, and Germany all trade extensively with each other and with European countries in general. Mexico trades largely with the United States; Singapore, with countries in the Western Pacific; and Russia, with countries of Eastern Europe.

Summarizing the trade patterns described in this section, we have shown that industrialized countries account for the bulk of world exports and world imports. In particular, the largest amount of trade occurs between industrialized countries. Asian countries have seen their share in world trade almost triple over the past 45 years, with Asia the second-largest source of exports after the EU as well as a significant customer for exporters from other parts of the world.

In terms of national trading patterns, countries tend to trade extensively with their neighbors. Nowhere is this more apparent than in the EU, where two-thirds of EU member exports go to other EU countries, and in North America, where Canada, the United States, and, increasingly, Mexico are major markets for each other's goods. In addition, the United States is an important market for the exports of many other countries.

* A stylized fact (or empirical regularity) is a pattern that is observed in real-world data on a regular basis. For instance, the regular occurrence that young and old people tend to spend more than they earn while middle-aged people save is a stylized fact of consumption behavior.

† The export levels for these three countries are included in the exports of Asia. In 1965, they totaled \$12.5 billion, of which Japan's share was \$8 billion. In 2010, the exports of these countries totaled \$1,200 billion; Japan's share that year was \$770 billion.

TABLE 1.2 Top Ten Trading Partners of Selected Countries, 2010

(Percentage of Total Merchandise Exports)

| United States | | United Kingdom | | China | |
|----------------------|--------------|-----------------------|--------------|----------------------|--------------|
| CANADA | 19.43 | UNITED STATES | 14.35 | UNITED STATES | 17.98 |
| MEXICO | 12.79 | GERMANY | 10.84 | HONG KONG | 13.84 |
| CHINA | 7.19 | NETHERLANDS | 7.84 | JAPAN | 7.67 |
| JAPAN | 4.74 | FRANCE | 7.69 | KOREA | 4.36 |
| UNITED KINGDOM | 3.79 | IRELAND | 6.21 | GERMANY | 4.31 |
| GERMANY | 3.76 | BELGIUM-LUXEMBOURG | 4.93 | NETHERLANDS | 3.15 |
| KOREA | 3.04 | SPAIN | 3.67 | INDIA | 2.59 |
| BRAZIL | 2.77 | ITALY | 3.33 | UNITED KINGDOM | 2.46 |
| NETHERLANDS | 2.74 | CHINA | 2.76 | SINGAPORE | 2.05 |
| SINGAPORE | 2.28 | SWEDEN | 2.04 | ITALY | 1.97 |
| Germany | | Japan | | Canada | |
| FRANCE | 9.45 | CHINA | 19.41 | UNITED STATES | 74.86 |
| UNITED STATES | 6.83 | UNITED STATES | 15.65 | UNITED KINGDOM | 4.08 |
| NETHERLANDS | 6.59 | KOREA | 8.10 | CHINA | 3.33 |
| UNITED KINGDOM | 6.20 | OTHER ASIA, n.e.s. | 6.82 | JAPAN | 2.31 |
| ITALY | 6.10 | HONG KONG | 5.50 | MEXICO | 1.26 |
| AUSTRIA | 5.60 | THAILAND | 4.44 | GERMANY | 0.95 |
| CHINA | 5.59 | SINGAPORE | 3.28 | KOREA | 0.93 |
| BELGIUM-LUXEMBOURG | 4.84 | GERMANY | 2.65 | NETHERLANDS | 0.81 |
| SWITZERLAND | 4.39 | MALAYSIA | 2.29 | BRAZIL | 0.65 |
| POLAND | 3.97 | NETHERLANDS | 2.13 | NORWAY | 0.64 |
| Mexico | | Brazil | | India* | |
| UNITED STATES | 80.07 | CHINA | 15.25 | UNITED ARAB EMIRATES | 14.38 |
| CANADA | 3.57 | UNITED STATES | 9.64 | UNITED STATES | 10.82 |
| CHINA | 1.41 | ARGENTINA | 9.17 | CHINA | 5.87 |
| SPAIN | 1.28 | NETHERLANDS | 5.07 | HONG KONG | 4.05 |
| BRAZIL | 1.27 | GERMANY | 4.03 | OTHER ASIA, n.e.s. | 3.88 |
| COLOMBIA | 1.26 | JAPAN | 3.54 | SINGAPORE | 3.86 |
| GERMANY | 1.19 | UNITED KINGDOM | 2.30 | UNITED KINGDOM | 3.69 |
| JAPAN | 0.64 | CHILE | 2.11 | NETHERLANDS | 3.66 |
| CHILE | 0.62 | ITALY | 2.10 | GERMANY | 3.31 |
| NETHERLANDS | 0.62 | RUSSIA | 2.06 | SAUDI ARABIA | 2.19 |
| Singapore* | | Egypt | | Russia | |
| HONG KONG | 11.58 | ITALY | 8.35 | NETHERLANDS | 14.26 |
| MALAYSIA | 11.46 | SPAIN | 6.16 | OTHER ASIA, n.e.s. | 13.35 |
| CHINA | 9.75 | SAUDI ARABIA | 5.88 | ITALY | 6.51 |
| INDONESIA | 9.68 | UNITED STATES | 5.88 | CHINA | 5.30 |
| UNITED STATES | 6.56 | INDIA | 4.66 | GERMANY | 4.25 |
| KOREA | 4.66 | LIBYA | 4.63 | POLAND | 3.81 |
| JAPAN | 4.55 | TURKEY | 3.74 | TURKEY | 3.75 |
| AUSTRALIA | 3.92 | SYRIA | 3.60 | UKRAINE | 3.65 |
| THAILAND | 3.74 | UNITED KINGDOM | 3.51 | JAPAN | 3.35 |
| INDIA | 3.43 | FRANCE | 3.09 | UNITED STATES | 3.23 |

* 2009 data.

Source: 2010 International Trade Statistics Yearbook, UN Comtrade Data Web site, <http://comtrade.un.org/pb/>

The country trade patterns described in this section have been put to a number of empirical tests by international trade economists. These economists use *gravity models* to try to predict which countries will tend to trade with each other.* A gravity model is a statistical model that estimates a country's trade flows to other countries based on the economic characteristics of the two trading partners. The basic prediction of the gravity model is that any two countries will trade more with each other when their combined GNPs are larger and the geographical distance between them is smaller. It should be no surprise, given the results reported in this section, that economists have found that gravity models explain trade very well.

WHAT GOODS DO COUNTRIES TRADE?

Up to this point we have established that trade is an important (on average accounting for almost 40 percent of GDP) and rapidly growing part of the world economy. We have also described a series of stylized facts about aggregate trade patterns. In this section we present some information on the individual goods that countries trade. Before we consider major exports and imports of individual countries, let's examine which goods are most likely to be traded.

Consider Table 1.3. There, goods are ranked according to their share (by value) in world trade in 2010.† Petroleum was the largest single traded item (by value) in 2007, up from fourth position in 1999. As the table shows, the value of petroleum exports in 2010 was roughly triple what it had been in 2003. Petroleum's number one ranking that year (and probably again in 2012) was due to two related factors. First, rising incomes throughout many developing countries from 2002 and continuing through the Great Recession period spurred demand for oil. Second, combined with the demand from industrialized countries, world demand increased relative to world supply, and prices rose consistently over much of this period. Because the demand for oil is quite inelastic, total spending on oil rose as prices increased. In 2010, office machines, computers, and parts ranked third (by value), and automobile exports ranked fourth. All three of these products have consistently ranked in the top three world exports over the past 15 years.

Clothing, transistors (e.g. semiconductors, microprocessors, television picture tubes, and other electronic components), organic chemicals, telecommunications equipment, pharmaceuticals, and iron and steel rounded out the top ten traded commodity categories. Many Americans might have been able to guess that these goods would appear at the top of the world imports list. Over the past several decades, Americans have become familiar with news stories about oil imports from the Mideast; steel mills closing down in Pittsburgh, Gary (Indiana), and elsewhere; unemployed autoworkers moving from Michigan to Texas; and apparel makers urging Americans to look for the *Made in America* logo. In short, because the United States imports more products than any other country in the world, it should not be surprising that the goods most commonly traded are some of America's major import items.

Table 1.3 goes on to list other products commonly traded in world markets. These products include wood products and paper, petroleum products, chemicals, pharmaceuticals, and aircraft. Many of these products are exports of the United States.

* For more on the theory behind gravity models, see James Anderson, "A Theoretical Foundation for the Gravity Equation," *American Economic Review* (1979); and Jeffrey H. Bergstrand, "The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence," *Review of Economics and Statistics* (1985). Some recent examples of empirical studies include Andrew Rose, "One Money, One Market: Estimating the Effects of Common Currencies on Trade," *Economic Policy* (2000); and James Anderson and Eric van Wincoop, "Gravity with Gravitas: A Solution to the Border Puzzle," *American Economic Review* (2003).

† Industries are identified in the left-hand column of this table according to the Standard International Trade Classification (SITC) code. This code divides industries into ten very broad groups numbered 0 to 9. Within each broad category, industries are further divided according to the specific type of production that occurs. These industry groupings are given two-digit identification numbers, with the first of these digits being the same as the major industry group. For instance, road vehicles are identified as industry 78 within group 7 (machines and transport equipment). Even more detail can be found by considering three-digit industries. Thus, passenger motorcars are classified as industry 781.

TABLE 1.3 World Trade in Major Products: 1999, 2003, 2006, 2010

(Rank, value in billions of \$, percent share)

| SITC code | Product | 1999 | | | 2003 | | | 2006 | | | 2010 | | |
|-------------|-----------------------------------|------|-------|-------|------|-------|-------|------|-------|-------|------|---------|-------|
| | | Rank | Value | Share | Rank | Value | Share | Rank | Value | Share | Rank | Value | Share |
| 333 | Crude petroleum | 4 | 216.5 | 4.1 | 3 | 385.3 | 5.5 | 1 | 991.9 | 8.3 | 1 | 1,100.2 | 7.3 |
| 334 | Petroleum products | 14 | 106.3 | 2.0 | 11 | 183.2 | 2.6 | 5 | 426.1 | 3.6 | 2 | 674.4 | 4.5 |
| 751+752+759 | Office machines, computers, parts | 1 | 306.1 | 5.8 | 1 | 763.6 | 10.9 | 2 | 545.4 | 4.6 | 3 | 576.2 | 3.8 |
| 781 | Passenger motor cars | 2 | 294.2 | 5.6 | 2 | 393.3 | 5.6 | 3 | 533.3 | 4.5 | 4 | 559.0 | 3.7 |
| 776 | Transistors, valves, etc. | 3 | 224 | 4.3 | 4 | 292.9 | 4.2 | 4 | 490.4 | 4.1 | 5 | 543.5 | 3.6 |
| 54 | Medicinal & pharmaceutical prods. | 15 | 104.6 | 2.0 | 8 | 213.5 | 3.0 | 8 | 320.3 | 2.7 | 6 | 456.9 | 3.0 |
| 764 | Telecom equipment and parts | 6 | 169.3 | 3.2 | 7 | 227.6 | 3.2 | 6 | 407.0 | 3.4 | 7 | 446.1 | 3.0 |
| 67 | Iron and steel | 10 | 130.7 | 2.5 | 10 | 185.6 | 2.6 | 7 | 367.0 | 3.1 | 8 | 415.4 | 2.8 |
| 84 | Clothing | 5 | 185.3 | 3.5 | 5 | 235.0 | 3.4 | 9 | 311.6 | 2.6 | 9 | 370.1 | 2.5 |
| 51 | Organic chemicals | 12 | 116.0 | 2.2 | 13 | 175.5 | 2.5 | 10 | 298.7 | 2.5 | 10 | 334.4 | 2.2 |
| 784 | Motor vehicle parts | 9 | 132.1 | 2.5 | 12 | 178.8 | 2.5 | 11 | 253.8 | 2.1 | 11 | 301.2 | 2.0 |
| 34 | Gas, natural and manufactured | 26 | 51.2 | 1.0 | 17 | 103.4 | 1.5 | 12 | 229.5 | 1.9 | 12 | 268.2 | 1.8 |
| 65 | Textiles | 8 | 147.2 | 2.8 | 9 | 186.2 | 2.7 | 13 | 206.2 | 1.7 | 13 | 258.8 | 1.7 |
| 58+893 | Artificial resins, plastics | 7 | 164.0 | 3.1 | 6 | 233.5 | 3.3 | 15 | 179.5 | 1.5 | 14 | 223.2 | 1.5 |
| 63+64 | Wood manufactures, paper | 11 | 128.3 | 2.4 | 14 | 157.1 | 2.2 | 14 | 202.7 | 1.7 | 15 | 216.7 | 1.4 |
| 772 | Electrical parts for circuits | 16 | 77.5 | 1.5 | 16 | 103.5 | 1.5 | 16 | 165.2 | 1.4 | 16 | 204.6 | 1.4 |
| 287+288+682 | Copper, copper ore, scrap | 27 | 50.9 | 1.0 | 28 | 64.7 | 0.9 | 17 | 162.8 | 1.4 | 17 | 194.8 | 1.3 |
| 05 | Fruit and vegetables | 17 | 71.8 | 1.4 | 18 | 90.9 | 1.3 | 18 | 134.7 | 1.1 | 18 | 180.4 | 1.2 |
| 22+42+081 | Oilseeds, veg. oils, oil cakes | 25 | 51.3 | 1.0 | 25 | 70.8 | 1.0 | 25 | 98.9 | 0.8 | 19 | 178.5 | 1.2 |
| 793 | Ships and boats | 34 | 40.1 | 0.8 | 34 | 52.7 | 0.8 | 40 | 53.9 | 0.5 | 20 | 168.8 | 1.1 |
| 874 | Measuring instruments | 19 | 64.3 | 1.2 | 19 | 85.2 | 1.2 | 21 | 127.4 | 1.1 | 21 | 153.2 | 1.0 |
| 281+282 | Iron ore and scrap | 39 | 31.7 | 0.6 | 45 | 24.6 | 0.4 | 32 | 80.0 | 0.7 | 22 | 147.4 | 1.0 |
| 792 | Aircraft | 13 | 110.0 | 2.1 | 15 | 117.1 | 1.7 | 19 | 132.0 | 1.1 | 23 | 137.6 | 0.9 |
| 713 | Piston engines | 18 | 66.4 | 1.3 | 21 | 83.4 | 1.2 | 22 | 122.3 | 1.0 | 24 | 137.0 | 0.9 |
| 821 | Furniture | 22 | 57.2 | 1.1 | 23 | 78.6 | 1.1 | 23 | 116.9 | 1.0 | 25 | 129.1 | 0.9 |
| 287+684 | Bauxite, alumina, aluminum | 21 | 59.4 | 1.1 | 24 | 78.1 | 1.1 | 20 | 128.0 | 1.1 | 26 | 128.6 | 0.9 |
| 667 | Pearls & precious stones | 31 | 44.9 | 0.9 | 29 | 60.5 | 0.9 | 28 | 86.4 | 0.7 | 27 | 127.5 | 0.8 |
| 04 | Cereal grains and preparations | 23 | 55.2 | 1.1 | 27 | 67.9 | 1.0 | 30 | 84.0 | 0.7 | 28 | 127.1 | 0.8 |
| 62 | Rubber articles | 33 | 43.0 | 0.8 | 32 | 54.9 | 0.8 | 27 | 86.9 | 0.7 | 29 | 116.4 | 0.8 |
| 32 | Coal | 46 | 18.5 | 0.4 | 44 | 26.2 | 0.4 | 37 | 68.0 | 0.6 | 30 | 114.7 | 0.8 |
| 01 | Meat and preparations | 32 | 43.5 | 0.8 | 30 | 55.4 | 0.8 | 35 | 76.9 | 0.6 | 31 | 111.8 | 0.7 |
| 782 | Lorries, special vehicles | 24 | 54.0 | 1.0 | 26 | 69.9 | 1.0 | 24 | 107.5 | 0.9 | 32 | 103.9 | 0.7 |
| 03 | Fish and preparations | 28 | 47.0 | 0.9 | 20 | 84.3 | 1.2 | 29 | 85.3 | 0.7 | 33 | 101.9 | 0.7 |
| 851 | Footwear | 35 | 39.7 | 0.8 | 36 | 47.8 | 0.7 | 34 | 79.4 | 0.7 | 34 | 96.0 | 0.6 |

| | | | | | | | | | | | | | |
|---|------------------------------|----|---------|------|----|---------|------|----|---------|------|----|----------|------|
| 723 | Civil engineering equip. | 45 | 24.6 | 0.5 | 43 | 33.4 | 0.5 | 31 | 80.4 | 0.7 | 35 | 95.6 | 0.6 |
| 741 | Heating and cooling equip. | 36 | 38.6 | 0.7 | 35 | 50.4 | 0.7 | 33 | 79.8 | 0.7 | 36 | 94.7 | 0.6 |
| 52 | Inorganic chemicals | 41 | 31.1 | 0.6 | 39 | 38.3 | 0.5 | 36 | 74.6 | 0.6 | 37 | 91.1 | 0.6 |
| 894 | Toys, sporting goods | 30 | 44.9 | 0.9 | 33 | 53.1 | 0.8 | 26 | 90.7 | 0.8 | 38 | 87.2 | 0.6 |
| 07 | Coffee, tea, cocoa, spices | 40 | 31.1 | 0.6 | 42 | 33.5 | 0.5 | 42 | 50.0 | 0.4 | 39 | 80.8 | 0.5 |
| 714 | Engines and motors, n.e.s. | 29 | 46.6 | 0.9 | 31 | 55.2 | 0.8 | 38 | 67.5 | 0.6 | 40 | 76.2 | 0.5 |
| 02 | Milk and products, eggs | 44 | 26.9 | 0.5 | 41 | 34.0 | 0.5 | 43 | 48.0 | 0.4 | 41 | 70.7 | 0.5 |
| 112 | Alcoholic beverages | 42 | 30.0 | 0.6 | 38 | 38.6 | 0.6 | 41 | 51.9 | 0.4 | 42 | 64.2 | 0.4 |
| 24 | Cork and wood | 37 | 36.9 | 0.7 | 37 | 38.7 | 0.6 | 39 | 59.7 | 0.5 | 43 | 53.0 | 0.4 |
| 26-266-267 | Natural textile fibers | 47 | 14.1 | 0.3 | 46 | 15.1 | 0.2 | 46 | 21.3 | 0.2 | 44 | 27.4 | 0.2 |
| 749 | Non-electric machinery parts | 20 | 61.1 | 1.2 | 22 | 16.1 | 0.2 | 45 | 22.2 | 0.2 | 45 | 25.4 | 0.2 |
| 881+882+883 | Photo apparatus and supplies | 38 | 32.1 | 0.6 | 40 | 35.0 | 0.5 | 44 | 36.2 | 0.3 | 46 | 25.0 | 0.2 |
| Total of Above | | | 3,920.0 | 74.6 | | 5,672.4 | 80.9 | | 8,442.2 | 71.0 | | 10,194.9 | 67.7 |
| Total World Merchandise Trade in \$ billions | | | 5,257 | | | 7,013.0 | | | 11,888 | | | 15,060 | |

Note: ^a n.e.s = Not elsewhere specified.

Source: United Nations, 2010 *International Trade Statistics Yearbook*, United Nations Comtrade Web site <http://comtrade.un.org/pb/>

Note that, with rare exceptions, the most commonly traded goods tend to be agricultural products, raw materials, semi-manufactured goods, or capital goods (e.g., petroleum, iron and steel, textiles, office equipment, cereal grains, automobile parts, natural gas, plastics, chemicals, wood, fruits and vegetables, oilseeds, aircraft, and telecommunications equipment). Very few imports appear to compete directly in world markets for the types of goods purchased by consumers.* Rather, a relatively common pattern seems to be that countries import raw materials or partially manufactured products and then complete the manufacturing process before marketing a good.

Since the late twentieth century there has been a marked increase in trade in partially manufactured products. Corporations have taken advantage of falling transportation costs and lower trade barriers to locate various parts of their production and assembly operations throughout the world. This behavior is known as *global production* (or outsourcing), and it is one of the chief factors in explaining the growth in world trade. Some economists have argued that the increase in global production may help explain the growing wage gap between skilled and unskilled workers in the United States and elsewhere.† For more on the relationship between trade and wages, see Chapter 4. For more on outsourcing, see Chapter 10.

Not included in Table 1.3 is any information regarding international trade in services. Trade in services is a growing part of world commerce. In 2010, world trade in services totaled \$3.5 trillion, accounting for almost 25 percent of all international trade. There are three main categories of services that are traded internationally: transportation services, travel services, and other. Trade in transportation services involves the hiring by residents of one country of another country's boats, airlines, or motor vehicles to move goods or people from one place to another. For instance, it is often the case that American firms hire ships from other countries, such as Panama, to move goods to foreign ports. The amounts paid for the use of these vessels represent an American import of transportation services. In 2010, transportation services accounted for about 21 percent of all services trade.

Travel services include purchases of certain items by residents of one country when they travel to another country. These purchases include such items as lodging, food, tours, and so on. Travel services represented about one-fourth of international services exports in 2010. Many countries that are highly regarded as vacation sites, such as the Bahamas and Jamaica, depend heavily on the export of travel services.

Examples of other services trade include banking, medicine, consulting, insurance, and education. For example, when foreign students enroll at an American university, that is an American export of education. Other services represented slightly more than 50 percent of world trade in services in 2007.

As is the case with merchandise, major industrial countries play a leading role in the international trade of services. In 2010, the United States exported \$518 billion in services and imported \$358 billion, ranking first in both categories. Germany was the second-largest services exporter (\$232 billion), followed by the United Kingdom (\$227 billion), China (\$170 billion), and France (\$143 billion). Germany was the second-largest importer of services (\$260 billion) in 2010, followed by China (\$192 billion), the United Kingdom (\$161 billion), and Japan (\$156 billion).‡

Table 1.4 provides some detail on the merchandise exports from selected countries for the year 2010.** Consider exports of the United States (column 1). More than one third of these goods

* Exceptions, of course, are passenger motorcars, home computers, clothing, and toys.

† See Robert C. Feenstra and Gordon Hanson, "Global Production Sharing and Rising Inequality: A Survey of Trade and Wages," in E. Kwan Choi and James Harrigan, eds., *Handbook of International Trade* (Oxford: Blackwell, 2003), 146–185.

‡ The World Trade Organization (WTO) has recently begun efforts to provide information on services trade and its importance relative to trade in merchandise. For more, see the *WTO Annual Report* (Geneva: World Trade Organization) or go to <http://www.wto.org>.

** This table also uses SITC codes to identify industries.

TABLE 1.4 Broad Categories of Exports of Selected Countries, 2010

| SITC Code | Product | United States | Germany | Japan | China | United Kingdom | France | Canada | Mexico | Brazil | Singapore | Egypt |
|-----------|-------------------------------|---------------|---------|-------|-------|----------------|--------|--------|--------|--------|-----------|-------|
| 0 | Food and live animals | 6.47 | 4.17 | 0.51 | 2.61 | 3.84 | 8.55 | 7.38 | 4.78 | 22.90 | 1.14 | 15.23 |
| 01 | Meat | 1.04 | 0.79 | 0.01 | 0.16 | 0.53 | 0.94 | 1.14 | 0.23 | 6.75 | 0.02 | 0.04 |
| 04 | Cereal grains | 1.81 | 0.60 | 0.05 | 0.08 | 0.74 | 2.16 | 2.16 | 0.38 | 1.40 | 0.06 | 1.97 |
| 1 | Beverages and tobacco | 0.43 | 0.78 | 0.08 | 0.12 | 2.26 | 2.93 | 0.25 | 1.12 | 1.45 | 0.68 | 0.42 |
| 12 | Tobacco products | 0.13 | 0.36 | 0.04 | 0.06 | 0.13 | 0.15 | 0.05 | 0.10 | 1.40 | 0.17 | 0.38 |
| 2 | Crude materials | 6.35 | 1.85 | 1.41 | 0.74 | 2.46 | 2.36 | 8.59 | 1.66 | 26.67 | 0.58 | 4.98 |
| 24 | Cork and wood | 0.38 | 0.22 | 0.01 | 0.07 | 0.04 | 0.18 | 1.51 | 0.03 | 0.53 | 0.02 | 0.08 |
| 3 | Mineral fuels | 6.32 | 1.88 | 1.69 | 1.69 | 12.60 | 3.66 | 23.80 | 13.77 | 10.05 | 16.12 | 28.67 |
| 32 | Coal and coke | 0.79 | 0.04 | 0.04 | 0.23 | 0.09 | 0.01 | 1.58 | 0.01 | 0.00 | 0.00 | 0.72 |
| 33 | Petroleum products | 4.91 | 1.14 | 1.64 | 1.29 | 11.15 | 2.65 | 17.10 | 13.64 | 9.88 | 16.06 | 18.95 |
| 4 | Fats and oils | 0.35 | 0.19 | 0.02 | 0.02 | 0.16 | 0.28 | 0.65 | 0.04 | 0.83 | 0.13 | 0.57 |
| 5 | Chemicals | 14.78 | 14.74 | 10.19 | 5.55 | 17.89 | 17.84 | 8.57 | 3.97 | 6.20 | 11.29 | 13.41 |
| 6 | Basic manufactures | 9.36 | 13.00 | 12.96 | 15.79 | 11.03 | 11.99 | 13.04 | 7.52 | 11.83 | 3.82 | 20.62 |
| 65 | Textiles | 0.95 | 1.04 | 0.92 | 4.87 | 0.92 | 1.11 | 0.49 | 0.65 | 0.55 | 0.23 | 4.90 |
| 67 | Iron and steel | 1.35 | 2.50 | 5.45 | 2.51 | 1.91 | 3.17 | 1.82 | 1.52 | 4.51 | 0.79 | 3.34 |
| 68 | Nonferrous metals | 1.25 | 2.07 | 1.87 | 1.14 | 2.21 | 1.28 | 4.26 | 1.63 | 1.35 | 0.89 | 4.29 |
| 7 | Machines and transport equip. | 35.17 | 46.01 | 59.50 | 49.51 | 31.63 | 39.00 | 26.14 | 55.58 | 16.78 | 51.05 | 4.29 |
| 75 | Office machines and computers | 3.59 | 2.13 | 2.69 | 13.06 | 2.20 | 1.13 | 0.78 | 5.35 | 0.19 | 8.44 | 0.08 |
| 761 | Televisions | 0.30 | 0.17 | 0.14 | 1.40 | 0.18 | 0.14 | 0.10 | 6.80 | 0.05 | 0.19 | 0.04 |
| 763 | Sound recorders, phonographs | 0.23 | 0.19 | 1.25 | 1.33 | 0.35 | 0.08 | 0.11 | 0.11 | 0.00 | 0.31 | 0.00 |
| 78 | Motor vehicles | 7.44 | 15.47 | 18.84 | 2.81 | 8.86 | 9.01 | 12.36 | 17.26 | 5.87 | 1.16 | 0.38 |
| 792 | Aircraft | 0.58 | 2.38 | 0.33 | 0.08 | 0.00 | 9.07 | 2.49 | 0.20 | 2.21 | 1.31 | 0.00 |
| 8 | Misc. manufactures | 10.48 | 10.15 | 7.59 | 23.89 | 11.78 | 10.67 | 4.92 | 9.09 | 2.38 | 6.98 | 7.67 |
| 84 | Clothing | 0.37 | 1.34 | 0.07 | 8.23 | 1.38 | 1.95 | 0.30 | 1.46 | 0.08 | 0.30 | 4.86 |
| 851 | Footwear | 0.09 | 0.29 | 0.01 | 2.26 | 0.32 | 0.41 | 0.06 | 0.13 | 0.83 | 0.07 | 0.08 |
| 88 | Photographic equip. | 0.67 | 0.59 | 1.95 | 0.75 | 0.68 | 0.64 | 0.19 | 0.27 | 0.06 | 0.85 | 0.00 |
| 9 | Other goods | 10.31 | 7.23 | 6.03 | 0.09 | 6.35 | 2.72 | 6.66 | 2.47 | 0.92 | 8.21 | 4.18 |

Source: United Nations, 2011 *International Trade Statistics Yearbook*, United Nations Comtrade Web site, <http://comtrade.un.org/pb/>

were machines and transport equipment. Within this group, motor vehicles (mostly exports of autos to Canada) accounted for almost 8 percent of all U.S. exports. Aircraft represented about 1 percent of exports, and office machines (including computers) accounted for almost 4 percent. Other major U.S. export sectors included food—the bulk of that category was exports of cereal grains (e.g., wheat)—crude materials (including paper and pulp wood), chemicals, and basic manufactures.

Almost all of Japan's exports (see column 3) came from basic manufactures (13.0 percent) and machines and transport equipment (59.5 percent). Iron and steel exports made up about one half of the exports of basic manufactures. Motor vehicles accounted for about one-third of machines and transport equipment exports.

Let's compare for a moment the differences between U.S. and Japanese export patterns. The United States exports a wide variety of products, with significant amounts from all major industry categories except beverages and tobacco and animal and vegetable fats. Japan's exports are concentrated in only two industry categories. What could explain this difference?

One answer has to do with the availability of resources. The United States is an enormous country with vast tracts of farm and forest lands. It also has a large and skilled workforce and abundant capital. Thus, it has the resources to be able to produce a wide variety of goods. Japan is a very small country with virtually no natural resources. Farmland is extremely scarce. On the other hand, Japan has a large and skilled workforce. Over time, its firms have invested in new plants and equipment. Thus, Japan has the resources needed to produce manufactured goods, but not those required to produce enough food or crude (raw) materials to feed its population or supply its factories.

We have presented some possible reasons for differences between U.S. and Japanese export patterns. The types of goods each country imports provide additional (but not complete) support to the explanation given earlier. Consider Table 1.5. More than 18 percent of U.S. imports in 2010 comprised mineral fuels. This reflects the fact that U.S. petroleum supplies are not plentiful enough to accommodate needs. Other major import categories for the United States included manufactured goods—trade that is not necessarily consistent with the lack of domestic resources needed to manufacture such items.

Similar to its export pattern, Japan's imports were much more concentrated. Mineral fuels were the largest import category, accounting for about 29 percent of total imports. Raw materials and food made up another 15 percent of total imports. That is, more than 40 percent of Japanese imports can be explained by the fact that Japan has very limited natural resources.

Thus, the following trade patterns emerge for these two countries: Japan exports manufactured products to the rest of the world in exchange for food, raw materials, and fuel. The United States exports manufactured goods, but also raw materials and food. It imports fuel, tropical products, and many kinds of manufactured products.

This discussion of U.S.–Japanese trade patterns is an illustration of the analysis of the commodity composition of trade. Such analysis seeks to answer this question: Which countries trade what to whom? Because there are so many goods and countries in the world and such a wide variety of economic activity, it is extremely difficult to describe, much less to understand, all that is going on. As a result, international economists have sought to build economic theories—models of international commerce that make certain simplifying assumptions so that fundamental patterns of activity can be understood. In the chapters to come we set out to build several such theories. For instance, the theory that countries export goods based on the quantities of resources and factors of production that are locally available is known as the Heckscher-Ohlin theory of comparative advantage. This theory is discussed in detail in Chapter 4. Other theories of international trade are discussed in Chapters 3 and 5. First, however, in Chapter 2 we discuss the general approach economists take in building their models of economic activity.

TABLE 1.5 Broad Categories of Imports of Selected Countries, 2010

| SITC Code | Product | United States | Germany | Japan | China | United Kingdom | France | Canada | Mexico | Brazil | Singapore | Egypt |
|-----------|-------------------------------|---------------|---------|-------|-------|----------------|--------|--------|--------|--------|-----------|-------|
| 0 | Food and live animals | 3.79 | 5.68 | 7.62 | 1.55 | 7.63 | 7.08 | 5.86 | 4.84 | 3.91 | 2.19 | 14.91 |
| 01 | Meat | 0.27 | 0.71 | 1.60 | 0.16 | 1.40 | 0.98 | 0.58 | 1.12 | 0.12 | 0.25 | 1.92 |
| 04 | Cereal grains | 0.34 | 0.45 | 1.16 | 0.13 | 0.65 | 0.61 | 0.67 | 1.28 | 1.56 | 0.23 | 6.69 |
| 1 | Beverages and tobacco | 0.89 | 0.74 | 0.93 | 0.17 | 1.56 | 0.93 | 0.98 | 0.30 | 0.28 | 0.72 | 0.81 |
| 12 | Tobacco products | 0.07 | 0.19 | 0.57 | 0.06 | 0.26 | 0.37 | 0.04 | 0.06 | 0.04 | 0.17 | 0.69 |
| 2 | Crude materials | 1.54 | 3.81 | 7.93 | 15.18 | 2.63 | 2.51 | 2.72 | 2.91 | 2.49 | 0.70 | 7.36 |
| 24 | Cork and wood | 0.24 | 0.23 | 0.90 | 0.76 | 0.42 | 0.32 | 0.36 | 0.15 | 0.02 | 0.05 | 1.77 |
| 3 | Mineral fuels | 18.44 | 11.43 | 28.68 | 13.54 | 11.23 | 13.80 | 10.06 | 7.98 | 16.60 | 26.11 | 13.45 |
| 32 | Coal and coke | 0.11 | 0.59 | 3.52 | 1.30 | 0.52 | 0.52 | 0.32 | 0.37 | 1.98 | 0.00 | 0.56 |
| 33 | Petroleum products | 17.20 | 7.53 | 18.19 | 11.76 | 8.67 | 10.01 | 8.51 | 6.30 | 12.36 | 26.11 | 9.46 |
| 4 | Fats and oils | 0.23 | 0.37 | 0.21 | 0.65 | 0.33 | 0.36 | 0.23 | 0.44 | 0.41 | 0.22 | 1.93 |
| 5 | Chemicals | 9.00 | 12.60 | 8.78 | 10.70 | 12.08 | 14.12 | 10.60 | 11.30 | 17.91 | 6.67 | 11.90 |
| 6 | Basic manufactures | 10.33 | 12.60 | 8.48 | 9.40 | 12.22 | 12.85 | 12.28 | 13.60 | 12.67 | 6.11 | 20.52 |
| 65 | Textiles | 1.19 | 1.17 | 1.04 | 1.27 | 1.21 | 1.25 | 1.06 | 1.71 | 2.09 | 0.34 | 3.84 |
| 67 | Iron and steel | 1.57 | 2.74 | 1.26 | 1.79 | 1.45 | 2.66 | 2.73 | 2.76 | 3.26 | 1.51 | 6.34 |
| 68 | Nonferrous metals | 1.78 | 2.75 | 2.60 | 3.53 | 2.43 | 1.81 | 1.43 | 2.00 | 2.29 | 1.18 | 1.57 |
| 7 | Machines and transport equip. | 37.03 | 33.97 | 23.30 | 39.38 | 31.50 | 34.12 | 41.11 | 47.23 | 39.33 | 46.31 | 24.42 |
| 75 | Office machines and computers | 6.12 | 3.72 | 3.63 | 4.07 | 3.83 | 2.71 | 3.21 | 4.96 | 2.78 | 5.72 | 0.95 |
| 761 | Televisions | 1.57 | 0.68 | 0.87 | 0.01 | 0.86 | 0.81 | 0.76 | 0.56 | 0.13 | 0.27 | 0.15 |
| 763 | Sound recorders, phonographs | 0.62 | 0.38 | 0.64 | 0.33 | 0.69 | 0.36 | 0.49 | 0.36 | 0.19 | 0.43 | 0.06 |
| 78 | Motor vehicles | 9.27 | 7.02 | 2.08 | 3.53 | 9.38 | 9.13 | 14.57 | 8.14 | 9.11 | 1.41 | 7.03 |
| 792 | Aircraft | 0.97 | 2.43 | 0.62 | 0.89 | 0.00 | 4.08 | 1.38 | 0.11 | 1.27 | 1.77 | 0.01 |
| 8 | Misc. manufactures | 15.26 | 10.97 | 12.20 | 8.11 | 15.21 | 14.11 | 12.28 | 9.43 | 6.40 | 7.00 | 4.60 |
| 84 | Clothing | 4.17 | 3.06 | 3.88 | 0.18 | 4.13 | 3.64 | 2.12 | 0.76 | 0.75 | 0.63 | 1.15 |
| 851 | Footwear | 1.12 | 0.69 | 0.69 | 0.08 | 1.00 | 1.00 | 0.49 | 0.21 | 0.20 | 0.16 | 0.24 |
| 88 | Photographic equip. | 0.60 | 0.53 | 0.91 | 1.03 | 0.66 | 0.78 | 0.46 | 0.48 | 0.43 | 1.05 | 0.25 |
| 9 | Other goods | 3.49 | 7.83 | 1.88 | 1.32 | 5.59 | 0.12 | 3.87 | 1.98 | 0.00 | 3.95 | 0.10 |

Source: United Nations, 2011 *International Trade Statistics Yearbook*, United Nations Comtrade Web site, <http://comtrade.un.org/pb/>

Summary

1. International trade is a small but growing part of world economic activity. Over the past four decades international trade has expanded by more than 2,000 percent in volume terms.
2. Industrialized countries are the major participants in world trade today. They account for more than 60 percent of total world exports. Much of their trade is with each other. They are also the largest markets for the products of developing countries.
3. The United States is the largest single participant in international trade (measured by the sum of imports and exports). It is a major trading partner for many other countries.
4. Most countries tend to trade extensively with their neighbors.
5. Although automobiles currently rank third in world exports (in value terms), most of the goods that enter international trade are agricultural products, raw materials, semimanufactured goods, or capital goods.

Exercises

1. Explain why neighboring countries tend to trade extensively with each other.
2. Use the information in Tables 1.4 and 1.5 and your knowledge of the Mexican economy to summarize and explain the trade pattern of Mexico.
3. Find five interesting facts in Table 1.1.
4. Find five interesting facts in Tables 1.4 and 1.5.
5. Compare the export rankings of the top ten leading exports of 1999 with the rankings of the top ten leading exports in 2010 (see Table 1.3). Discuss some of the reasons why these rankings have changed so dramatically.
6. Use Table 1.1 to find the five most open economies in 2009. How does the growth performance of these countries compare with the growth of the average country listed in the table?
7. Use Table 1.4 to compare the structure of U.S. and Canadian exports. Comment on similarities and differences. Are there any obvious reasons for the patterns you observe?
8. According to Figure 1.2, intra-European Union trade accounts for a huge proportion of EU trade. What factor or factors might account for this fact?
9. According to Figure 1.2, the EU is a major customer of exports from Africa and the Middle East. What types of products do you think these areas produce for export, and why do you think the EU is their best customer?
10. Use Table 1.5 to compare and contrast the import patterns of China and Germany.

Please visit our Web site at www.pearsonhighered.com/husted for more exercises and readings.

Tools of Analysis for International Trade Models

Topics to Be Covered

Some Methodological Preliminaries
The Basic Model: Assumptions
The Basic Model: Solutions
Measuring National Welfare
National Supply and Demand

Key Words

| | |
|---------------------------------------|------------------------------------|
| Positive analysis | Opportunity (or social) cost |
| Normative analysis | Indifference curve |
| General equilibrium | Community indifference curve (CIC) |
| Money illusion | Autarky |
| Relative price | National supply |
| Nominal price | National demand |
| Production possibility frontier (PPF) | |

One of the messages of the preceding chapter is that the international economy is extremely complex. All countries of the world take part. Some trade extensively, others very little. Each country is different in terms of its endowment of productive resources and level of economic development. Most countries have many trading partners. Thousands of different types of goods are exchanged. How can all of this activity be understood and explained?

In this chapter and the chapters that follow we seek to answer that question. In particular, in this chapter we begin to build an economic model of a nation that engages in international trade. Once the model, or theory, is constructed, it will be used to answer a number of important questions. For instance, *why does international trade occur?* What are the benefits that are gained, and what are the costs that are incurred? It would seem obvious that there are gains from trade, or else people would

not participate. It seems equally obvious that not everyone within a country gains equally from trade, or else trade would not be the contentious issue it is today.

There are a number of questions related to the characteristics of countries engaged in international trade that we would like our theory to answer. For instance, *What goods will a country import, and what will it export?* This is one of the oldest questions in the theory of international economic relations. And, as we shall see, there are a number of alternative answers. In addition, *What will be the volume of trade?* Is trade likely to be large or small relative to the overall size of the economy? And *What will be the prices at which trade occurs?* One measure of international prices is known as the terms of trade. This measure is defined as the price of a country's exports divided by the price of its imports. As we shall see, changes in a country's terms of trade are closely related to gains from international trade for that country.

Finally, we would like our theory to be able to explain *the effect of trade on payments to various factors of production*. That is, how does international trade affect the level of wages paid to labor or rents paid to owners of capital goods? This is perhaps the most important question we can ask regarding international trade; and yet, at first glance, it would seem that trade has little effect on wages or rents. As groups such as the United Steelworkers of America are quick to remind us, however, trade can have a profound effect. For instance, competition from foreign steel producers has helped lead to large-scale reductions in domestic steel employment and to wage concessions from the union to the domestic industry. And, of course, it is situations such as this that produce opposition to free international trade and call for protection from foreign competition. Hence, we would also like our theory to be able to explain how government can regulate the volume of international trade and what the effects of such regulation might be.

We proceed in our development of the theory of international trade as follows: In this chapter we concentrate on the basic elements of economic model building. Our attention will be focused on the economy of a country that lives in isolation from the rest of the world. We study such an economy to understand how prices and outputs are determined in the absence of international trade, so that we can compare these prices and outputs with those that prevail once trade is allowed. In the next two chapters we introduce this country to a world of international trade under differing assumptions about the production characteristics of the country. Beginning with Chapter 6 we show how to incorporate government-imposed restraints on trade into the model and how to analyze the effects of these restraints.

SOME METHODOLOGICAL PRELIMINARIES

An economy is a collection of agents (including individuals and firms) that interact with each other in the exchange of goods and services. In international economics, economies are separated from each other by national boundaries, and countries are treated as economic agents as well. International economics is interested in explaining the interaction of countries in the exchange of goods and services.

Economists often build economic models to help them understand the pattern of economic behavior. An *economic model* is a theoretical description of this behavior. An economic model can take a variety of forms. It can be a purely verbal statement about economic behavior. Verbal models are the most important of all, because it is through these that economists can pass along their understanding of economic phenomena to the general public. Because the audience is the general public, verbal models are usually very simple. But to be truly useful, a model must be capable of application to a variety of circumstances. Thus, the challenge of building a good verbal model is to ensure that underlying the model is a formal structure that is consistent in its internal logic. And since mathematics is the formal language of logic, we often find that economists use this tool in formulating their theories.

Mathematical expressions of economic theories can take two forms. They can be geometric, which is the case with most of the models found in this book. The advantages of a geometric

model are that it is a formal mathematical statement, it is relatively simple for most people to understand, and it can be readily manipulated to analyze many different phenomena. A disadvantage of a geometric model is that it is necessarily limited to no more than three dimensions. This restricts the number of variables that can be studied or manipulated at any one time.

Models can also be algebraic. An algebraic model is useful first because it is not hampered by dimensionality limitations. Second, it can be used in conjunction with a computer to conduct a statistical evaluation of economic data or to simulate economic behavior.

Despite differences in their degree of formality, all economic theories have certain common characteristics. Models are abstractions from reality; that is, they employ assumptions about the environment to be studied or the behavior of the agents that allow the economist to make the most precise predictions the theory allows. Theories are necessarily simpler than the real world; not surprisingly, therefore, they are not always correct in their explanation of or predictions about behavior. The late Nobel Prize-winning economist, Milton Friedman, argued that a test of the validity of a theory is not to question the plausibility of the assumptions employed but rather to compare the predictions of the theory with experience.* Theories can be rejected if their predictions are frequently contradicted, or if they are correct less often than the predictions of alternative theories. This is a methodology that is common to all sciences. However, it is particularly difficult to apply in economics—because economists can rarely carry out controlled experiments.

Consider the following example: From introductory microeconomics we know that (under the usual assumptions about demand and supply) the effect of the imposition of a tax on a product is to raise its price. Suppose a 50 cents per gallon tax on gasoline is imposed by the government and shortly thereafter the price of gasoline falls. Is economic theory wrong? According to a naive interpretation of the criterion for judging economic theories discussed earlier, the answer would seem to be yes. However, it is simple to show that if, at the same time the tax is imposed, the demand for gasoline is falling (due to a recession or to a nationwide green initiative to reduce the carbon footprint of the country), gasoline prices could fall. Ideally, then, we would like our theory to be a complete enough picture of the world so that we can distinguish among the effects of various and possibly conflicting forces at work on the economy. Once these forces have been identified, the theory is stated in terms of the effect one variable has on the economy, holding all other variables constant. Going back to our example, the correct way to express our theory is that, all else constant, a tax on cigarettes will lead to an increase in their price.

As we shall see in the coming chapters, real-world phenomena do not always square well with the predictions made by our theories regarding international trade. In some cases, this lack of agreement will cause us to search for factors we have not properly taken into account. In other cases, it will cause us to develop new theories.

A second common feature of all theories in economics is that they can be used to conduct both **positive** and **normative analysis**. Positive analysis refers to the attempt to answer descriptive questions: What is the effect of a tax on cigarettes on the amount of cigarettes produced or consumed? In normative analysis, the effort is to answer questions that are more prescriptive in nature: Should the government impose a tax on cigarettes? The answers to the first type of question are usually noncontroversial, especially among economists. Any two economists working with the same model should reach the same conclusions (although different models may give very different answers). Answers to normative questions depend much more on value judgments and could differ strongly from one economist to the next. In this book we try to point out where and when our own value judgments enter into the analysis presented. We shall also try to give an evenhanded account of opposing viewpoints on the optimality of various government policies related to the international economy.

Positive analysis

Analysis that studies economic behavior without making recommendations about what is or ought to be.

Normative analysis

Economic analysis that makes value judgments regarding what is or should be.

* Milton Friedman, “The Methodology of Positive Economics,” in *Essays in Positive Economics* (Chicago: University of Chicago Press, 1953), 3–43.

THE BASIC MODEL: ASSUMPTIONS

General equilibrium

Simultaneous equilibrium in all the markets of an economy.

We begin now to build a basic model of an economy that engages in international trade. The model we build is known as a **general equilibrium** model. By *general equilibrium* we mean that production, consumption, prices, and (eventually) international trade are all determined simultaneously for all goods produced and consumed in the country.

There are many advantages to a general equilibrium model. The principal benefit is that such a model allows us to keep track of what is happening to all sectors of an economy as it engages in trade. A chief drawback of general equilibrium models is that if we were truly interested in exploring simultaneous changes in the production and the consumption and the prices of *all* goods that could potentially be produced or consumed in any economy, we would quickly find that our model is too large and complicated to be studied effectively. Thus, we are forced to make some simplifying assumptions. We begin by making seven.

ASSUMPTION 1

All economic agents, in particular firms and consumers, exhibit rational behavior.

Economic agents are goal oriented. Firms make production decisions in an attempt to maximize profits. Consumers maximize utility (satisfaction) through their consumption decisions. This is a fundamental tenet in economics. If this assumption does not hold, then economic behavior would be random and hence inexplicable.

ASSUMPTION 2

There are only two countries in the world, America (denoted by the letter *A*) and Britain (denoted by the letter *B*). There are also only two goods in the world, soybeans (denoted by the letter *S*) and textiles (denoted by the letter *T*). Each good is identical in its characteristics in the two countries, and some of each is always consumed in each country.

Both parts of this assumption are made for geometric convenience. As it turns out, general equilibrium models can be expressed algebraically, wherein both the number of countries and the number of goods can exceed two by any arbitrary amount. All the conclusions of this chapter carry through in these more general models. However, in some cases the results in chapters to come do not carry through when the number of goods or countries is greater than two. We shall try to indicate where this is true.

ASSUMPTION 3

There is *no* **money illusion**.

Money illusion

A situation in which individuals make decisions based on changes in some prices without taking into account changes in others.

That is, we assume that when firms make their production decisions and when consumers make their consumption choices, they take into account the behavior of all prices rather than only a few. Thus, they are not fooled into changing their behavior when nothing “real” in the economy has changed. To make the implications of this assumption more clear, consider the following example.

Suppose a farmer is trying to decide which crop to plant in a given year. He has two choices (say, corn and wheat), each of which he can grow in equal amounts with equal effort.* Suppose that, initially, each product sells for the same price. Under these circumstances, the farmer is indifferent to planting either of these commodities and decides, perhaps by flipping a coin, to grow wheat. Now, just before planting, the farmer learns that the price of corn has doubled. Should he

* For those of you who are familiar with farming, we realize this is a rather contrived and implausible example, but bear with us.

plant corn? The answer is, Not necessarily. First, he should examine what has happened to the price of wheat. He should plant corn instead of wheat if the price of corn has risen by more than the price of wheat. If wheat prices have also doubled, then he is no better off by switching to corn production. If wheat prices have more than doubled, he is worse off by switching to corn. The farmer who looks only at changes in one price without considering changes in others suffers from money illusion.

Consider another example. Suppose that from one year to the next an individual is given a 10 percent increase in his or her salary. An individual with money illusion would think that simply because his or her income had increased in nominal (money) terms, his or her buying power (real income) had also increased. Clearly, this is not necessarily so, because the prices of the goods this person buys could have risen by more than 10 percent.

How can we represent the assumption that firms and individuals do not suffer from money illusion when they operate in the economy? The answer is to require that all economic decisions (i.e., decisions to produce or to consume) are based on **relative** rather than **nominal prices**. Nominal prices refer to money prices, such as the dollar price of soybeans, denoted as P_S , or the dollar price of textiles, P_T . A relative price refers to a price ratio, say P_S/P_T . To understand how relative prices work, consider the following important rule:

$$\text{If } P_S/P_T = k \text{ (then 1 unit of } S = k \text{ units of } T \text{ (in value))}$$

or

$$1 \text{ unit of } T = 1/k \text{ units of } S \text{ (in value)}$$

For example, suppose that 1 bushel of soybeans costs \$10, and 1 yard of textiles costs \$5. The relative price of soybeans in terms of textiles, P_S/P_T , would be 2. That is, 1 bushel of soybeans could be sold in the market to yield enough cash to purchase 2 yards of textiles. Note further that this would still be true if both prices doubled or changed by any other proportionate factor. Relative prices when one price in the ratio changes by more than the other; in the models presented in the next few chapters movements in relative prices influence economic agents. For an example of how a relative price change affects both consumer and producer behavior see Global Insights 2.1.

We can also illustrate the notion of relative prices graphically. Consider Figure 2.1. On the vertical axis we measure textiles in physical units. On the horizontal axis we measure units of good S , soybeans. Suppose that P_S/P_T equals 2. Suppose further that a farmer produces 10 units of soybeans and sells them all in the market. What is the maximum amount of textiles that could be purchased with the proceeds from this sale? Since soybeans are twice as expensive as textiles,

Relative price

A ratio of two product prices.

Nominal price

A price expressed in terms of money.

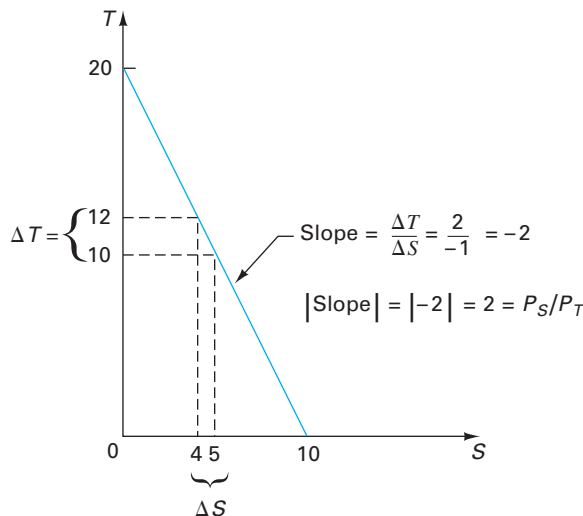


FIGURE 2.1 Example of a Price Line

Global Insights 2.1

World Response to Higher Relative Price of Oil

Throughout 2007 and into 2008 oil prices rose dramatically around the world, and so did the price of gasoline. In many parts of the United States, a gallon of gasoline rose from about \$2 per gallon to over \$4. This rise in the price of gasoline can be viewed as a relative price change since prices of virtually all other goods did not rise nearly as much over this period. This change in an important relative price had an enormous effect on behavior in the United States and around the world.* In 2008, monthly U.S. consumption of crude oil and petroleum products averaged about 4 percent less than in comparable months the year before. In May 2008, Americans drove 9.7 billion fewer miles than they had a year earlier, a decline of 3.7 percent. Other specific examples of how U.S. consumers responded to the relative price change include the following.

Americans switched automobile purchases away from large cars and pickups to smaller, more fuel-efficient cars, motor scooters, and bicycles. Dealerships quickly sold out of hybrid cars such as the Toyota Prius and placed would-be purchasers on long waiting lists. Ford announced that it would drastically change the mix of cars it produces in its North American assembly plants, away from trucks, SUVs, and other gas guzzlers toward smaller, more fuel-efficient models similar to the ones it produces in Europe and other parts of the world where gasoline prices have been high for decades. Bicycle repair shops reported large

increases in business. In record numbers, students enrolled in online college courses rather than drive to attend campus classes. Amtrak train ridership soared and so did other forms of mass-transit ridership. Homeowners around the country increased their purchases of more energy-efficient home appliances.

Around the world, producers also took measures to reduce their use of gasoline and other petroleum products. Domestic and foreign airline companies switched their purchases of airplanes to the most fuel-efficient models on the market. Farmers in the Indian state of Rajasthan switched to camels rather than tractors to pull their plows. In a similar move, farmers in parts of Tennessee switched from tractors to mules. Farmers in Iowa shifted to air drying harvested corn rather than using propane heaters.

These changes show why economists stress the role of changes in relative prices as a motivator of human behavior. By the end of 2008 the relative price of gasoline had fallen dramatically, although it still remains above its pre-spike level, and consumption continues to be lower than it was in 2007. The lower rate of consumption is due in part to the higher rates of unemployment across the country as well as the fuel-saving measures adopted by American consumers. Whether or not energy-saving behavior continues clearly depends on what happens to the relative price of energy, as well as the overall state of the economy in future years.

* These and other examples can be found in "U.S. Retools Economy, Curbing Thirst for Oil," *Wall Street Journal*, August 12, 2008.

the answer is 20 units. We show this relation on the graph by drawing a line between 20 units of T and 10 units of S . This line is known as the price (or terms of trade) line. The price line shows us (for a given relative price) all the possible combinations of the two goods that can be purchased with a fixed amount of money.

The most important feature of the price line is that the slope of the line (in absolute value) tells us the relative price P_S/P_T . Consider the graph again. If the farmer sells 1 unit of S , we know that the resulting revenue can be exchanged for 2 units of T . Thus, movements along the line reflect trades of equal value—the only type of uncoerced exchange one should be willing to make.

Note that the end points of the line tell us something about the income level of the person making the trade. That is, we began this example by assuming that the farmer produced 10 units of S . Suppose he had produced 1,000 units and then taken this amount to the market to sell. What would be the maximum amount of T he could purchase? The answer is, of course, 2,000 units.

Hence, the end points of the price line would be 1,000 on the S axis and 2,000 on the T axis, and the slope of the line connecting these points would again be 2 (in absolute value)—the relative price of S . Thus, for any given level of S (or T) the price line tells us at what rate that good could be exchanged in the market for the other.

Finally, suppose that P_S/P_T rises from 2 to 3. What will be the effect on the price line? It will get steeper. What does this imply? It means that the same amount of S now trades for 3 units of textiles rather than 2 units. That is, T has become relatively cheaper, or, equivalently, S has become relatively more expensive. Hence, graphically, price lines that are steep denote the fact that S is relatively expensive compared with T , while price lines that are flat denote the opposite.

ASSUMPTION 4

In each country, factor endowments are fixed and the set of technologies available to each country is constant.

If these conditions hold, then we can illustrate the supply conditions of a country by a **production possibility frontier (PPF)**. A production possibility frontier tells us the maximum amount of output of one type of good, say T , that can be produced in a country, given the technology of that country, that country's factors of production (e.g., land, labor, capital), and the level of output of the other good, S . Figure 2.2 illustrates two possible shapes for a country's PPF. In part (a) of the figure, we provide the diagram familiar from most textbooks. Given the country's resources, production can occur anywhere along or inside the curve DE . If the output point of the country is on the frontier, say, at point G , then resources are fully employed and production is said to be efficient. This is because it is not possible to increase the output of one good without lowering the output of the other. If production occurs in the interior of the PPF, say, at point I , then there is inefficiency in production, because the output of one or both goods can be increased without increasing the resource base of the country. And it is assumed that production cannot occur at a point outside the frontier (e.g., point H), because this would require resources or technology not available to the country.

Recall that when resources are being efficiently utilized, it is not possible to increase the production of any one good without decreasing the production of the other. We define the **opportunity (or social) cost** of producing one more unit of S (T) as the amount of T (S) that must be sacrificed to use resources to produce S (T) rather than T (S). Now, note that the PPF in Figure 2.2a has a bowed (concave to the origin) shape. This shape signifies the assumption that production of the two goods in the country is subject to *increasing opportunity costs*. That is, beginning from point E (where the economy is producing only good T), as the economy moves toward producing more and more S (i.e., as the economy moves down its PPF), the cost in terms of foregone production of T increases. More simply, as Figure 2.2a indicates, for each additional

Production possibility frontier (PPF)

A diagram that shows the maximum amount of one type of good that can be produced in an economy, given the production of the other.

Opportunity (or social) cost

The amount of production of one type of good that must be sacrificed to produce one more unit of the other.

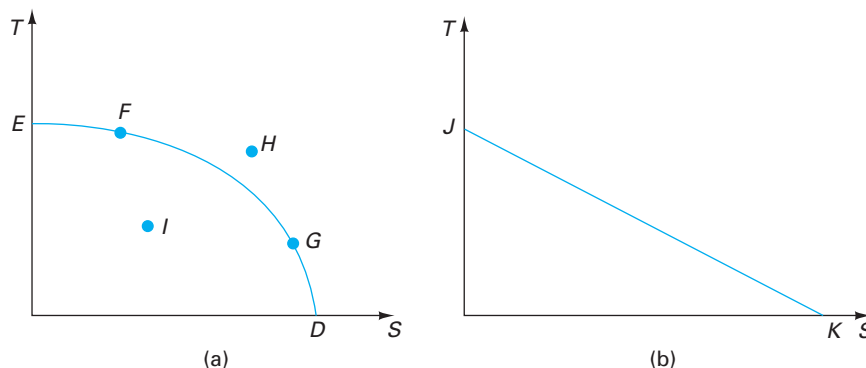


FIGURE 2.2 Examples of Production Possibility Frontiers: (a) Increasing Opportunity Costs; (b) Constant Opportunity Costs

unit of S produced in the economy, the amount of T produced falls by an increasing amount. Mathematically, we can define the cost of producing an additional unit of S as minus the slope of the PPF at the initial production point, that is, $-\Delta T/\Delta S$.*

What could cause opportunity costs to increase? One possibility is that the two industries, S and T , use factors of production in different combinations in the production process. For instance, textiles might require large amounts of labor to produce, while soybeans might need only small amounts; likewise, soybeans might require vast tracts of land, while textile production could be concentrated in a very small area. Now consider point E in the diagram. At that point all of the country's resources are concentrated in the T industry. To move away from that point, the T industry must release factors to industry S . Given that T needs large amounts of labor but only a little land, while S requires just the opposite, an efficient reallocation of resources would prompt T as it contracts to release initially to S more land than labor. As a result, the output of T would fall by only a small amount, while the production of S would rise by a large amount. However, this process cannot go on indefinitely. If the output of S is to continue to expand, eventually more and more labor relative to land will be released from T . As this begins to happen, the output of T will fall by larger and larger amounts.

Part (b) of Figure 2.2 illustrates an alternative assumption—namely, *constant opportunity costs*. In this case, as the production of S expands, the output of T falls, but at a constant rate. A condition that would produce this situation would be one in which factors of production are used in fixed proportions identical with each other in both industries. For example, suppose that both industries always employ 100 workers per acre of land. Then, as one industry contracts, it will always release factors at this rate, and output will fall by a fixed amount. Meanwhile, the expanding industry will want to absorb resources at this rate, and its output will rise by a fixed amount.

In the models that follow, we have occasion to assume that the economy is subject to either constant or increasing opportunity costs. While both situations are possible in the real world, most economists agree that the assumption of increasing opportunity costs offers a better approximation of reality. On the other hand, the assumption of constant opportunity costs is sometimes very useful, because it is somewhat easier to work with and it leads to powerful predictions about the effect of international trade on various characteristics of the economy.

ASSUMPTION 5

Perfect competition prevails in both industries in both countries. In addition, there are no externalities in production.

Recall that the opportunity cost (i.e., social cost) of producing one more unit of good S is the amount of output of good T foregone in the process. Assumption 5 guarantees that market prices reflect the true social (opportunity) costs of production. From basic principles of microeconomics we know that a competitive firm maximizes its profits by producing at the point where price equals marginal cost (i.e., the cost of the last unit produced). If there are no externalities in production (e.g., if no pollution is created as the good is manufactured), then the marginal cost of producing one more unit of S is precisely the value of the resources (including normal profit) used in the production of this good. The alternative to using these resources for the production of S would be to employ them to produce T , so that there is complete correspondence between production and opportunity costs in this case.

Two points deserve further mention. First, this assumption offers a convenient graphical counterpart. Perfect competition requires that price equals marginal cost. In our example, the price of S in terms of T must equal the cost of producing S in terms of T . Or, equivalently, the

* Because the slope of the PPF is negative, we include a minus sign in the definition of opportunity cost so that cost is measured in terms of positive numbers. Alternatively, we can define the cost as the absolute value of the slope of the PPF at the initial production point.