INTERNATIONAL TRADE - THEORY AND POLICY



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International Trade - Theory and Policy

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CHAPTER OVERVIEW

1: Introductory Trade Issues - History, Institutions, and Legal Framework

Economics is a social science whose purpose is to understand the workings of the real-world economy. An economy is something that no one person can observe in its entirety. We are all a part of the economy, we all buy and sell things daily, but we cannot observe all parts and aspects of an economy at any one time.

- For this reason, economists build mathematical models, or theories, meant to describe different aspects of the real world. For some students, economics seems to be all about these models and theories, these abstract equations and diagrams. However, in actuality, economics is about the real world, the world we all live in.
- For this reason, it is important in any economics course to describe the conditions in the real world before diving into the theory intended to explain them. In this case, in a textbook about international trade, it is very useful for a student to know some of the policy issues, the controversies, the discussions, and the history of international trade.

This first chapter provides an overview of the real world with respect to international trade. It explains not only where we are now but also where we have been and why things changed along the way. It describes current trade laws and institutions and explains why they have been implemented. With this overview about international trade in the real world in mind, a student can better understand why the theories and models in the later chapters are being developed. This chapter lays the groundwork for everything else that follows.

1.1: The International Economy and International Economics
1.2: Understanding Tariffs
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1.1: The International Economy and International Economics 1.1: The International Economy and International EconomicsEdit Update titlecancel

Learning Objectives

1. Learn past trends in international trade and foreign investment.
2. Learn the distinction between international trade and international finance.

International economics is growing in importance as a field of study because of the rapid integration of international economic markets. Increasingly, businesses, consumers, and governments realize that their lives are affected not only by what goes on in their own town, state, or country but also by what is happening around the world. Consumers can walk into their local shops today and buy goods and services from all over the world. Local businesses must compete with these foreign products. However, many of these same businesses also have new opportunities to expand their markets by selling to a multitude of consumers in other countries. The advance of telecommunications is also rapidly reducing the cost of providing services internationally, while the Internet will assuredly change the nature of many products and services as it expands markets even further.

One simple way to see the rising importance of international economics is to look at the growth of exports in the world during the past fifty or more years. Figure 1.1.1 shows the overall annual exports measured in billions of U.S. dollars from 1948 to 2008. Recognizing that one country's exports are another country's imports, one can see the exponential growth in outflows and inflows during the past fifty years.

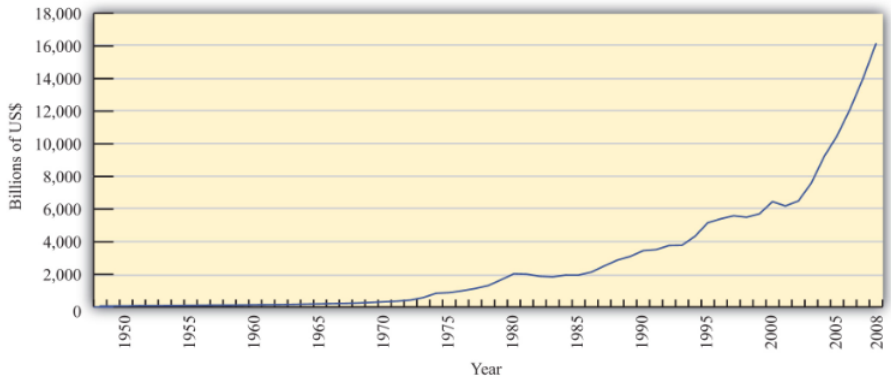


Figure 1.1.1: World Exports, 1948–2008 (in Billions of U.S. Dollars)

Source: World Trade Organization, International trade and tariff data, http://www.wto.org/english/res_e/statis_e/statis_e.htm

However, rapid growth in the value of exports does not necessarily indicate that trade is becoming more important. A better method is to look at the share of traded goods in relation to the size of the world economy. Figure 1.1.2 shows world exports as a percentage of the world gross domestic product (GDP) for the years 1970 to 2008. It shows a steady increase in trade as a share of the size of the world economy. World exports grew from just over 10 percent of the GDP in 1970 to over 30 percent by 2008. Thus trade is not only rising rapidly in absolute terms; it is becoming relatively more important too.

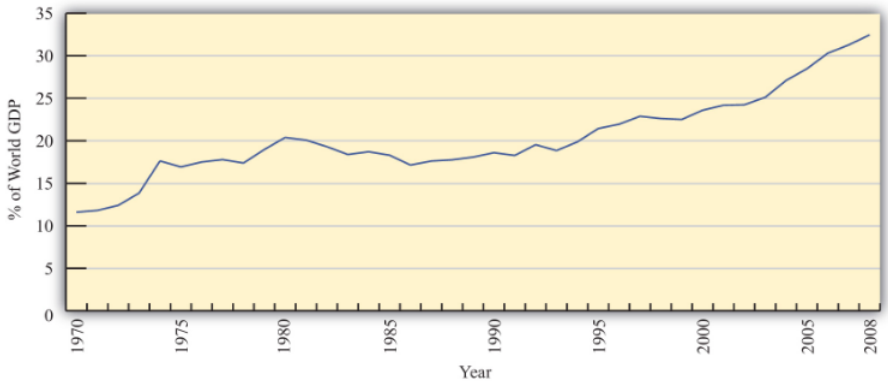


Figure 1.1.2: World Exports, 1970–2008 (Percentage of World GDP)

Source: IMF World Economic Outlook Database, http://www.imf.org/external/pubs/ft/weo/2009/02/weodata/index.aspx

One other indicator of world interconnectedness can be seen in changes in the amount of foreign direct investment (FDI). FDI is foreign ownership of productive activities and thus is another way in which foreign economic influence can affect a country. Figure 1.1.3 shows the stock, or the sum total value, of FDI around the world taken as a percentage of the world GDP between 1980 and 2007. It gives an indication of the importance of foreign ownership and influence around the world. As can be seen, the share of FDI has grown dramatically from around 5 percent of the world GDP in 1980 to over 25 percent of the GDP just twenty-five years later.

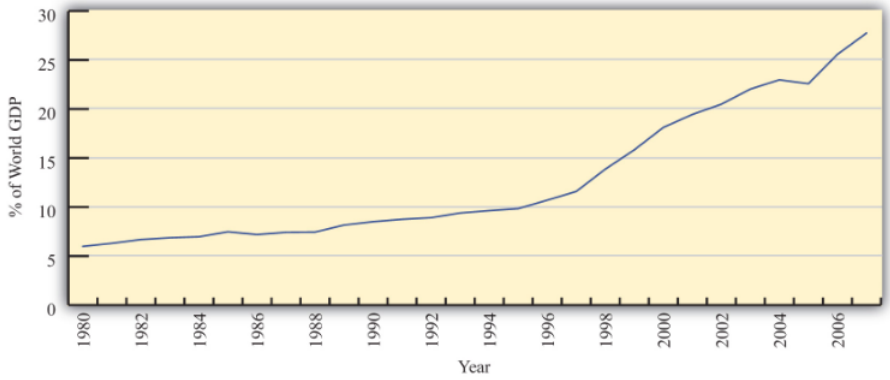


Figure 1.1.3: World Inward FDI Stocks, 1980–2007 (Percentage of World GDP)

Source: IMF World Economic Outlook Database, http://www.imf.org/external/pubs/ft/weo/2009/02/weodata/index.aspx; UNCTAD, FDI Statistics: Division on Investment and Enterprise

The growth of international trade and investment has been stimulated partly by the steady decline of trade barriers since the Great Depression of the 1930s. In the post–World War II era, the **General Agreement on Tariffs and Trade**, or GATT, prompted regular negotiations among a growing body of members to reciprocally reduce tariffs (import taxes) on imported goods. During each of these regular negotiations (eight of these rounds were completed between 1948 and 1994), countries promised to reduce their tariffs on imports in exchange for concessions—that means tariffs reductions—by other GATT members. When the **Uruguay Round**, the most recently completed round, was finalized in 1994, the member countries succeeded in extending the agreement to include liberalization promises in a much larger sphere of influence. Now countries not only would lower tariffs on goods trade but also would begin to liberalize the agriculture and services markets. They would eliminate the many quota systems—like the multifiber agreement in clothing—that had sprouted up in previous decades. And they would agree to adhere to certain minimum standards to protect intellectual property rights such as patents, trademarks, and copyrights. The **World Trade Organization (WTO)** was created to manage this system of new agreements, to provide a forum for regular discussion of trade matters, and to implement a well-defined process for settling trade disputes that might arise among countries.

As of 2009, 153 countries were members of the WTO "trade liberalization club," and many more countries were still negotiating entry. As the club grows to include more members—and if the latest round of trade liberalization talks, called the Doha Round,

concludes with an agreement—world markets will become increasingly open to trade and investment.Note that the Doha Round of discussions was begun in 2001 and remains uncompleted as of 2009.

Another international push for trade liberalization has come in the form of regional free trade agreements. Over two hundred regional trade agreements around the world have been notified, or announced, to the WTO. Many countries have negotiated these agreements with neighboring countries or major trading partners to promote even faster trade liberalization. In part, these have arisen because of the slow, plodding pace of liberalization under the GATT/WTO. In part, the regional trade agreements have occurred because countries have wished to promote interdependence and connectedness with important economic or strategic trade partners. In any case, the phenomenon serves to open international markets even further than achieved in the WTO.

These changes in economic patterns and the trend toward ever-increasing openness are an important aspect of the more exhaustive phenomenon known as globalization. Globalization more formally refers to the economic, social, cultural, or environmental changes that tend to interconnect peoples around the world. Since the economic aspects of globalization are certainly the most pervasive of these changes, it is increasingly important to understand the implications of a global marketplace on consumers, businesses, and governments. That is where the study of international economics begins.

What is International Economics?

International economics is a field of study that assesses the implications of international trade, international investment, and international borrowing and lending. There are two broad subfields within the discipline: international trade and international finance.

International trade is a field in economics that applies microeconomic models to help understand the international economy. Its content includes basic supply-and-demand analysis of international markets; firm and consumer behavior; perfectly competitive, oligopolistic, and monopolistic market structures; and the effects of market distortions. The typical course describes economic relationships among consumers, firms, factory owners, and the government.

The objective of an international trade course is to understand the effects of international trade on individuals and businesses and the effects of changes in trade policies and other economic conditions. The course develops arguments that support a free trade policy as well as arguments that support various types of protectionist policies. By the end of the course, students should better understand the centuries-old controversy between free trade and protectionism.

International finance applies macroeconomic models to help understand the international economy. Its focus is on the interrelationships among aggregate economic variables such as GDP, unemployment rates, inflation rates, trade balances, exchange rates, interest rates, and so on. This field expands basic macroeconomics to include international exchanges. Its focus is on the significance of trade imbalances, the determinants of exchange rates, and the aggregate effects of government monetary and fiscal policies. The pros and cons of fixed versus floating exchange rate systems are among the important issues addressed.

This international trade textbook begins in this chapter by discussing current and past issues and controversies relating to microeconomic trends and policies. We will highlight past trends both in implementing policies that restrict trade and in forging agreements to reduce trade barriers. It is these real-world issues that make the theory of international trade worth studying.

KEY TAKEAWAYS

- International trade and investment flows have grown dramatically and consistently during the past half century.
- International trade is a field in economics that applies microeconomic models to help understand the international economy.
- International finance focuses on the interrelationships among aggregate economic variables such as GDP, unemployment, inflation, trade balances, exchange rates, and so on.

Exercise 1.1.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The approximate share of world exports as a percentage of world GDP in 2008.
   b. The approximate share of world foreign direct investment as a percentage of world GDP in 1980.
   c. The number of countries that were members of the WTO in 2009.
   d. This branch of international economics applies microeconomic models to understand the international economy.
   e. This branch of international economics applies macroeconomic models to understand the international economy.

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1.2: Understanding Tariffs 1.2: Understanding TariffsEdit Update titlecancel

Learning Objectives

1. Learn the different methods used to assess a tariff.
2. Measure, interpret, and compare average tariffs around the world.

The most common way to protect one's economy from import competition is to implement a tariff: a tax on imports. Generally speaking, a tariff is any tax or fee collected by a government. Sometimes the term "tariff" is used in a nontrade context, as in railroad tariffs. However, the term is much more commonly used to refer to a tax on imported goods.

Tariffs have been applied by countries for centuries and have been one of the most common methods used to collect revenue for governments. Largely this is because it is relatively simple to place customs officials at the border of a country and collect a fee on goods that enter. Administratively, a tariff is probably one of the easiest taxes to collect. (Of course, high tariffs may induce smuggling of goods through nontraditional entry points, but we will ignore that problem here.)

Tariffs are worth defining early in an international trade course since changes in tariffs represent the primary way in which countries either liberalize trade or protect their economies. It isn't the only way, though, since countries also implement subsidies, quotas, and other types of regulations that can affect trade flows between countries. These other methods will be defined and discussed later, but for now it suffices to understand tariffs since they still represent the basic policy affecting international trade patterns.

When people talk about trade liberalization, they generally mean reducing the tariffs on imported goods, thereby allowing the products to enter at lower cost. Since lowering the cost of trade makes it more profitable, it will make trade freer. A complete elimination of tariffs and other barriers to trade is what economists and others mean by free trade. In contrast, any increase in tariffs is referred to as protection, or protectionism. Because tariffs raise the cost of importing products from abroad but not from domestic firms, they have the effect of protecting the domestic firms that compete with imported products. These domestic firms are called import competitors.

There are two basic ways in which tariffs may be levied: specific tariffs and ad valorem tariffs. A specific tariff is levied as a fixed charge per unit of imports. For example, the U.S. government levies a $0.51 specific tariff on every wristwatch imported into the United States. Thus, if one thousand watches are imported, the U.S. government collects $510 in tariff revenue. In this case, $510 is collected whether the watch is a $40 Swatch or a $5,000 Rolex.

An ad valorem tariff is levied as a fixed percentage of the value of the commodity imported. "Ad valorem" is Latin for "on value" or "in proportion to the value." The United States currently levies a 2.5 percent ad valorem tariff on imported automobiles. Thus, if $100,000 worth of automobiles are imported, the U.S. government collects $2,500 in tariff revenue. In this case, $2,500 is collected whether two $50,000 BMWs or ten $10,000 Hyundais are imported.

Occasionally, both a specific and an ad valorem tariff are levied on the same product simultaneously. This is known as a two-part tariff. For example, wristwatches imported into the United States face the $0.51 specific tariff as well as a 6.25 percent ad valorem tariff on the case and the strap and a 5.3 percent ad valorem tariff on the battery. Perhaps this should be called a three-part tariff!

As the above examples suggest, different tariffs are generally applied to different commodities. Governments rarely apply the same tariff to all goods and services imported into the country. Several countries prove the exception, though. For example, Chile levies a 6 percent tariff on every imported good, regardless of the category. Similarly, the United Arab Emirates sets a 5 percent tariff on almost all items, while Bolivia levies tariffs either at 0 percent, 2.5 percent, 5 percent, 7.5 percent, or 10 percent. Nonetheless, simple and constant tariffs such as these are uncommon.

Thus, instead of one tariff rate, countries have a tariff schedule that specifies the tariff collected on every particular good and service. In the United States, the tariff schedule is called the Harmonized Tariff Schedule (HTS) of the United States. The commodity classifications are based on the international Harmonized Commodity Coding and Classification System (or the Harmonized System) established by the World Customs Organization.

Tariff rates for selected products in the United States in 2009 are available in Chapter 1: Introductory Trade Issues- History, Institutions, and Legal Framework, Section 1.8: Appendix A- Selected U.S. Tariffs—2009.

Measuring Protectionism: Average Tariff Rates around the World

One method used to measure the degree of protectionism within an economy is the average tariff rate. Since tariffs generally reduce imports of foreign products, the higher the tariff, the greater the protection afforded to the country's import-competing industries. At one time, tariffs were perhaps the most commonly applied trade policy. Many countries used tariffs as a primary source of funds for their government budgets. However, as trade liberalization advanced in the second half of the twentieth century, many other types of nontariff barriers became more prominent.

Table 1.2.1 provides a list of average tariff rates in selected countries around the world. These rates were calculated as the simple average tariff across more than five thousand product categories in each country's applied tariff schedule located on the World Trade Organization (WTO) Web site. The countries are ordered by highest to lowest per capita income.

Table 1.2.1: Average Tariffs in Selected Countries (2009)

Country	Average Tariff Rates (%)
United States	3.6
Canada	3.6
European Community (EC)	4.3
Japan	3.1
South Korea	11.3
Mexico	12.5
Chile	6.0 (uniform)
Argentina	11.2
Brazil	13.6
Thailand	9.1
China	9.95
Egypt	17.0
Philippines	6.3
India	15.0
Kenya	12.7
Ghana	13.1

Generally speaking, average tariff rates are less than 20 percent in most countries, although they are often quite a bit higher for agricultural commodities. In the most developed countries, average tariffs are less than 10 percent and often less than 5 percent. On average, less-developed countries maintain higher tariff barriers, but many countries that have recently joined the WTO have reduced their tariffs substantially to gain entry.

Problems Using Average Tariffs as a Measure of Protection

The first problem with using average tariffs as a measure of protection in a country is that there are several different ways to calculate an average tariff rate, and each method can give a very different impression about the level of protection.

The tariffs in Table 1.2.1 are calculated as a simple average. To calculate this rate, one simply adds up all the tariff rates and divides by the number of import categories. One problem with this method arises if a country has most of its trade in a few categories with zero tariffs but has high tariffs in many categories it would never find advantageous to import. In this case, the average tariff may overstate the degree of protection in the economy.

This problem can be avoided, to a certain extent, if one calculates the trade-weighted average tariff. This measure weighs each tariff by the share of total imports in that import category. Thus, if a country has most of its imports in a category with very low

tariffs but has many import categories with high tariffs and virtually no imports, then the trade-weighted average tariff would indicate a low level of protection. The simple way to calculate a trade-weighted average tariff rate is to divide the total tariff revenue by the total value of imports. Since these data are regularly reported by many countries, this is a common way to report average tariffs. To illustrate the difference, the United States is listed in Table 1.2.1 with a simple average tariff of 3.6 percent. However, in 2008 the U.S. tariff revenue collected came to $29.2 billion from imports of goods totaling $2,126 billion, meaning that the U.S. trade-weighted average tariff was a mere 1.4 percent.

Nonetheless, the trade-weighted average tariff is not without flaws. For example, suppose a country has relatively little trade because it has prohibitive tariffs (i.e., tariffs set so high as to eliminate imports) in many import categories. If it has some trade in a few import categories with relatively low tariffs, then the trade-weighted average tariff would be relatively low. After all, there would be no tariff revenue in the categories with prohibitive tariffs. In this case, a low average tariff could be reported for a highly protectionist country. Also, in this case, the simple average tariff would register as a higher average tariff and might be a better indicator of the level of protection in the economy.

Of course, the best way to overstate the degree of protection is to use the average tariff rate on *dutiable* imports. This alternative measure, which is sometimes reported, only considers categories in which a tariff is actually levied and ignores all categories in which the tariff is set to zero. Since many countries today have many categories of goods with zero tariffs applied, this measure would give a higher estimate of average tariffs than most of the other measures.

The second major problem with using average tariff rates to measure the degree of protection is that tariffs are not the only trade policy used by countries. Countries also implement quotas, import licenses, voluntary export restraints, export taxes, export subsidies, government procurement policies, domestic content rules, and much more. In addition, there are a variety of domestic regulations that, for large economies at least, can and do have an impact on trade flows. None of these regulations, restrictions, or impediments to trade, affecting both imports and exports, would be captured using any of the average tariff measures. Nevertheless, these nontariff barriers can have a much greater effect on trade flows than tariffs themselves.

KEY TAKEAWAYS

- Specific tariffs are assessed as a money charge per unit of the imported good.
- Ad valorem tariffs are assessed as a percentage of the value of the imported good.
- Average tariffs can be measured as a simple average across product categories or can be weighted by the level of imports.
- Although average tariffs are used to measure the degree of protection or openness of a country, neither measure is best because each measure has unique problems.
- In general, average tariffs are higher in developing countries and lower in developed countries.

Exercise 1.2.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. A type of tariff assessed as a percentage of the value of the imported good (e.g., 12 percent of the value of apples).
   b. A type of tariff assessed as a fixed money charge per unit of imports (e.g., $0.35 per pound of apples).
   c. Of *increase* or *decrease*, this is how tariffs would be changed if a country is liberalizing trade.
2. Calculate the amount of tariff revenue collected if a 7 percent ad valorem tariff is assessed on ten auto imports with the autos valued at $20,000 each.
3. Calculate the amount of tariff revenue collected if a $500 specific tariff is assessed on ten auto imports with the autos valued at $20,000 each.
   a. What would the ad valorem tariff rate have to be to collect the same amount of tariff revenue?
4. Calculate the trade-weighted average tariff if a country has annual goods imports of $157 billion and annual tariff revenue of $13.7 billion.

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1.3: Recent Trade Controversies 1.3: Recent Trade ControversiesEdit Update titlecancel

Learning Objectives

1. Identify some of the ways the world has stepped closer to free trade recently.
2. Identify some of the ways the world has stepped further from free trade recently.

In the spring of 2009, the world was in the midst of the largest economic downturn since the early 1980s. Economic production was falling and unemployment was rising. International trade had fallen substantially everywhere in the world, while investment both domestically and internationally dried up.

The source of these problems was the bursting of a real estate bubble. Bubbles are fairly common in both real estate and stock markets. A bubble describes a steady and persistent increase in prices in a market—in this case, in the real estate markets in the United States and abroad. When bubbles are developing, many market observers argue that the prices are reflective of true values despite a sharp and unexpected increase. These justifications fool many people into buying the products in the hope that the prices will continue to rise and generate a profit.

When the bubble bursts, the demand driving the price increases ceases and a large number of participants begin to sell off their product to realize their profit. When this occurs, prices quickly plummet. The dramatic drop in real estate prices in the United States in 2007 and 2008 left many financial institutions near bankruptcy. These financial market instabilities finally spilled over into the *real sector* (i.e., the sector where goods and services are produced), contributing not only to a world recession but also to a new popular attitude that capitalism and free markets may not be working very well. This attitude change may fuel the antiglobalization sentiments that were growing during the previous decade.

As the current economic crisis unfolded, there were numerous suggestions about similarities between this recession and the Great Depression in the 1930s. One big concern was that countries might revert to protectionism to try to save jobs for domestic workers. This is precisely what many countries did at the onset of the Great Depression, and it is widely believed that that reaction made the Depression worse rather than better.

Since the economic crisis began in late 2008, national leaders have regularly vowed to avoid protectionist pressures and maintain current trade liberalization commitments made under the World Trade Organization (WTO) and individual free trade agreements. However, at the same time, countries have raised barriers to trade in a variety of subtle ways. For example, the United States revoked a promise to maintain a program allowing Mexican trucks to enter the United States under the North American Free Trade Agreement (NAFTA), it included “Buy American” provisions it its economic stimulus package, it initiated a special safeguards action against Chinese tire imports, and it brought a case against China at the WTO. Although many of these actions are legal and allowable under U.S. international commitments, they are nevertheless irritating to U.S. trading partners and indicative of the rising pressure to implement policies favorable to domestic businesses and workers. Most other countries have taken similar, albeit subtle, protectionist actions as well.

Nevertheless, this rising protectionism runs counter to a second popular sentiment among people seeking to achieve greater liberalization and openness in international markets. For example, as the recession began, the United States had several free trade areas waiting to be approved by the U.S. Congress: one with South Korea, another with Colombia, and a third with Panama. In addition, the United States has participated in talks recently with many Pacific Rim countries to forge a Trans-Pacific Partnership (TPP) that could liberalize trade around the region. Simultaneously, free trade area discussions continue among many other country pairings around the world.

This current ambivalence among countries and policymakers is nothing new. Since the Great Depression, trade policymaking around the world can be seen as a tug of war between proponents and opponents of trade liberalization. Even as free trade advocates have achieved trade expansions and liberalizations, free trade opponents have often achieved market-closing policies at the same time; three steps forward toward trade liberalization are often coupled with two steps back at the same time.

To illustrate this point, we continue with a discussion of both recent initiatives for trade liberalization and some of the efforts to resist these liberalization movements. We’ll also look back to see how the current policies and discussions have been shaped by events in the past century.

Doha and WTO

The Doha Round is the name of the current round of trade liberalization negotiations undertaken by WTO member countries. The objective is for all participating countries to reduce trade barriers from their present levels for trade in goods, services, and agricultural products; to promote international investment; and to protect intellectual property rights. In addition, member countries discuss improvements in procedures that outline the rights and responsibilities of the member countries. Member countries decided that a final agreement should place special emphasis on changes targeting the needs of developing countries and the world's poor and disadvantaged. As a result, the Doha Round is sometimes called the Doha Development Agenda, or DDA.

The Doha Round was begun at the WTO ministerial meeting held in Doha, Qatar, in November 2001. It is the first round of trade liberalization talks under the auspices of the WTO, which was founded in 1994 in the final General Agreement on Tariffs and Trade (GATT) round of talks, the Uruguay Round. Because missed deadlines are commonplace in the history of GATT talks, an old joke is that GATT really means the "General Agreement to Talk and Talk."

In anticipation, WTO members decided to place strict deadlines for different phases of the agreement. By adhering to the deadlines, countries were more assured that the talks would be completed on schedule in the summer of 2005—but the talks weren't. So members pushed off the deadline to 2006, and then to 2007, and then to 2008, always reporting that an agreement was near. As of 2009, the Doha Round has still not been completed, testifying to the difficulty of getting 153 member countries to conceive of a trade liberalization agreement that all countries can accept mutually.

This is an important point: WTO rounds (and the GATT rounds before them) are never finalized until every member country agrees to the terms and conditions. Each country offers a set of trade-liberalizing commitments, or promises, and in return receives the trade-liberalizing commitments made by its 152 potential trading partners. This is a much stronger requirement than majority voting, wherein coalitions can force other members into undesirable outcomes. Thus one reason this round has so far failed is because some countries believe that the others are offering too little liberalization relative to the liberalization they themselves are offering.

The DDA is especially complex, not only because 153 countries must reach a consensus, but also because there are so many trade-related issues under discussion. Countries discuss not only tariff reductions on manufactured goods but also changes in agricultural support programs, regulations affecting services trade, intellectual property rights policy and enforcement, and procedures involving trade remedy laws, to name just a few. Reaching an agreement that every country is happy about across all these issues may be more than the system can handle. We'll have to wait to see whether the Doha Round ever finishes to know if it is possible. Even then, there is some chance an agreement that is achievable may be so watered down that it doesn't result in much trade liberalization.

The primary stumbling block in the Doha Round (and the previous Uruguay Round too) has been insufficient commitments on agricultural liberalization, especially by the developed countries. Today, agriculture remains the most heavily protected industry around the world. In addition to high tariffs at the borders, most countries offer subsidies to farmers and dairy producers, all of which affects world prices and international trade. Developing countries believe that the low world prices for farm products caused by subsidies in rich countries both prevents them from realizing their comparative advantages and stymies economic development. However, convincing developed country farmers to give up long-standing handouts from their governments has been a difficult to impossible endeavor.

To their credit, developed countries have suggested that they may be willing to accept greater reductions in agricultural subsidies if developing countries would substantially reduce their very high tariff bindings on imported goods *and* bind most or all of their imported products. Developing countries have argued, however, that because this is the Doha "Development" Round, they shouldn't be asked to make many changes at all to their trade policies; rather, they argue that changes should be tilted toward greater market access from developing into developed country markets.

Of course, this is not the only impasse in the discussions, as there are many other issues on the agenda. Nevertheless, agricultural liberalization will surely remain one of the major stumbling blocks to continued trade liberalization efforts. And the Doha Round is not dead yet, since continuing discussions behind the spotlight reflect at least some sentiment around the world that further trade liberalization is a worthy goal. But this is not a sentiment shared by all, and indeed opponents almost prevented this WTO round from beginning in the first place. To understand why, we need to go back two years to the Doha Round commencement in Seattle, Washington, in December 1999.

The WTO Seattle Ministerial—1999

Every two years, the WTO members agreed to hold a ministerial meeting bringing together, at minimum, the trade ministers of the member countries to discuss WTO issues. In 1999, the ministerial was held in Seattle, Washington, in the United States, and because it was over five years since the last round of trade discussions had finished, many members thought it was time to begin a new round of trade talks. There is a well-known "bicycle theory" about international trade talks that says that forward momentum must be maintained or else, like a bicycle, liberalization efforts will stall.

And so the WTO countries decided by 1999 to begin a new "Millennial Round" of trade liberalization talks and to kick off the discussions in Seattle in December 1999. However, two things happened, the first attesting to the difficulty of getting agreement among so many countries and the second attesting to the growing opposition to the principles of free trade itself.

Shortly before the ministers met, they realized that there was not even sufficient agreement among governments about what the countries should discuss in the new round. For example, the United States was opposed to any discussion about trade remedy laws, whereas many developing countries were eager to discuss revisions. Consequently, because no agreement—even about what to talk about—could be reached, the start of the round was postponed.

The second result of the meeting was a cacophony of complaints that rose up from the thousands of protesters who gathered outside the meetings. This result was more profound if only because the resulting disturbances, including property damage and numerous arrests, brought the issues of trade and the WTO to the international stage. Suddenly, the world saw that there was substantial opposition to the principles of the WTO in promoting trade and expanded globalization.

These protests at the Seattle Ministerial were perhaps directed not solely at the WTO itself but instead at a variety of issues brought to the forefront by globalization. Some protesters were there to protest environmental degradation and were worried that current development was unsustainable, others were protesting child labor and unsafe working conditions in developing countries, and still others were concerned about the loss of domestic jobs due to international competition. In many ways, the protesters were an eclectic group consisting of students, labor union members, environmentalists, and even some anarchists.

After Seattle, groups sometimes labeled "antiglobalization groups" began organizing protests at other prominent international governmental meetings, including the biannual World Bank and International Monetary Fund (IMF) meetings, the meeting of the G8 countries, and the World Economic Forum at Davos, Switzerland. The opposition to freer trade, and globalization more generally, was on the rise. At the same time, though, national governments continued to press for more international trade and investment through other means.

Ambivalence about Globalization since the Uruguay Round

Objectively speaking, ambivalence about trade and globalization seems to best characterize the decades of the 1990s and 2000s. Although this was a time of rising protests and opposition to globalization, it was also a time in which substantial movements to freer trade occurred. What follows are some events of the last few decades highlighting this ambivalence.

First off, trade liberalization became all the rage around the world by the late 1980s. The remarkable success of outward-oriented economies such as South Korea, Taiwan, Hong Kong, and Singapore—known collectively as the East Asian Tigers—combined with the relatively poor performance of inward-oriented economies in Latin America, Africa, India, and elsewhere led to a resurgence of support for trade.

Because the Uruguay Round of the GATT was on its way to creating the WTO, many countries decided to jump on the liberalizing bandwagon by joining the negotiations to become founding members of the WTO. One hundred twenty-three countries were members of the WTO upon its inception in 1995, only to grow to 153 members by 2009.

Perhaps the most important new entrant into the WTO was China in 2001. China had wanted to be a founding member of the WTO in 1995 but was unable to overcome the accession hurdle. You see, any country that is already a WTO member has the right to demand trade liberalization concessions from newly acceding members. Since producers around the world were fearful of competition from China, most countries demanded more stringent liberalization commitments than were usually expected from other acceding countries at a similar level of economic development. As a result, it took longer for China to gain entry than for most other countries.

But at the same time that many developing countries were eager to join the WTO, beliefs in freer trade and the WTO were reversing in the United States. Perhaps the best example was the struggle for the U.S. president to secure trade-negotiating authority. First, a little history.

Article 1, section 8 of the U.S. Constitution states, "The Congress shall have the power…to regulate commerce with foreign nations." This means that decisions about trade policies must be made by the U.S. Senate and House of Representatives, and *not* by the U.S. president. Despite this, the central agency in trade negotiations today is the United States Trade Representative (USTR), an executive branch (or presidential) agency. The reason for this arrangement is that the U.S. Congress has ceded authority for these activities to the USTR. One such piece of enabling legislation is known as trade promotion authority (TPA).

TPA enables the U.S. president, or more specifically the USTR, to negotiate trade liberalization agreements with other countries. The legislation is known as *fast-track authority* because it provides for expedited procedures in the approval process by the U.S. Congress. More specifically, for any trade agreement the president presents to the Congress, Congress will vote the agreement, in its entirety, up or down in a yea or nay vote. Congress agrees not to amend or change in any way the contents of the negotiated agreement. The fast-track procedure provides added credibility to U.S. negotiators since trade agreement partners will know the U.S. Congress cannot change the details upon review.

TPA has been given to the U.S. president in various guises since the 1930s. In the post–World War II era, authority was granted to the president to negotiate successive GATT rounds. A more recent incarnation was granted to the president in the Trade Act of 1974. TPA enabled negotiations for the U.S.-Israel free trade area (FTA) in 1985 and NAFTA in 1993. However, this authority expired in 1994 under President Clinton and was never reinstated during the remainder of his presidency. The failure to extend TPA signified the growing discontent, especially in the U.S. House of Representatives, with trade liberalization.

When George W. Bush became president, he wanted to push for more trade liberalization through the expansion of FTAs with regional and strategic trade partners. He managed to gain a renewal of TPA in 2001 (with passage in the House by just one vote, 216 to 215). This enabled President Bush to negotiate and implement a series of FTAs with Chile, Singapore, Australia, Morocco, Jordan, Bahrain, Oman, Central America and the Dominican Republic, and Peru. Awaiting congressional approval (as of December 2009) are FTAs with South Korea, Colombia, and Panama.

Despite these advances toward trade liberalization, TPA expired in 2007 and has not yet been renewed by the U.S. Congress, again representing the ambivalence of U.S. policymakers to embrace freer trade. Another indication is the fact that the FTAs with South Korea, Colombia, and Panama were submitted for approval to Congress before the deadline for TPA expired in 2007 and these agreements still have not been brought forward for a vote by the U.S. Congress.

While the United States slows its advance toward freer trade, other countries around the world continue to push forward. There are new FTAs between China and the Association of Southeast Asian Nations (ASEAN) countries, Japan and the Philippines, Thailand and Chile, Pakistan and China, and Malaysia and Sri Lanka, along with several other new pairings.

Future prospects for trade liberalization versus trade protections are quite likely to depend on the length and severity of the present economic crisis. If the crisis abates soon, trade liberalization may return to its past prominence. However, if the crisis continues for several more years and if unemployment rates remain much higher than usual for an extended time, then demands for more trade protection may increase significantly. Economic crises have proved in the past to be a major contributor to high levels of protection. Indeed, as was mentioned previously, there is keen awareness today that the world may stumble into the trade policy mistakes of the Great Depression. Much of the trade liberalization that has occurred since then can be traced to the desire to reverse the effects of the Smoot-Hawley Tariff Act of 1930. Thus to better understand the current references to our past history, the story of the Great Depression is told next.

KEY TAKEAWAYS

- Recent support for trade liberalization is seen in the establishment of numerous free trade areas and the participation of many countries in the Doha Round of trade talks.
- Recent opposition to trade liberalization is seen in national responses to the financial crisis, the protest movement at the Seattle Ministerial and other venues, and the failure in the United States to grant trade promotion authority to the president.

Exercise 1.3.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. This branch of the U.S. government is given the authority to make trade policy.
   b. This theory suggests why continual negotiations are needed to assure long-term progress toward trade liberalization.
   c. This WTO ministerial meeting in 1999 began a wave of protests around the world against globalization initiatives.

d. The term used to describe the U.S. presidential authority that includes expedited approval procedures in the U.S. Congress.
e. The names of three countries with which the United States has implemented free trade areas.
f. The name of the WTO round of trade liberalization talks begun in 2001.
g. The term used to describe the economic sector in which goods and services are produced and traded, in contrast to the monetary sector.

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1.4: The Great Depression, Smoot-Hawley, and the Reciprocal Trade Agreements Act (RTAA) 1.4: The Great Depression, Smoot-Hawley, and the Reciprocal Trade Agreements Act (RTAA)Edit Update titlecancel

Learning Objectives

1. Understand the trade policy effects of the Great Depression.

Perhaps the greatest historical motivator for trade liberalization since World War II was the experience of the Great Depression. The Depression ostensibly began with the crash of the U.S. stock market in late 1929. Quite rapidly thereafter, the world economy began to shrink at an alarming pace. In 1930, the U.S. economy shrank by 8.6 percent and the unemployment rate rose to 8.9 percent. With the contraction came a chorus of calls for protection of domestic industries facing competition from imported products.

For U.S. workers, a tariff bill to substantially raise protection was already working its way through the legislature when the economic crisis hit. The objective of higher tariffs was to increase the cost of imported goods so that U.S. consumers would spend their money on U.S. products instead. By doing so, U.S. jobs could be saved in the import-competing industries. Many economists at the time disagreed with this analysis and thought the high tariffs would make things worse. In May 1930, 1,028 economists signed a petition protesting the tariff act and beseeched President Hoover to veto the bill. Despite these objections, in June of 1930 the Smoot-Hawley Tariff Act (aka the Tariff Act of 1930), which raised average tariffs to as much as 60 percent, was passed into law.

However, because higher U.S. tariffs also injured the foreign companies that were exporting into the U.S. market and because the foreign economies were also stagnating and suffering from rising unemployment, they responded to the Smoot-Hawley tariffs with higher tariffs of their own in retaliation. Within several months, numerous U.S. trade partners responded by protecting their own domestic industries with higher trade barriers. The effect was a dramatic drop in international trade flows throughout the world and quite possibly a deepening of the economic crisis.

In subsequent years, the Depression did get much worse. The U.S. economy continued to contract at double-digit rates for several more years, and the unemployment rate peaked in 1933 at 24.9 percent. When Franklin Roosevelt ran for president in 1932, he spoke against the high tariffs. By 1934, a new attitude accepting the advantages of more liberal trade took hold in the U.S. Congress, which passed the Reciprocal Trade Agreements Act (RTAA). The RTAA authorized the U.S. president to negotiate bilateral tariff reduction agreements with other countries.

In practice, the president could send his agents to another country, say Mexico, to offer tariff reductions on a collection of imported items in return for tariff reductions by Mexico on another set of items imported from the United States. Once both sides agreed to the quid pro quo, the agreements would be brought back to the United States and the Mexican governments for approval and passage into law. Over sixty bilateral deals were negotiated under the RTAA, and it set in motion a process of trade liberalization that would continue for decades to come.

The RTAA is significant for two reasons. First, it was one of the earliest times when the U.S. Congress granted trade policymaking authority directly to the president. In later years, this practice continued with congressional approval for presidential trade promotion authority (TPA; aka fast-track authority) that was used to negotiate other trade liberalization agreements. Second, the RTAA served as a model for the negotiating framework of the General Agreement on Tariffs and Trade (GATT). Under the GATT, countries would also offer “concessions,” meaning tariff reductions on imports, in return for comparable concessions from the other GATT members. The main difference is that the RTAA involved bilateral concessions, whereas the GATT was negotiated in a multilateral environment. More on the GATT next.

KEY TAKEAWAYS

- The Great Depression inspired a great wave of protectionism around the world beginning with the Smoot-Hawley Tariff Act in the United States in 1930.
- The Reciprocal Trade Agreements Act (RTAA) was the start of a wave of trade liberalization.
- The RTAA was important because it gave trade policymaking authority to the U.S. president and because it served as a model for the GATT.

Exercise 1.4.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The *common name* given to the U.S. Tariff Act of 1930.
   b. The term used to describe the U.S. presidential authority to negotiate free trade areas.
   c. The name of the 1934 U.S. legislative act that authorized the U.S. president to negotiate bilateral tariff reduction agreements.
   d. The highest U.S. unemployment rate during the Great Depression.
   e. The name of the U.S. president who signed the Tariff Act of 1930.
   f. The number of economists who signed a petition protesting the Smoot-Hawley Tariff Act.

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1.5: The General Agreement on Tariffs and Trade (GATT) 1.5: The General Agreement on Tariffs and Trade (GATT)Edit Update titlecancel

Learning Objectives

1. Learn the basic principles underpinning the GATT.
2. Identify the special provisions and allowable exceptions to the basic principles of the GATT.

The General Agreement on Tariffs and Trade (GATT) was never designed to be a stand-alone agreement. Instead, it was meant to be just one part of a much broader agreement to establish an International Trade Organization (ITO). The ITO was intended to promote trade liberalization by establishing guidelines or rules that member countries would agree to adopt. The ITO was conceived during the Bretton Woods conference attended by the main allied countries in New Hampshire in 1944 and was seen as complementary to two other organizations also conceived there: the International Monetary Fund (IMF) and the World Bank. The IMF would monitor and regulate the international fixed exchange rate system, the World Bank would assist with loans for reconstruction and development, and the ITO would regulate international trade.

The ITO never came into existence, however. Although a charter was drawn, the U.S. Congress never approved it. The main concern was that the agreement would force unwelcome domestic policy changes, especially with respect to wage and employment policies. Because the United States would not participate, other countries had little incentive to participate. Nonetheless, the United States, Britain, and other allied countries maintained a strong commitment to the reduction of tariffs on manufactured goods. Tariffs still remained high in the aftermath of the Depression-era increases. Thus, as discussions over the ITO charter proceeded, the GATT component was finalized early and signed by twenty-three countries in 1948 as a way of jump-starting the trade liberalization process.

The GATT consists of a set of promises, or commitments, that countries make to each other regarding their own trade policies. The goal of the GATT is to make trade freer (i.e., to promote trade liberalization), and thus the promises countries make must involve reductions in trade barriers. Countries that make these commitments and sign on to the agreement are called signatory countries. The discussions held before the commitments are decided are called negotiating rounds. Each round is generally given a name tied either to the location of the meetings or to a prominent figure. There were eight rounds of negotiation under the GATT: the Geneva Round (1948), the Annecy Round (1950), the Torquay Round (1951), the Geneva II Round (1956), the Dillon Round (1962), the Kennedy Round (1967), the Tokyo Round (1979), and the Uruguay Round (1994). Most importantly, the agreements are reached by consensus. A round finishes only when every negotiating country is satisfied with the promises it and all of its negotiating partners are making. The slogan sometimes used is “Nothing Is Agreed Until Everything Is Agreed.”

The promises, or commitments, countries make under the GATT take two forms. First, there are country-specific and product-specific promises. For example, a country (say, the United States) may agree to reduce the maximum tariff charged on a particular item (say, refrigerator imports) to a particular percentage (say, 10 percent). This maximum rate is called a tariff binding, or a bound tariff rate.

In each round, every participating country offers concessions, which involve a list of new tariff bindings—one for every imported product. To achieve trade liberalization, the tariff bindings must be lower than they were previously. However, it is important to note that there is no harmonization of tariff bindings. At the end of a round, signatory countries do not end up with the same tariff rates.

Instead, each country enters a round with a unique tariff set on every item. The expectation in the negotiating round is that each country will ratchet its tariffs downward, on average, from its initial levels. Thus, if Country A enters the discussions with a 10 percent tariff on refrigerator imports, while Country B has a 50 percent tariff, then a typical outcome to the round may have A lowering its tariff binding to 7 percent, while B lowers its to 35 percent—both 30 percent reductions in the tariff binding. Both countries have liberalized trade, but the GATT has not required them to adhere to the same trade policies.

Some countries, especially developing countries, maintain fairly high bound tariffs but have decided to reduce the actual tariff to a level below the bound rate. This tariff is called the applied tariff. Lowering tariffs unilaterally is allowable under the GATT, as is raising the applied rate up to the bound rate. Further discussion of this issue can be found in Chapter 1: Introductory Trade Issues-History, Institutions, and Legal Framework, Section 1.9: Appendix B- Bound versus Applied Tariffs.

There is a second form of promise that GATT countries make that is harmonized. These promises involve acceptance of certain principles of behavior with respect to international trade policies. Here, too, there are two types of promises: the first involves core principles regarding nondiscrimination and the second involves allowable exceptions to these principles.

Nondiscrimination

One of the key principles of the GATT, one that signatory countries agree to adhere to, is the nondiscriminatory treatment of traded goods. This means countries assure that their own domestic regulations will not affect one country's goods more or less favorably than another country's and will not treat their own goods more favorably than imported goods. There are two applications of nondiscrimination: most-favored nation and national treatment.

Most-Favored Nation

Most-favored nation (MFN) refers to the nondiscriminatory treatment toward identical or highly substitutable goods coming from two different countries. For example, if the United States applies a tariff of 2.6 percent on printing press imports from the European Union (EU, one World Trade Organization [WTO] country), then it must apply a 2.6 percent tariff on printing press imports from every other WTO member country. Since all the countries must be treated *identically*, MFN is a bit of a misnomer since it seems to suggest that one country is *most* favored, whereas in actuality, it means that countries are *equally* favored.

The confusion the term generates led the United States in the 1990s to adopt an alternative phrase, *normal trade relations* (NTR), for use in domestic legislation. This term is a better description of what the country is offering when a new country enters the WTO or when a non-WTO country is offered the same tariff rates as its WTO partner countries. As such, these are two ways to describe the same thing: that is, MFN ≡ NTR.

National Treatment

National treatment refers to the nondiscriminatory treatment of identical or highly substitutable domestically produced goods with foreign goods once the foreign products have cleared customs. Thus it is allowable to discriminate by applying a tariff on imported goods that would not be applied to domestic goods, but once the product has passed through customs it must be treated identically. This norm applies then to both state and local taxes, as well as regulations such as those involving health and safety standards. For example, if a state or provincial government applies a tax on cigarettes, then national treatment requires that the same tax rate be applied equally on domestic and foreign cigarettes. Similarly, national treatment would prevent a government from regulating lead-painted imported toys to be sold but not lead-painted domestic toys; if lead is to be regulated, then all toys must be treated the same.

GATT Exceptions

There are several situations in which countries are allowed to violate GATT nondiscrimination principles and previous commitments such as tariff bindings. These represent allowable exceptions that, when implemented according to the guidelines, are GATT sanctioned or GATT legal. The most important exceptions are trade remedies and free trade area allowances.

Trade Remedies

An important class of exceptions is known as trade remedies. These are laws that enable domestic industries to request increases in import tariffs that are above the bound rates and are applied in a discriminatory fashion. They are called remedies because they are intended to correct for unfair trade practices and unexpected changes in trade patterns that are damaging to those industries that compete with imports.

These remedies are in the GATT largely because these procedures were already a part of the laws of the United States and other allied countries when the GATT was first conceived. Since application of these laws would clearly violate the basic GATT principles of nondiscrimination, exceptions were written into the original agreement, and these remain today. As other countries have joined the GATT/WTO over the years, these countries have also adopted these same laws, since the agreement allows for them. As a result, this legal framework, established in the United States and other developed countries almost a century ago, has been exported to most other countries around the world and has become the basic method of altering trade policies from the commitments made in previous GATT rounds.

Today, the trade remedy laws represent the primary legal method WTO countries can use to raise their levels of protection for domestic industries. By binding countries to maximum levels of protection, the GATT and WTO agreements eliminate their national sovereignty with respect to higher trade barriers.Note that countries are always free to lower trade barriers unilaterally if

they wish without violating the agreements. The trade remedy laws offer a kind of safety valve, because in certain prescribed circumstances, countries can essentially renege on their promises.

Antidumping

Antidumping laws provide protection to domestic import-competing firms that can show that foreign imported products are being "dumped" in the domestic market. Since dumping is often considered an unfair trade practice, antidumping is known as an unfair trade law. Dumping is defined in several different ways. In general, dumping means selling a product at an unfair, or less than reasonable, price. More specifically, dumping is defined as (1) sales in a foreign market at a price less than in the home market, (2) sales in a foreign market at a price that is less than average production costs, or (3) if sales in the home market do not exist, sales in one foreign market at a price that is less than the price charged in another foreign market. The percentage by which the actual price must be raised to reach the fair or reasonable price is called the dumping margin. For example, if a firm sells its product in its home market for $12 but sells it in a foreign market for $10, then the dumping margin is 20 percent since a 20 percent increase in the $10 price will raise it to $12.

Any import-competing industry is allowed to petition its own government for protection under its antidumping law. Protection in the form of an antidumping (AD) duty (i.e., a tariff on imports) can be provided if two conditions are satisfied. First, the government must show that dumping, as defined above, is actually occurring. Second, the government must show that the import-competing firms are suffering from, or are threatened with, material injury as a result of the dumped imports. Injury might involve a reduction in revenues, a loss of profit, declining employment, or other indicators of diminished well-being. If both conditions are satisfied, then an AD duty set equal to the dumping margin can be implemented. After the Uruguay Round, countries agreed that AD duties should remain in place for no more than five years before a review (called a *sunset review*) must be conducted to determine if the dumping is likely to recur. If a recurrence of dumping is likely, the AD duties may be extended.

Normally, AD investigations determine different dumping margins, even for different firms from the same country. When AD duties are applied, these different firms will have separate tariffs applied to their products. Thus the action is highly discriminatory and would normally violate MFN treatment. The increase in the tariff would also raise it above the bound tariff rate the country reached in the latest negotiating round. However, Article 6 of the original GATT allows this exception.

Antisubsidy

Antisubsidy laws provide protection to domestic import-competing firms that can show that foreign imported products are being directly subsidized by the foreign government. Since foreign subsidies are considered an unfair trade practice, antisubsidy is considered an unfair trade law. The subsidies must be ones that are targeted at the export of a particular product. These are known as *specific subsidies*. In contrast, *generally available subsidies*, those that apply to both export firms and domestic firms equally, are not actionable under this provision. The percentage of the subsidy provided by the government is known as the subsidy margin.

Import-competing firms have two recourses in the face of a foreign government subsidy. First, they can appeal directly to the WTO using the dispute settlement procedure (described in Chapter 1: Introductory Trade Issues- History, Institutions, and Legal Framework, Section 1.7: The World Trade Organization). Second, they can petition their own government under their domestic antisubsidy laws. In either case, they must demonstrate two things: (1) that a subsidy is being provided by the foreign government and (2) that the resulting imports have caused injury to the import-competing firms. If both conditions are satisfied, then a country may implement a *countervailing duty* (CVD)—that is, a tariff on imports set equal to the subsidy margin. As with AD duties, CVDs should remain in place for no more than five years before a sunset review must be conducted to determine if the subsidies continue. If they are still in place, the CVD may be extended.

Since CVDs are generally applied against one country's firms but not another's, the action is discriminatory and would normally violate MFN treatment. The higher tariff would also raise it above the bound tariff rate the country reached in the latest negotiating round. Nonetheless, Article 6 of the original GATT allows this exception.

Safeguards

Safeguard laws (aka escape clauses) provide protection to domestic import-competing firms that can demonstrate two things: (1) that a surge of imported products has caused disruption in the market for a particular product and (2) that the surge has substantially caused, or threatens to cause, serious injury to the domestic import-competing firms. The use of the term *serious injury* means that the injury must be more severe than the injury cause in AD and antisubsidy cases. Since import surges are not generally considered to be under the control of the exporting firms or government, safeguard laws are not considered unfair trade laws.

In the event both conditions are satisfied, a country may respond by implementing either tariffs or quotas to protect its domestic industry. If tariffs are used, they are to be implemented in a nondiscriminatory fashion, meaning they are executed equally against all countries. However, if quotas are used, they may be allocated in a way that favors some trading partners more than others. Safeguard actions are also intended to be temporary, lasting no more than four years.

As with antidumping and antisubsidy cases, because a safeguard response involves higher levels of protection, it will likely conflict with the previously agreed bound tariff rates and thus violate the GATT principles. However, Article 19 of the GATT, the so-called *escape clause*, provides for an exception to the general rules in this case.

Because safeguard actions in effect take away some of the concessions a country has made to others, countries are supposed to give something back in return. An example of acceptable compensation would be the reduction of tariffs on some other items. This extra requirement, together with the need to establish serious rather than material injury, have contributed to making the use of safeguard actions less common relative to antidumping and antisubsidy actions.

China's Special Safeguards. When China was accepted as a WTO member country in 2001, it agreed to many demands made by other WTO members. One such provision requested by the United States was allowance for a "special safeguard provision." The agreement reached allowed the United States and all other WTO countries to implement additional safeguard provisions on specific products from China that might suddenly flood their markets.

One important concern at the time was the surge of textile and apparel products that might come after the expiration of the quota system in 2005 under the Uruguay Round's Agreement on Textiles and Clothing. As a stopgap, countries were allowed to reintroduce quotas or other barriers in the event that imports from China surged in once the official quotas were gone. Both the United States and the EU implemented increased protections in 2005, and China did not enjoy the full benefit of the quota elimination until this safeguard provision expired in 2008.

Additional special safeguards are in place to protect against import surges of other products from China, and these do not expire until 2014. (In the United States, these are called section 421 cases.) Although these provisions are similar to the standard safeguards, they are more lenient in defining an actionable event.

Free Trade Areas

One other common situation requires an exception to the rules of the GATT/WTO. Many countries have decided to take multiple paths toward trade liberalization. The multilateral approach describes the process of the GATT, whereby many countries simultaneously reduce their trade barriers, but not to zero. The alternative approach is referred to as regionalism, whereby two to several countries agree to reduce their tariffs and other barriers to zero—but only among themselves. This is called a regional approach since most times the free trade partners are nearby, or at the very least are significant trading partners (though this isn't always the case).

In principle, a free trade agreement means free trade will be implemented on all products traded between the countries. In practice, free trade areas often fall short. First, they are rarely implemented immediately; instead, they are put into place over a time horizon of ten, fifteen, or even twenty or more years. Thus many free trade areas (FTAs) today are really in transition to freer trade. Second, FTAs sometimes exempt some products from liberalization. This occurs because of strong political pressure by some domestic industries. If a substantial number of products are exempted, the area is known as a preferential trade arrangement, or a PTA.

Perhaps the most important free trade area implemented in the past fifty years was the European Economic Community formed by the major countries in Western Europe in 1960 that ultimately led to the formation of the European Union in 1993. The term "union" refers to the fact that the area is now a customs union that not only includes free trade in goods and services but also allows for the mobility of workers and other factors of production. In addition, some of the core European countries have taken it one step further by creating and using the euro as a common currency, thus establishing a monetary union in addition to the customs union.

In the United States, an FTA was first implemented with Israel in 1986. An FTA with Canada in 1988 and the inclusion of Mexico with Canada to form the North American Free Trade Agreement (NAFTA) followed. Since the turn of the millennium, the United States has implemented FTAs with Jordan, Bahrain, Morocco, Singapore, Chile, Australia, the Central American Free Trade Agreement—Dominican Republic (CAFTA-DR), and Peru.

An FTA violates the GATT/WTO principle of most-favored nation because MFN requires countries to offer their most liberal trade policy to all GATT/WTO members. When an FTA is formed, the most liberal policy will become a zero tariff, or free trade. However, the original GATT carved out an exception to this rule by including Article 24. Article 24 allows countries to pair up and form free trade areas as long as the FTA moves countries significantly close to free trade and as long as countries notify the

GATT/WTO of each new agreement. The simple logic is that an FTA is in the spirit of the GATT since it does involve trade liberalization.

As of 2009, over two hundred FTAs have been notified either to the GATT or the WTO. Many of these have been started in the past fifteen to twenty years, suggesting that regional approaches to trade liberalization have become more popular, especially as progress in the multilateral forum has slowed. This trend has also fueled debate about the most effective way to achieve trade liberalization. For example, is the regional approach a substitute or complement to the multilateral approach?

KEY TAKEAWAYS

- The most-favored nation (MFN) principle of the GATT requires countries to provide nondiscriminatory treatment between identical or highly substitutable goods coming from two different countries.
- The national treatment principle of the GATT requires countries to provide nondiscriminatory treatment between identical or highly substitutable goods produced domestically and those imported from another country.
- Trade remedy laws such as antidumping, antisubsidy, and safeguards provide GATT-allowable exceptions to previous commitments and the fundamental principles.
- Although bilateral or regional free trade areas violate MFN, they are allowed by GATT because they are consistent with the goal of trade liberalization.

Exercise 1.5.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The name for a tariff used to offset the effects of a foreign government export subsidy in an antisubsidy action.
   b. The international agreement established in 1948 designed to foster trade liberalization.
   c. The term used to describe sales made by a foreign firm at a price determined to be less than reasonable value.
   d. The WTO principle to provide the same treatment to imports from two separate WTO countries.
   e. The WTO principle to treat an imported product in the same way as a domestically produced product.
   f. The U.S. term used as a synonym for *most favored nation*.
   g. The term used to describe laws that enable domestic industries to request increases in import tariffs that would otherwise violate WTO commitments.
   h. The term used to describe a five-year review of a previous antidumping action.
   i. The name for a WTO-sanctioned trade law that protects an industry from a surge of imports.
   j. GATT Article 24 provides an exception for free trade areas because they violate this GATT principle.
2. What is an antidumping duty? How is its size determined?
   a. What must U.S. government agencies determine before applying antidumping duties against foreign firms?
   b. How does U.S. trade law define dumping?
3. What is a countervailing duty? How is its size determined?
   a. What must U.S. government agencies determine before applying a countervailing duty against foreign firms?

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1.6: The Uruguay Round 1.6: The Uruguay RoundEdit Update titlecancel

Learning Objectives

1. Learn how the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) greatly expanded the coverage of trade liberalization efforts to previously uncovered sectors.

The Uruguay Round was the last of eight completed rounds of the GATT. Discussion for the round began in Montevideo, Uruguay, in 1986, and it was hoped that the round would be completed by 1990. However, impasses were frequent, and the round was not finalized until 1994. One reason for the delay is that this round incorporated many new issues in the negotiations.

In earlier rounds, the primary focus was always a continuing reduction in the bound tariff rates charged on imported manufactured goods. As a result of seven completed GATT rounds, by the mid-1980s tariffs in the main developed countries were as low as 5 percent to 10 percent and there was less and less room for further liberalization. At the same time, there were a series of trade issues that sidestepped the GATT trade liberalization efforts over the years. In those areas—like agriculture, textiles and apparel, services, and intellectual property—trade barriers of one sort or another persisted. Thus the ambitious objective of the Uruguay Round was to bring those issues to the table and try to forge a more comprehensive trade liberalization agreement. The goals were reached by establishing a series of supplementary agreements on top of the traditional tariff reduction commitments of the GATT. A few of these agreements are highlighted next.

The Agreement on Agriculture (AoA)

Protections and support for agricultural industries began wholeheartedly during the Great Depression in the 1930s. Not only were tariffs raised along with most other import products, but a series of price and income support programs were implemented in many countries. When the first GATT agreement was negotiated, special exceptions for agriculture were included, including an allowance to use export subsidies. Recall that export subsidies are subject to retaliation under the antisubsidy code but that requirement was negated for agricultural products. This enabled countries to keep prices for farm products high in the domestic market and, when those prices generated a surplus of food, to dump that surplus on international markets by using export subsidies.

The result of this set of rules implemented worldwide was a severe distortion in agricultural markets and numerous problems, especially for developing countries, whose producers would regularly be forced to compete with low-priced subsidized food for the developed world.

The intention at the start of the Uruguay Round was a major reduction in tariffs and quotas and also in domestic support programs. Indeed, in the United States, the Reagan administration initially proposed a complete elimination of all trade-distorting subsidies to be phased in over a ten-year period. What ultimately was achieved was much more modest. The Uruguay Round agreement missed its deadlines several times because of the reluctance of some countries, especially the European Community (EC), to make many concessions to reduce agricultural subsidies.

Countries did agree to one thing: to make a transition away from quota restrictions on agricultural commodity imports toward tariffs instead—a process called **tariffication**. The logic is that tariffs are more transparent and would be easier to negotiate downward in future World Trade Organization (WTO) rounds. A second concession countries made was to accept at least low levels of market access for important commodities. For many countries, important food products had prohibitive quotas in place. A prime example was the complete restriction on rice imports to Japan. The mechanism used to guarantee these minimum levels was to implement tariff-rate quotas. A **tariff-rate quota** sets a low tariff on a fixed quantity of imports and a high tariff on any imports over that quota. By setting the quota appropriately and setting a relatively low tariff on that amount, a country can easily meet its target minimum import levels.

The General Agreement on Trade in Services (GATS)

Trade in services has become an increasingly important share of international trade. Trade in transportation, insurance, banking, health, and other services now accounts for over 20 percent of world trade. However, trade in services is not restricted by tariffs, largely because services are not shipped in a container on a ship, truck, or train. Instead, they are transmitted in four distinct ways. First, they are transmitted by mail, phone, fax, or the Internet; this is called *cross-border supply* of services, or Mode 1. Second, services are delivered when foreign residents travel to a host country; this is called *consumption abroad*, or Mode 2. Third, services trade occurs when a foreign company establishes a subsidiary abroad; this is called *commercial presence*, or Mode 3. Finally,

services are delivered when foreign residents travel abroad to supply them; this is called *presence of natural persons*, or Mode 4. Because of the transparent nature of services, economists often refer to services as "invisibles trade."

Because services are delivered invisibly, services trade is affected not by tariffs but rather by domestic regulations. For example, the United States has a law in place called the Jones Act, which prohibits products being transported between two U.S. ports on a foreign ship. Consider this circumstance: a foreign ship arrives at one U.S. port and unloads half its cargo. It then proceeds to a second U.S. port where it unloads the remainder. During the trip between ports 1 and 2, the ship is half empty and the shipping company may be quite eager to sell cargo transport services to U.S. firms. After all, since the ship is going to port 2 anyway, the marginal cost of additional cargo is almost zero. This would be an example of Mode 1 services trade, except for the fact that the Jones Act prohibits this activity even though these services could be beneficial to both U.S. firms and to the foreign shipping company.

The Jones Act is only one of innumerable domestic regulations in the United States that restrict foreign supply of services. Other countries maintain numerous regulations of their own, restricting access to U.S. and other service suppliers as well. When the original GATT was negotiated in the 1940s, services trade was relatively unimportant, and thus at the time there was no discussion of services regulations affecting trade. By the time of the Uruguay Round, however, services trade was increasingly important, and yet there were no provisions to discuss regulatory changes that could liberalize services trade. The Uruguay Round changed that.

As a result of Uruguay Round negotiations, GATT member countries introduced the General Agreement on Trade in Services, or GATS. The GATS includes a set of specific commitments countries have made to each other with respect to market access, market access limitations, and exceptions to national treatment in specified services. For example, a country may commit to allowing foreign insurance companies to operate without restrictions. Alternatively, a country may specify limitations perhaps restricting foreign insurance company licenses to a fixed number. A country can also specify a national treatment exception if, say, domestic banks are to be granted certain privileges that foreign banks are not allowed.

Most importantly, if exceptions have not been specified, countries have agreed to maintain most-favored nation (MFN) and national treatment with respect to services provision. This is an important step in the direction of trade liberalization largely because a previously uncovered area of trade that is rapidly growing is now a part of the trade liberalization effort.

The Agreement on Textiles and Clothing (ATC)

During the 1950s, 1960s, and 1970s, as tariffs were being negotiated downward, another type of trade restriction was being used in the textile and apparel industry: voluntary export restraints. A voluntary export restraint (VER) is a restriction set by a government on the quantity of goods that can be exported out of a country during a specified period of time. Often the word "voluntary" is placed in quotes because these restraints were often implemented upon the insistence of the importing nations.

For example, in the mid 1950s, U.S. cotton textile producers faced increases in Japanese exports of cotton textiles that negatively affected their profitability. The U.S. government subsequently negotiated a VER on cotton textiles with Japan. Afterward, textiles began to flood the U.S. market from other sources like Taiwan and South Korea. A similar wave of imports affected the nations in Europe.

The United States and Europe responded by negotiating VERs on cotton textiles with those countries. By the early 1960s, other textile producers, who were producing clothing using the new synthetic fibers like polyester, began to experience the same problem with Japanese exports that cotton producers faced a few years earlier. So VERs were negotiated on exports of synthetic fibers, first from Japan and eventually from many other Southeast Asian nations. These bilateral VERs continued until eventually exporters and importers of textile products around the world held a multilateral negotiation resulting in the Multi-Fiber Agreement (MFA) in 1974. The MFA specified quotas on exports from all major exporting countries to all major importing countries. Essentially, it represented a complex arrangement of multilateral VERs.

The MFA was renewed periodically throughout the 1970s, 1980s, and 1990s, and it represented a significant setback in the pursuit of trade liberalization. Thus, as a part of the Uruguay Round discussions, countries agreed to a significant overhaul of the MFA. First, the agreement was brought under the control of the WTO and renamed the Agreement on Textiles and Clothing (ATC). Second, countries decided to phase out the quotas completely over a ten-year transition period ending on January 1, 2005.

That transition to a quota-less industry did occur as scheduled; however, it is worth noting that many countries continue to maintain higher-than-average tariffs on textile and apparel products. Therefore, one still cannot say that free trade has been achieved.

Trade-Related Aspects of Intellectual Property Rights (TRIPS)

One major expansion of coverage of a trade liberalization agreement was the inclusion of intellectual property rights (IPR) into the discussion during the Uruguay Round. IPR covers the protections of written materials (copyrights), inventions (patents), and brand names and logos (trademarks). Most countries have established monopoly provisions for these types of creations in order to spur the creation of new writing and inventions and to protect the investments made in the establishment of trademarks. However, many of these protections have been unequally enforced around the world, resulting in a substantial amount of counterfeiting and pirating. The world is abound in fake CDs and DVDs, Gucci and Coach purses, and of course the international favorite, Rolex watches.

To harmonize the IPR protections around the world and to encourage enforcement of these provisions, countries created an IPR agreement called the Trade-Related Aspects of Intellectual Property Rights Agreement, or TRIPS. The TRIPS intends to both encourage trade and protect writers, inventors, and companies from the theft of their hard work and investments.

Other Agreements

What is listed and discussed above are just a few of the agreements negotiated during the Uruguay Round. In addition, any round of trade discussions provides an excellent forum for consideration of many other issues that are of particular interest to specific industries. Some of the others include the Agreement on Sanitary and Phytosanitary Measures, which provides guidelines for countries on food safety and plant and animal trade; an agreement on antidumping; the Agreement on Subsidies and Countervailing Measures; the Agreement on Trade-Related Investment Measures (TRIMS); the Agreement on Import-Licensing Procedures; the Agreement on Customs Valuation; the Preshipment Inspection Agreement; the Rules of Origin Agreement; and finally, several plurilateral agreements (meaning they don't cover everybody) concerning civilian aircraft, government procurement, and dairy products.

KEY TAKEAWAYS

- The Uruguay Round of the GATT resulted in numerous new trade-liberalizing agreements among member countries, including the General Agreement on Trade in Services (GATS), the Agreement on Agriculture, the Agreement on Textiles and Clothing (ATC), and the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), among others.
- The GATS involved commitments to reduce regulations restricting international trade in services.
- The ATC involved commitments to eliminate the quota system established in the 1970s on textile and apparel products.
- The Agreement on Agriculture involved some modest commitments to reduce support for the agricultural industry.
- The TRIPS agreement involved commitments to standardize the treatment and enforcement of intellectual property rights.

Exercise 1.6.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The name of the U.S. legislation that prohibits foreign ships from transporting cargo between two U.S. ports.
   b. The name used to describe services trade, such as language translations, provided by a foreign firm via the Internet.
   c. The name used to describe services trade, such as banking, provided by a branch office located in the foreign country.
   d. The name used to describe services trade, such as a hotel stay, provided to a foreigner traveling to the domestic country.
   e. The name used to describe services trade, such as labor expertise, provided by foreign workers working in the domestic country.
   f. The name of the Uruguay Round agreement liberalizing trade in services.
   g. The name of the Uruguay Round agreement that superseded the Multi-Fiber Agreement (MFA).
   h. The term used to describe the process of replacing import quotas with tariffs.
   i. The name for a trade policy that sets a low tariff on a fixed quantity of imports and a high tariff on any imports over that quota.
   j. The name of the Uruguay Round agreement on intellectual property rights.
   k. The name of the Uruguay Round agreement on agriculture.

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1.7: The World Trade Organization 1.7: The World Trade OrganizationEdit Update titlecancel

Learning Objectives

1. Learn the basic intent of the World Trade Organization and its primary activities.

In order to monitor and sustain the complete set of Uruguay Round agreements, the member countries established a new body called the World Trade Organization (WTO). The WTO is a relatively small organization based in Geneva, Switzerland. It has a director-general, currently Pascal Lamy (as of January 2010), and a small staff of economists, lawyers, and others. The goal of the WTO is the same goal as its predecessor, the General Agreement on Tariffs and Trade (GATT): namely, to promote trade liberalization and thereby to foster growth and economic development.

Sometimes the WTO is described as an international organization governing international trade. However, this description can be misleading. The WTO does not make trade rules. The only makers of rules are national governments. In this sense, then, the WTO does not govern anybody. A better way to think of the WTO is as a club of member nations. The club's purpose is to monitor each member country's trade policies with respect to the trade agreements that were made in the Uruguay Round. The WTO agreements include thousands of promises for every country, all intending to reduce barriers to trade relative to what the barriers were before the Uruguay Round. The WTO does not represent free trade. At best, the agreements can be described as freer trade.

Besides monitoring each member country's trade policies, which the WTO fulfills by conducting periodic trade policy reviews of the member countries, the WTO club was also created to deal with disputes. This is surely the most important "power" of the WTO.

The Dispute Settlement Process

Disputes are handled by the Dispute Settlement Body (DSB). The DSB works like a committee that meets regularly to discuss any issues countries may have with respect to each other's trade policies. The DSB is comprised of one representative from each member country. When they meet, countries have the right to object to the trade policies of another country. However, they cannot object to anything or everything; instead, a country can only object to an unfulfilled promise with respect to one or more of the WTO agreements.

When the Uruguay Round was finalized, each member country went back to its own legislature and changed its trade policies and rules to conform to its new commitments. Sometimes inadvertently and sometimes purposely, some countries do not implement their commitments fully. Or sometimes a country believes that it has fulfilled its commitment, but its trading partner believes otherwise. Or new legislation may violate one of the country's previous commitments. In these cases, a member country (the complainant) is allowed to register a dispute with the DSB against another member country (the defendant). Resolution of a dispute follows these steps:

1. *Consultations*. The DSB first demands that the appropriate government representatives from the complainant country and the defendant country meet to discuss the dispute. They must do this within a strict timetable (less than sixty days) and hopefully will be able to resolve the dispute without external intervention.
2. *Panel formation*. If the countries return to the DSB at a later session and report that the consultations failed, then the complainant may ask the DSB to form a panel. A panel consists of three to five independent trade law experts who are hired expressly to make a judgment about the particular dispute. The DSB chooses the panelists in consultation with the disputing countries, or the panelists are chosen by the director-general if the countries cannot agree. The panel is generally given about six months to decide whether the defendant violated some of its promises, whereupon it reports its decision to the DSB. Since a panel report can only be rejected by consensus, no country has veto power over DSB adoption of a report. Thus all panel reports become official decisions. But the process doesn't yet end.
3. *Appeals*. Either country can appeal the decision given in the panel report. A request or appeal sends the issue to an appellate board comprised of three judges drawn from a set of seven, each of whom has a four-year term. As in the U.S. court system, appellate arguments must be based on points of law relating to legal interpretations but cannot consider new evidence or retry the case. As with the original panel reports, appellate decisions are almost automatically adopted by the DSB.
4. *Resolution*. If the appellate board concurs with a panel decision that a defendant country has violated some of its WTO agreement commitments, there are two paths to resolution:

a. *Compliance*. In the preferred outcome, the defendant country complies with the ruling against it and changes its laws as needed to conform. Sometimes compliance may take time because of delays in a legislative process, so normally the defendant will be given time to rectify the situation. In the process, the country will be expected to report its progress regularly to the DSB.
b. *Suspension of concessions*. Sometimes a country refuses to comply with a ruling or it takes longer than the complainant is willing to wait. In this case, the complainant country is allowed by the DSB to suspend some of its previous concessions toward the defendant country. It works like this: Since it has been shown that the defendant has *not* lived up to all of its previous promises, the complainant is now allowed to rescind some of its own trade-liberalizing promises, but only toward the defendant country. To be fair, the rescission must have an effect on the defendant that is approximately equal in value to the cost imposed by the defendant's violations.

Dispute Settlement History

Since the WTO began in 1995 there have been over four hundred disputes brought to the DSB. A complete listing can be found at the WTO Web site here (http://www.wto.org/english/tratop_e/dispu_e/dispu_status_e.htm). A large number countries have been complainants and defendants although the two countries most often on one side or the other are the United States and the EU. Some of the most well-known disputes have involved bananas, steel, hormone-treated beef, and commercial aircraft. Lesser-known cases have involved narrow product groups such as Circular Welded Carbon Quality Line Pipe, Canned Tuna with Soybean Oil, Combed Cotton Yarn, and Retreaded Tires.

Many cases have been raised once, sent to consultations, and then never raised again. In some cases, consultations are sufficient to settle the dispute. Many other cases proceed to panel formation, appeals, and resolution. In many cases, defendants lose and eventually change their laws to comply with the WTO decision. In other cases, defendants lose and because of their refusal to comply, or their procrastination in complying, complainants suspend concessions. In a few cases, countries have refused to comply and faced no consequences. Occasionally, a defendant wins its case against a complainant.

Overall, the WTO dispute process has worked reasonably well. The cases brought, because they are often targeted to narrow industries, do not affect a huge amount of international trade. Nonetheless the existence of a forum in which to register disputes and a mechanism for resolving them (one that includes some penalties for violations) has had a notable effect of reducing the risk of international trade.

Traders know better what to expect from their trading partners because their partners have committed themselves to particular trade policies and to a resolution mechanism in the event of noncompliance. In a sense, then, it is true that the WTO agreements restrict the freedom of a country to set whatever trade policy it deems appropriate for the moment. That loss of sovereignty, though, is designed to prevent countries from choosing more destructive protectionist policies—policies that are very seductive to voters, especially in an economic crisis. If successful, the WTO could prevent a reoccurrence of Smoot-Hawley and its aftermath both now and in the future.

KEY TAKEAWAYS

- The WTO's main purpose is to monitor the trade liberalization agreements reached by GATT member countries in the Uruguay Round.
- The most important "power" of the WTO is its ability to adjudicate disputes between member countries regarding compliance with the Agreements.
- Dispute resolution is conducted by the Dispute Settlement Body (DSB), which includes one representative from each WTO government.
- The four main steps to a WTO dispute case are (1) consultations, (2) panel formation, (3) appeals, and (4) resolution.

Exercise 1.7.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The name of the GATT round that created the WTO in 1995.
   b. The name of the current director general of the WTO.
   c. The term used to describe the process of rescinding one's trade liberalization promises at the end of a WTO dispute.
   d. The name of the WTO body that handles disagreements related to WTO commitments.

e. Countries must engage in these immediately after a dispute is raised at the WTO.
f. This official chooses dispute panel members if the complainant and defendant countries cannot agree.
g. The length of time served by a WTO appellate judge.
h. What a country is expected to do after losing a WTO dispute case.
i. The city in which WTO headquarters are located.
j. The approximate number of dispute cases filed at the WTO since its inception in 1995.

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1.8: Appendix A- Selected U.S. Tariffs - 2009 1.8: Appendix A- Selected U.S. Tariffs - 2009Edit Update titlecancel

Table 1.8.1 contains a selection of the U.S. tariff rates specified in the 2009 U.S. Harmonized Tariff Schedule (HTS). The complete U.S. HTS is available at the U.S. International Trade Commission Web site (http://www.usitc.gov).

Table 1.8.1: Special Tariff Classifications in the United States

Symbol	Description
A, A∗, A+	Generalized System of Preferences (GSP)
AU	U.S.-Australia free trade area (FTA)
B	Automotive Products Trade Act
BH	U.S.-Bahrain FTA
C	Agreement on Civil Aircraft
CA, MX	North American Free Trade Agreement (NAFTA): Canada and Mexico
CL	U.S.-Chile FTA
D	African Growth and Opportunity Act (AGOA)
E	Caribbean Basin Economic Recovery Act
IL	U.S.-Israel FTA
J, J∗, J+	Andean Trade Preference Act
JO	U.S.-Jordan FTA
K	Agreement on Pharmaceuticals
P, P+	CAFTA-DR FTA
PE	U.S.-Peru FTA
MA	U.S.-Morocco FTA
OM	U.S.-Oman FTA
R	U.S.-Caribbean Trade Partnership Act
SG	U.S.-Singapore FTA

The tariff schedule in Table 1.8.2 displays four columns. The first column gives a brief description of the product. The second column shows the product classification number. The first two numbers refer to the chapter, the most general product specification. For example, 08 refers to chapter 8, “Edible fruit and nuts; peel of citrus fruit or melons.” The product classification becomes more specific for each digit to the right. Thus 0805 refers more specifically to “Citrus fruit, fresh or dried.” The code 0805 40 refers to “Grapefruit,” and 0805 40 40 refers to “Grapefruit entering between August 1 and September 30.” This classification system is harmonized among about two hundred countries up to the first six digits and is overseen by the World Customs Organization.

The third column displays the “General Rate of Duty” for that particular product. This is the tariff that the United States applies to all countries with most-favored nation (MFN) status, or as it is now referred to in the United States, “normal trade relations” (NTR). The status was renamed NTR to provide a more accurate description of the term. One provision in the U.S. GATT/WTO agreements is that the United States promises to provide every WTO member country with MFN status. As a matter of policy, the United States also typically grants most non-WTO countries the same status. For example, as of 2009, Russia was not a member of the WTO, but the United States applied its NTR tariff rates to Russian imports.

The final column lists special rates of duty that apply to select countries under special circumstances. For each product, you will see a tariff rate followed by a list of symbols in parentheses. The symbols indicate the trade act or free trade agreement that provides special tariff treatment to those countries. A complete list of these is shown in Table 1.8.1. Symbols that include a "+" or "∗" generally refer to special exceptions that apply for some countries with that product.

In the standard U.S. tariff schedule, there is one additional column labeled "2." This is the U.S. non-MFN tariff, meaning essentially the nonspecial tariffs. Many of these tariff rates, especially for product categories that have been around for a long time, are holdovers from the Smoot-Hawley tariffs set in the Tariff Act of 1930. They are significantly higher than the standard MFN tariffs in column 1 but apply to only two countries: Cuba and North Korea.

Table 1.8.2: Selected Tariffs in the United States, 2009

Description	HTS Code	MFN/NTR Tariff	Special Tariff
Cauliflower, broccoli	0704.10.20	2.5% (June 5–Oct. 25)	Free (A,AU,BH,CA,CL,E,IL,J,JO,MA,MX,OM,P,PE,SG)
	0704.10.40	10% (Other, not reduced in size)	Free (A,AU,BH,CA,CL,E,IL,J,JO,MA,MX,OM,P,PE,SG)
	0704.10.60	14% (Cut or sliced)	Free (A,BH,CA,CL,E,IL,J,JO,MA,MX,OM,P,PE) 7% (AU) 3.5% (SG)
Grapefruit, incl. pomelos	0805.40.40	1.9¢/kg (Aug.–Sept.)	Free (AU,BH,CA,D,E,IL,J,JO,MA,MX,OM,P,PE,SG)
	0805.40.60	1.5¢/kg (Oct.)	Free (CA, CL, D, E,IL,J,JO,MX,P,PE, SG) 1¢/kg (AU) 0.9¢/kg (BH) 1.1¢/kg (MA) 1.2¢/kg (OM)
	0805.40.80	2.5¢/kg (Nov.–July)	Free (CA, D, E, IL, J, JO, MX, P, PE) 1.8¢/kg (AU,MA) 1.5¢/kg (BH) 1¢/kg (CL,SG) 2.2¢/kg (OM)
Grapes, fresh	0806.10.20	$1.13/m^3 (Feb. 15–Mar. 31)	Free (A+,AU,BH,CA,CL,D,E,IL,J,JO,MA,MX,OM,P,PE,SG)
	0806.10.40	Free (Apr. 1–June 30)	
	0806.10.60	$1.80/m^3 (any other time)	Free (A+,AU,BH,CA,CL,D,E,IL,J,JO,MA,MX,OM,P,PE,SG)

Description	HTS Code	MFN/NTR Tariff	Special Tariff
Ceramic tableware; cups valued over $5.25 per dozen; saucers valued over $3 per dozen; soups, oatmeals, and cereals valued over $6 per dozen; plates not over 22.9 cm in maximum diameter and valued over $6 per dozen; plates over 22.9 but not over 27.9 cm in maximum diameter and valued over $8.50 per dozen; platters or chop dishes valued over $35 per dozen; sugars valued over $21 per dozen; creamers valued over $15 per dozen; and beverage servers valued over $42 per dozen	6912.00.45	4.5%	Free (A+,AU,CA,CL,D,E,IL,J,JO,MX,P,PE,SG) 2.7% (BH) 2.4% (MA) 4% (OM)
Motor cars principally designed for the transport of persons, of all cylinder capacities	8703.2x.00	2.5%	Free (A+,AU,B,BH,CA,CL,D,E,IL,J,JO,MA,MX,OM,P,PE,SG)
Motor vehicles for the transport of goods (i.e., trucks), gross vehicle weight exceeding 5 metric tons but less than 20 metric tons	8704.22.50	25%	Free (A+,AU,B,BH,CA,CL,D,E,IL,J,MA,MX,OM,P,PE) 2.5% (JO) 10% (SG)
Bicycles having both wheels not exceeding 63.5 cm in diameter	8712.00.15	11%	Free (A+,AU,BH,CA,CL,D,E,IL,J,JO,MA,MX,OM,P,PE) 1.3% (SG)
Cane sugar	1701.11.05	1.4606¢/kg less 0.020668¢/kg for each degree under 100 degrees but not less than 0.943854¢/kg	Free (A∗,AU,BH,CA,CL,E∗,IL,J,JO,MA,MX,OM,P,PE,SG)
Sports footwear: tennis shoes, basketball shoes, gym shoes, training shoes and the like: having uppers of which over 50% of the external surface area is leather	6404.11.20	10.5%	Free (AU,BH,CA,CL,D,E,IL,J+,JO,MA,MX,OM,P,PE,R) 1.3% (SG)
Golf clubs	9506.31.00	4.4%	Free (A,AU,BH,CA,CL,E,IL,J,JO,MA,MX,OM,P,PE,SG)
Wristwatches	9101.11.40	51¢ each + 6.25% on case and strap + 5.3% on battery	Free (AU,BH,CA,CL,D,E,IL,J,J+,JO,MA,MX,OM,P,PE,R,SG)
Fax Machines	8517.21.00	Free	

Description	HTS Code	MFN/NTR Tariff	Special Tariff
Coffee, caffeinated	0901.21.00	Free	
Tea, green tea, flavored	0902.10.10	6.4%	Free (A,AU,BH,CA,CL,E,IL,J,JO,MA,MX,OM,P,PE,SG)

The products presented in Table 1.8.2 were selected to demonstrate several noteworthy features of U.S. trade policy. The WTO reports in the 2006 U.S. trade policy review that most goods enter the United States either duty free or with very low tariffs. Coffee and fax machines are two goods, shown above, representative of the many goods that enter duty free. The average MFN tariff in the United States in 2002 was about 5 percent, although for agricultural goods the rate was almost twice as high. About 7 percent of U.S. tariffs exceed 15 percent; these are mostly sensitive products such as peanuts, dairy, footwear, textiles, and clothing. The trade-weighted average tariff in the United States was only about 1.5 percent in 2003.

One interesting feature of the tariff schedule is the degree of specificity of the products in the HTS schedule. Besides product type, categories are divided according to weight, size, or the time of year. Note especially the description of ceramic tableware and bicycles.

Tariffs vary according to time of entry, as with cauliflower, grapefruit, and grapes. This reflects the harvest season for those products in the United States. When the tariff is low, that product is out of season in the United States. Higher tariffs are in place when U.S. output in the product rises.

Notice the tariffs on cauliflower and broccoli. They are lower if the vegetables are unprocessed. If the product is cut or sliced before arriving in the United States, the tariff rises to 14 percent. This reflects a case of tariff escalation. Tariff escalation means charging a higher tariff the greater the degree of processing for a product. This is a common practice among many developed countries and serves to protect domestic processing industries. Developing countries complain that these practices impede their development by preventing them from competing in more advanced industries. Consequently, tariff escalation is a common topic of discussion during trade liberalization talks.

Tariff rates also vary with different components of the same product, as with watches. Note also that watches have both specific tariffs and ad valorem tariffs applied.

Notice that the tariff on cars in the United States is 2.5 percent, but the tariff on truck imports is ten times that rate at 25 percent. The truck tariff dates back to 1963 and is sometimes referred to as the “chicken tax.” It was implemented primarily to affect Volkswagen in retaliation for West Germany’s high tariff on chicken imports from the United States. Today, Canada and Mexico are exempt from the tariff due to NAFTA, and Australia will also be exempt with the new U.S.-Australia FTA. The truck tax is set to be a contentious issue in current U.S.-Thailand FTA discussions.

The tariff rates themselves are typically set to several significant digits. One has to wonder why the United States charges 4.4 percent on golf clubs rather than an even 4 percent or 5 percent. Much worse is the tariff rate on cane sugar with six significant digits.

The special tariff rates are often labeled “free,” meaning these goods enter duty-free from that group of countries. Note that Chile and Singapore sometimes have tariff rates in between the MFN rate and zero. This reflects the FTA’s phase in the process. Most FTAs include a five- to fifteen-year phase-in period during which time tariffs are reduced annually toward zero.

One thing to think about while reviewing this tariff schedule is the administrative cost of monitoring and taxing imported goods. Not only does the customs service incur costs to properly categorize and measure goods entering the country, but foreign firms themselves must be attuned to the intricacies of the tariff schedule of all the countries to which they export. All of this requires the attention and time of employees of the firms and represents a cost of doing business. These administrative costs are rarely included in the evaluation of trade policies.

An administratively cheaper alternative would be to charge a fixed ad valorem tariff on all goods that enter, much like a local sales tax. However, for political reasons, it would be almost impossible to switch to this much simpler alternative.

Exercise 1.8.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?” [Note: the following exercises are meant to provide practice in reading and interpreting the U.S. tariff schedule.]
   a. The 2009 MFN tariff rate on imported broccoli that has been processed by cutting or slicing before shipping.
   b. The allowable diameter range for ceramic plates valued over $8.50 under HTS code 6912.00.45.
   c. The 2009 U.S. tariff on truck imports from Singapore.
   d. The 2009 MFN tariff on cauliflower that entered the U.S. in November.
   e. The 2009 U.S. tariff on golf clubs from Israel.

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1.9: Appendix B- Bound versus Applied Tariffs 1.9: Appendix B- Bound versus Applied TariffsEdit Update titlecancel

The WTO agreement includes commitments by countries to bind their tariff rates at an agreed-upon maximum rate for each import product category. The maximum tariff in a product category is called the *bound tariff rate*. The bound tariff rates differ across products and across countries: some countries agree to higher maximums; others agree to lower maximums. In general, less-developed countries have higher bound tariff rates than developed countries, reflecting their perception that they need greater protection from competition against the more highly developed industries in the developed markets.

However, some countries, especially those with higher bound tariffs, decide to set their actual tariffs at lower levels than their bound rates. The actual tariff rate is called the *applied tariff rate*. Table 1.9.1 lists the average applied tariff rates compared to average bound tariffs for a selected set of WTO member countries.The averages are calculated as a simple average: namely, the ad valorem tariff rates (bound or applied) are added together and divided by the total number of tariff categories. These are not trade-weighted average tariffs. Also, when specific tariffs are assessed for a product, they are excluded from the calculations. (Note that specific tariffs are set as a dollar charge per unit of imports.) Also listed is the percentage of six-digit tariff lines that have a tariff binding. For products that have no tariff binding, the country is free to set whatever tariff it wishes. The countries are ordered from the highest to the lowest gross domestic product (GDP) per person.

Table 1.9.1: Bound versus Applied Average Tariffs

Country	Applied Rate (%)	Bound Rate (%)	% Bound
United States	3.6	3.6	100.0
Canada	3.6	5.1	99.7
EC	4.3	4.1	100.0
Japan	3.1	2.9	99.6
South Korea	11.3	16.0	94.7
Mexico	12.5	34.9	100.0
Chile	6.0 (uniform)	25.1	100.0
Argentina	11.2	32.0	100.0
Brazil	13.6	31.4	100.0
Thailand	9.1	25.7	74.7
China	9.95	10.0	100.0
Egypt	17.0	36.8	99.3
Philippines	6.3	25.6	66.8
India	15.0	49.7	73.8
Kenya	12.7	95.7	14.6
Ghana	13.1	92.5	14.3

Table 1.9.1 reveals the following things worth noting:

1. More-developed countries tend to apply lower average tariffs than less-developed countries (LDCs).
2. Average bound tariff rates are higher for less-developed countries. This means that the WTO agreement has not forced LDCs to open their economies to the same degree as developed countries.
3. The less developed a country, the fewer tariff categories that are bound. For the most developed economies, 100 percent of the tariff lines are bound, but for Ghana and Kenya, only 14 percent are bound. This also means that the WTO agreement has not forced LDCs to open their economies to the same degree as developed countries.

4. For LDCs, applied tariffs are set much lower on average than the bound rates. These countries have the flexibility to raise their tariffs without violating their WTO commitments.
5. China has lower tariffs and greater bindings than countries of similar wealth.
6. Since the most developed economies have applied rates equal to bound rates, they cannot raise tariffs without violating their WTO commitments. WTO-sanctioned trade remedy actions can be used instead, however.

? Exercise 1.9.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The term for the maximum tariff rate a country agrees to assess on imports from other WTO member countries.
   b. The term for the actual tariff rate a country assesses on imports from other WTO member countries.
   c. Between *developed* or *less developed countries*, these tend to have much higher bound tariff rates.
   d. The percentage of tariff lines on which the Philippines has agreed to set maximum tariffs in the WTO.
   e. The average WTO-bound tariff rate in Ghana.
   f. One country that has agreed to much lower bound tariffs than other countries of comparable income and wealth in the WTO.

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CHAPTER OVERVIEW

2: The Ricardian Theory of Comparative Advantage

This chapter presents the first formal model of international trade: the Ricardian model. It is one of the simplest models, and still, by introducing the principle of comparative advantage, it offers some of the most compelling reasons supporting international trade. Readers will learn some of the surprising outcomes of the Ricardian model; for example, less productive nations can benefit from free trade with their more productive neighbors, and very low-wage countries are unlikely to be able to use their production cost advantage in many circumstances. Readers will also learn why so many people, even those who have studied the Ricardian theory, consistently get the results wrong.

In other words, the Ricardian model is both one of the most misunderstood and one of the most compelling models of international trade.

2.1: The Reasons for Trade
2.2: The Theory of Comparative Advantage- Overview
2.3: Ricardian Model Assumptions
2.4: The Ricardian Model Production Possibility Frontier
2.5: Definitions- Absolute and Comparative Advantage
2.6: A Ricardian Numerical Example
2.7: Relationship between Prices and Wages
2.8: Deriving the Autarky Terms of Trade
2.9: The Motivation for International Trade and Specialization
2.10: Welfare Effects of Free Trade- Real Wage Effects
2.11: The Welfare Effects of Free Trade- Aggregate Effects
2.12: Appendix- Robert Torrens on Comparative Advantage

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2.1: The Reasons for Trade 2.1: The Reasons for TradeEdit Update titlecancel

Learning Objectives

1. Learn the five reasons why trade between countries may occur.
2. Recognize that separate models of trade incorporate different motivations for trade.

The first theory section of this course develops models that provide different explanations or reasons why trade takes place between countries. The five basic reasons why trade may take place are summarized below. The purpose of each model is to establish a basis for trade and then to use that model to identify the expected effects of trade on prices, profits, incomes, and individual welfare.

Reason for Trade #1: Differences in Technology

Advantageous trade can occur between countries if the countries differ in their technological abilities to produce goods and services. Technology refers to the techniques used to turn resources (labor, capital, land) into outputs (goods and services). The basis for trade in the *Ricardian model of comparative advantage* in Chapter 2: The Ricardian Theory of Comparative Advantage is differences in technology.

Reason for Trade #2: Differences in Resource Endowments

Advantageous trade can occur between countries if the countries differ in their endowments of resources. Resource endowments refer to the skills and abilities of a country's workforce, the natural resources available within its borders (minerals, farmland, etc.), and the sophistication of its capital stock (machinery, infrastructure, communications systems). The basis for trade in both the pure exchange model in Chapter 3: The Pure Exchange Model of Trade and the Heckscher-Ohlin model in Chapter 5: The Heckscher-Ohlin (Factor Proportions) Model is differences in resource endowments.

Reason for Trade #3: Differences in Demand

Advantageous trade can occur between countries if demands or preferences differ between countries. Individuals in different countries may have different preferences or demands for various products. For example, the Chinese are likely to demand more rice than Americans, even if consumers face the same price. Canadians may demand more beer, the Dutch more wooden shoes, and the Japanese more fish than Americans would, even if they all faced the same prices. There is no formal trade model with demand differences, although the monopolistic competition model in Chapter 6 "Economies of Scale and International Trade" does include a demand for variety that can be based on differences in tastes between consumers.

Reason for Trade #4: Existence of Economies of Scale in Production

The existence of economies of scale in production is sufficient to generate advantageous trade between two countries. Economies of scale refer to a production process in which production costs fall as the scale of production rises. This feature of production is also known as "increasing returns to scale." Two models of trade incorporating economies of scale are presented in Chapter 6: Economies of Scale and International Trade.

Reason for Trade #5: Existence of Government Policies

Government tax and subsidy programs alter the prices charged for goods and services. These changes can be sufficient to generate advantages in production of certain products. In these circumstances, advantageous trade may arise solely due to differences in government policies across countries. Chapter 8: Domestic Policies and International Trade, Section 8.3: Production Subsidies as a Reason for Trade and Chapter 8: Domestic Policies and International Trade, Section 8.6: Consumption Taxes as a Reason for Trade provide several examples in which domestic tax or subsidy policies can induce international trade.

Summary

There are very few models of trade that include all five reasons for trade simultaneously. The reason is that such a model is too complicated to work with. Economists simplify the world by choosing a model that generally contains just one reason. This does not mean that economists believe that one reason, or one model, is sufficient to explain all outcomes. Instead, one must try to understand the world by looking at what a collection of different models tells us about the same phenomenon.

For example, the Ricardian model of trade, which incorporates differences in technologies between countries, concludes that everyone benefits from trade, whereas the Heckscher-Ohlin model, which incorporates endowment differences, concludes that there will be winners and losers from trade. Change the basis for trade and you may change the outcomes from trade.

In the real world, trade takes place because of a combination of all these different reasons. Each single model provides only a glimpse of some of the effects that might arise. Consequently, we should expect that a combination of the different outcomes that are presented in different models is the true characterization of the real world. Unfortunately, because of this, understanding the complexities of the real world is still more of an art than a science.

KEY TAKEAWAYS

- The five main reasons international trade takes place are differences in technology, differences in resource endowments, differences in demand, the presence of economies of scale, and the presence of government policies.
- Each model of trade generally includes just one motivation for trade.

Exercise 2.1.1

1. List the five reasons why international trade takes place.
2. Identify which model incorporates
    a. differences in technology,
    b. presence of economies of scale,
    c. differences in demand,
    d. differences in endowments.

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2.2: The Theory of Comparative Advantage- Overview 2.2: The Theory of Comparative Advantage- OverviewEdit Update titlecancel

Learning Objectives

1. Learn how a rearrangement of production on the basis of comparative advantage, coupled with international trade, can lead to an improvement in the well-being of individuals in all countries.
2. Learn the major historical figures who first described the effects of international trade: Adam Smith, David Ricardo, and Robert Torrens.

Historical Overview

The theory of **comparative advantage** is perhaps the most important concept in international trade theory. It is also one of the most commonly misunderstood principles. There is a popular story told among economists that once when an economics skeptic asked Paul Samuelson (a Nobel laureate in economics) to provide a meaningful and nontrivial result from the economics discipline, Samuelson quickly responded, "comparative advantage."

The sources of the misunderstandings are easy to identify. First, the principle of comparative advantage is clearly counterintuitive. Many results from the formal model are contrary to simple logic. Second, it is easy to confuse the theory with another notion about advantageous trade, known in trade theory as the theory of absolute advantage. The logic behind absolute advantage *is* quite intuitive. This confusion between these two concepts leads many people to think that they understand comparative advantage when in fact what they understand is absolute advantage. Finally, the theory of comparative advantage is all too often presented only in its mathematical form. Numerical examples or diagrammatic representations are extremely useful in demonstrating the basic results and the deeper implications of the theory. However, it is also easy to *see* the results mathematically without ever understanding the basic intuition of the theory.

The early logic that free trade could be advantageous for countries was based on the concept of absolute advantages in production. Adam Smith wrote in *The Wealth of Nations*, "If a foreign country can supply us with a commodity cheaper than we ourselves can make it, better buy it of them with some part of the produce of our own industry, employed in a way in which we have some advantage" (Book IV, Section ii, 12).For more information, see Rod Hay, "Adam Smith," McMaster University Archive for the History of Economic Thought, http://socserv.mcmaster.ca/econ/ugcm/3ll3/smith/wealth/index.html.

The idea here is simple and intuitive. If our country can produce some set of goods at a lower cost than a foreign country and if the foreign country can produce some other set of goods at a lower cost than we can produce them, then clearly it would be best for us to trade our relatively cheaper goods for their relatively cheaper goods. In this way, both countries may gain from trade.

The original idea of comparative advantage dates to the early part of the nineteenth century.For a more complete history of these ideas, see Douglas A. Irwin, *Against the Tide: An Intellectual History of Free Trade* (Princeton, NJ: Princeton University Press, 1996). Although the model describing the theory is commonly referred to as the "Ricardian model," the original description of the idea (see Chapter 2: The Ricardian Theory of Comparative Advantage, Section 2.12: Appendix- Robert Torrens on Comparative Advantage) can be found in the 1815 *Essay on the External Corn Trade*See Robert Torrens, *Essay on the External Corn Trade* (London: J. Hatchard, 1815). by Robert Torrens. David Ricardo formalized the idea using a compelling yet simple numerical example in his 1817 book *On the Principles of Political Economy and Taxation*.See David Ricardo, *On the Principles of Political Economy and Taxation*, McMaster University Archive for the History of Economic Thought, http://socserv2.socsci.mcmaster.ca/~econ/ugcm/3ll3/ricardo/prin/index.html. The idea appeared again in James Mill's 1821 *Elements of Political Economy*.See James Mill, *Elements of Political Economy* (London: Baldwin, Cradock & Joy, 1821). Finally, the concept became a key feature of international political economy upon the 1848 publication of *Principles of Political Economy* by John Stuart Mill.See John Stuart Mill, *Principles of Political Economy*, McMaster University Archive for the History of Economic Thought, http://socserv2.socsci.mcmaster.ca/~econ/ugcm/3ll3/mill/index.html.

Ricardo's Numerical Example

Because the idea of comparative advantage is not immediately intuitive, the best way of presenting it seems to be with an explicit numerical example as provided by Ricardo. Indeed, some variation of Ricardo's example lives on in most international trade textbooks today.

In his example, Ricardo imagined two countries, England and Portugal, producing two goods, cloth and wine, using labor as the sole input in production. He assumed that the productivity of labor (i.e., the quantity of output produced per worker) varied between industries and across countries. However, instead of assuming, as Adam Smith did, that England is more productive in producing one good and Portugal is more productive in the other, Ricardo assumed that Portugal was more productive in both goods. Based on Smith's intuition, then, it would seem that trade could not be advantageous, at least for England.

However, Ricardo demonstrated numerically that if England specialized in producing one of the two goods and if Portugal produced the other, then total world output of both goods could rise! If an appropriate **terms of trade** (i.e., amount of one good traded for another) were then chosen, both countries could end up with more of both goods after specialization and free trade than they each had before trade. This means that England may nevertheless benefit from free trade even though it is assumed to be technologically inferior to Portugal in the production of everything.

As it turned out, specialization in *any* good would not suffice to guarantee the improvement in world output. Only one of the goods would work. Ricardo showed that the specialization good in each country should be that good in which the country had a comparative advantage in production. To identify a country's comparative advantage good requires a comparison of production costs across countries. However, one does not compare the monetary costs of production or even the resource costs (labor needed per unit of output) of production. Instead, one must compare the *opportunity* costs of producing goods across countries.

A country is said to have a comparative advantage in the production of a good (say, cloth) if it can produce it at a lower opportunity cost than another country. The opportunity cost of cloth production is defined as the amount of wine that must be given up in order to produce one more unit of cloth. Thus England would have the comparative advantage in cloth production relative to Portugal if it must give up less wine to produce another unit of cloth than the amount of wine that Portugal would have to give up to produce another unit of cloth.

All in all, this condition is rather confusing. Suffice it to say that it is quite possible, indeed likely, that although England may be less productive in producing both goods relative to Portugal, it will nonetheless have a comparative advantage in the production of one of the two goods. Indeed, there is only one circumstance in which England would not have a comparative advantage in either good, and in this case Portugal also would not have a comparative advantage in either good. In other words, either each country has the comparative advantage in one of the two goods or neither country has a comparative advantage in anything.

Another way to define comparative advantage is by comparing productivities across industries and countries. Suppose, as before, that Portugal is more productive than England in the production of both cloth and wine. If Portugal is twice as productive in cloth production relative to England but three times as productive in wine, then Portugal's comparative advantage is in wine, the good in which its productivity advantage is greatest. Similarly, England's comparative advantage good is cloth, the good in which its productivity disadvantage is least. This implies that to benefit from specialization and free trade, Portugal should specialize in and trade the good that it is "most better" at producing, while England should specialize in and trade the good that it is "least worse" at producing.

Note that trade based on comparative advantage does not contradict Adam Smith's notion of advantageous trade based on absolute advantage. If, as in Smith's example, England were more productive in cloth production and Portugal were more productive in wine, then we would say that England has an absolute advantage in cloth production, while Portugal has an absolute advantage in wine. If we calculated comparative advantages, then England would also have the comparative advantage in cloth and Portugal would have the comparative advantage in wine. In this case, gains from trade could be realized if both countries specialized in their comparative and absolute advantage goods. Advantageous trade based on comparative advantage, then, covers a larger set of circumstances while still including the case of absolute advantage and hence is a more general theory.

The Ricardian Model: Assumptions and Results

The modern version of the Ricardian model and its results is typically presented by constructing and analyzing an economic model of an international economy. In its most simple form, the model assumes two countries producing two goods using labor as the only factor of production. Goods are assumed to be **homogeneous** (i.e., identical) across firms and countries. Labor is homogeneous within a country but heterogeneous (nonidentical) across countries. Goods can be transported costlessly between countries. Labor can be reallocated costlessly between industries within a country but cannot move between countries. Labor is always fully employed. Production technology differences exist across industries and across countries and are reflected in labor productivity parameters. The labor and goods markets are assumed to be perfectly competitive in both countries. Firms are assumed to maximize profit, while consumers (workers) are assumed to maximize utility.

The primary issue in the analysis of this model is what happens when each country moves from **autarky** (no trade) to free trade with the other country—in other words, what are the effects of trade? The main things we care about are trade's effects on the prices of the goods in each country, the production levels of the goods, employment levels in each industry, the pattern of trade (who exports and who imports what), consumption levels in each country, wages and incomes, and the welfare effects both nationally and individually.

Using the model, one can show that in autarky each country will produce some of each good. Because of the technology differences, relative prices of the two goods will differ between countries. The price of each country's comparative advantage good will be lower than the price of the same good in the other country. If one country has an absolute advantage in the production of both goods (as assumed by Ricardo), then real wages of workers (i.e., the purchasing power of wages) in that country will be higher in both industries compared to wages in the other country. In other words, workers in the technologically advanced country would enjoy a higher standard of living than in the technologically inferior country. The reason for this is that wages are based on productivity; thus in the country that is more productive, workers get higher wages.

The next step in the analysis is to assume that trade between countries is suddenly liberalized and made free. The initial differences in relative prices of the goods between countries in autarky will stimulate trade between the countries. Since the differences in prices arise directly out of differences in technology between countries, it is the differences in technology that cause trade in the model. Profit-seeking firms in each country's comparative advantage industry would recognize that the price of their good is higher in the other country. Since transportation costs are zero, more profit can be made through export than with sales domestically. Thus each country would export the good in which it has a comparative advantage. Trade flows would increase until the price of each good is equal across countries. In the end, the price of each country's export good (its comparative advantage good) will rise and the price of its import good (its comparative disadvantage good) will fall.

The higher price received for each country's comparative advantage good would lead each country to specialize in that good. To accomplish this, labor would have to move from the comparative disadvantage industry into the comparative advantage industry. This means that one industry goes out of business in each country. However, because the model assumes full employment and costless mobility of labor, all these workers are immediately gainfully employed in the other industry.

One striking result here is that even when one country is technologically superior to the other in both industries, one of these industries would go out of business when opening to free trade. Thus technological superiority is not enough to guarantee continued production of a good in free trade. A country must have a comparative advantage in production of a good rather than an absolute advantage to guarantee continued production in free trade. From the perspective of a less-developed country, *the developed country's superior technology need not imply that less-developed country (LDC) industries cannot compete in international markets*.

Another striking result is that the technologically superior country's comparative advantage industry survives while the same industry disappears in the other country, even though the workers in the other country's industry have lower wages. In other words, low wages in another country in a particular industry is not sufficient information to determine which country's industry would perish under free trade. From the perspective of a developed country, *freer trade may not result in a domestic industry's decline just because the foreign firms pay their workers lower wages*.

The movement to free trade generates an improvement in welfare in both countries individually and nationally. Specialization and trade will increase the set of consumption possibilities, compared with autarky, and will make possible an increase in consumption of both goods nationally. These aggregate gains are often described as improvements in production and consumption efficiency. Free trade raises aggregate world production efficiency because more of both goods are likely to be produced with the same number of workers. Free trade also improves aggregate consumption efficiency, which implies that consumers have a more pleasing set of choices and prices available to them.

Real wages (and incomes) of individual workers are also shown to rise in both countries. Thus every worker can consume more of both goods in free trade compared with autarky. In short, everybody benefits from free trade in both countries. In the Ricardian model, trade is truly a win-win situation.

Defending against Skeptics: The Intuition behind the Theory of Comparative Advantage

Many people who learn about the theory of comparative advantage quickly convince themselves that its ability to describe the real world is extremely limited, if not nonexistent. Although the results follow logically from the assumptions, the assumptions are easily assailed as unrealistic. For example, the model assumes only two countries producing two goods using just one factor of production. No capital or land or other resources are needed for production. The real world, on the other hand, consists of many

countries producing many goods using many factors of production. In the model, each market is assumed to be perfectly competitive when in reality there are many industries in which firms have market power. Labor productivity is assumed to be fixed when in actuality it changes over time, perhaps based on past production levels. Full employment is assumed when clearly workers cannot immediately and costlessly move to other industries. Also, all workers are assumed to be identical. This means that when a worker is moved from one industry to another, he or she is immediately as productive as every other worker who was previously employed there. Finally, the model assumes that technology differences are the only differences that exist between the countries.

With so many unrealistic assumptions, it is difficult for some people to accept the conclusions of the model with any confidence, especially when so many of the results are counterintuitive. Indeed, one of the most difficult aspects of economic analysis is how to interpret the conclusions of models. Models are, by their nature, simplifications of the real world and thus all economic models contain unrealistic assumptions. Therefore, to dismiss the results of economic analysis on the basis of unrealistic assumptions means that one must dismiss all insights contained within the entire economics discipline. Surely, this is neither practical nor realistic. Economic models in general and the Ricardian model in particular do contain insights that most likely carry over to the more complex real world. The following story is meant to explain some of the insights within the theory of comparative advantage by placing the model into a more familiar setting.

A Gardening Story

Suppose it is early spring and it is time to prepare the family backyard garden for the first planting of the year. The father in the household sets aside one Sunday afternoon to do the job but hopes to complete the job as quickly as possible. Preparation of the garden requires the following tasks. First, the soil must be turned over and broken up using the rototiller. Then the soil must be raked and smoothed. Finally, seeds must be planted, or sowed.

This year, the father's seven-year-old son is anxious to help. The question at hand is whether the son should be allowed to help if one's only objective is to complete the task in the shortest amount of time possible.

At first thought, the father is reluctant to accept help. Clearly each task would take the father less time to complete than it would take the son. In other words, the father can perform each task more efficiently than the seven-year-old son. The father estimates that it will take him three hours to prepare the garden if he works alone, as shown in Table 2.2.1.

Table 2.2.1: Father's Task Times Without Son

Task	Completion Time (Hours)
Rototilling	1.0
Raking	1.0
Planting	1.0
Total	3.0

On second thought, the father decides to let his son help according to the following procedure. First, the father begins the rototilling. Once he has completed half of the garden, the son begins raking the rototilled section while the father finishes rototilling the rest of the garden plot. After the father finishes rototilling, he begins planting seeds in the section the son has already raked. Suppose that the son rakes slower than the father plants and that the father completes the sowing process just as the son finishes raking. Note this implies that raking takes the son almost two hours compared to one hour for the father. However, because the son's work and the father's work are done simultaneously, it does not add to the total time for the project. Under this plan, the time needed to complete the tasks is shown in Table 2.2.2.

Table 2.2.2: Father's Task Times with Son

Task	Completion Time (Hours)
Rototilling	1.0
Raking and Planting	1.0
Total	2.0

Notice that the total time needed to prepare the garden has fallen from three hours to two hours. The garden is prepared in less time with the son's help than it could have been done independently by the father. In other words, it makes sense to employ the son in (garden) production even though the son is less efficient than the dad in every one of the three required tasks. Overall efficiency is enhanced when both resources (the father and son) are fully employed.

This arrangement also clearly benefits both the father and son. The father completes the task in less time and thus winds up with some additional leisure time that the father and son can enjoy together. The son also benefits because he has contributed his skills to a productive activity and will enjoy a sense of accomplishment. Thus both parties benefit from the arrangement.

However, it is important to allocate the tasks correctly between the father and the son. Suppose the father allowed his son to do the rototilling instead. In this case, the time needed for each task might look as it does in Table 2.2.3.

Table 2.2.3: Task Times with Incorrect Specialization

Task	Completion Time (Hours)
Rototilling	4.0
Raking	1.0
Planting	1.0
Total	6.0

The time needed for rototilling has now jumped to four hours because we have included the time spent traveling to and from the hospital and the time spent in the emergency room! Once the father and son return, the father must complete the remaining tasks on his own. Overall efficiency declines in this case compared with the father acting alone.

This highlights the importance of specializing in production of the task in which you have a comparative advantage. Even though the father can complete all three tasks quicker than his son, his relative advantage in rototilling greatly exceeds his advantage in raking and planting. One might say that the father is "most better" at rototilling, while he is "least better" at raking and planting. On the other hand, the son is "least worse" at raking and planting but "most worse" at rototilling. Finally, because of the sequential nature of the tasks, the son can remain fully employed only if he works on the middle task, namely, raking.

Interpreting the Theory of Comparative Advantage

The garden story offers an intuitive explanation for the theory of comparative advantage and also provides a useful way of interpreting the model results. The usual way of stating the Ricardian model results is to say that countries *will* specialize in their comparative advantage good and trade it to the other country such that everyone in both countries benefits. Stated this way, it is easy to imagine how it would not hold true in the complex real world.

A better way to state the results is as follows. The Ricardian model shows that if we want to maximize total output in the world, then we should

1. fully employ all resources worldwide,
2. allocate those resources within countries to each country's comparative advantage industries,
3. allow the countries to trade freely thereafter.

In this way, we might raise the well-being of all individuals despite differences in relative productivities. In this description, we do not predict that a result will carry over to the complex real world. Instead, we carry the logic of comparative advantage to the real world and ask how things would have to look to achieve a certain result (maximum output and benefits). In the end, we should not say that the model of comparative advantage tells us anything about what *will* happen when two countries begin to trade; instead, we should say that the theory tells us some things that *can* happen.

KEY TAKEAWAYS

- Trade based on comparative advantage can make everyone in both countries better off after trade.
- Superior technology in developed countries need not imply that industries in less-developed countries cannot compete in international markets.
- Firms in developed countries can sometimes compete in international markets even when foreign firms pay their workers much lower wages.

Exercise 2.2.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The term used to describe workers who have the same productivity in multiple industries.
   b. The term used to describe a product when it is identical across multiple firms.
   c. The term used to describe a product, like wine, that is produced by different firms, each with slightly different characteristics.
   d. The assumption made about labor employment in the Ricardian model.
   e. The term used to describe the amount of goods that can be produced using all the available world resources.
2. What three things must be achieved to maximize world output?
3. In the gardening story, if the son can do the rototilling in four hours, the raking in two hours, and the planting in three hours, which activity is the son “least worse” in producing compared with his father?

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2.3: Ricardian Model Assumptions 2.3: Ricardian Model AssumptionsEdit Update titlecancel

Learning Objectives

1. Learn the structure and assumptions that describe the Ricardian model of comparative advantage.

The Ricardian model shows the possibility that an industry in a developed country could compete against an industry in a less-developed country (LDC) even though the LDC industry pays its workers much lower wages.

The modern version of the Ricardian model assumes that there are two countries producing two goods using one factor of production, usually labor. The model is a general equilibrium model in which all markets (i.e., goods and factors) are perfectly competitive. The goods produced are assumed to be homogeneous across countries and firms within an industry. Goods can be costlessly shipped between countries (i.e., there are no transportation costs). Labor is homogeneous within a country but may have different productivities across countries. This implies that the production technology is assumed to differ across countries. Labor is costlessly mobile across industries within a country but is immobile across countries. Full employment of labor is also assumed. Consumers (the laborers) are assumed to maximize utility subject to an income constraint.

Below you will find a more complete description of each assumption along with a mathematical formulation of the model.

Perfect Competition

Perfect competition in all markets means that the following conditions are assumed to hold.

1. Many firms produce output in each industry such that each firm is too small for its output decisions to affect the market price. This implies that when choosing output to maximize profit, each firm takes the price as given or exogenous.
2. Firms choose output to maximize profit. The rule used by perfectly competitive firms is to choose the output level that equalizes the price (P) with the marginal cost (MC). That is, set $P = MC$.
3. Output is homogeneous across all firms. This means that goods are identical in all their characteristics such that a consumer would find products from different firms indistinguishable. We could also say that goods from different firms are perfect substitutes for all consumers.
4. There is free entry and exit of firms in response to profits. Positive profit sends a signal to the rest of the economy and new firms enter the industry. Negative profit (losses) leads existing firms to exit, one by one, out of the industry. As a result, in the long run economic profit is driven to zero in the industry.
5. Information is perfect. For example, all firms have the necessary information to maximize profit and to identify the positive profit and negative profit industries.

Two Countries

The case of two countries is used to simplify the model analysis. Let one country be the United States and the other France. Note that anything related exclusively to France in the model will be marked with an asterisk. The two countries are assumed to differ only with respect to the production technology.

Two Goods

Two goods are produced by both countries. We assume a barter economy. This means that no money is used to make transactions. Instead, for trade to occur, goods must be traded for other goods. Thus we need at least two goods in the model. Let the two produced goods be wine and cheese.

One Factor of Production

Labor is the one factor of production used to produce each of the goods. The factor is homogeneous and can freely move between industries.

Utility Maximization and Demand

In David Ricardo's original presentation of the model, he focused exclusively on the supply side. Only later did John Stuart Mill introduce demand into the model. Since much can be learned with Ricardo's incomplete model, we proceed initially without

formally specifying demand or utility functions. Later in the chapter we will use the aggregate utility specification to depict an equilibrium in the model.

When needed, we will assume that aggregate utility can be represented by a function of the form $U = C_C C_W$, where C_C and C_W are the aggregate quantities of cheese and wine consumed in the country, respectively. This function is chosen because it has properties that make it easy to depict an equilibrium. The most important feature is that the function is homothetic, which implies that the country consumes wine and cheese in the same fixed proportion at given prices regardless of income. If two countries share the same homothetic preferences, then when the countries share the same prices, as they will in free trade, they will also consume wine and cheese in the same proportion.

General Equilibrium

The Ricardian model is a general equilibrium model. This means that it describes a complete circular flow of money in exchange for goods and services. Thus the sale of goods and services generates revenue to the firms that in turn is used to pay for the factor services (wages to workers in this case) used in production. The factor income (wages) is used, in turn, to buy the goods and services produced by the firms. This generates revenue to the firms and the cycle repeats again. A "general equilibrium" arises when prices of goods, services, and factors are such as to equalize supply and demand in all markets simultaneously.

Production

The production functions in *Table* 2.3.1 and *Table* 2.3.2 represent industry production, not firm production. The industry consists of many small firms in light of the assumption of perfect competition.

Table 2.3.1: Production of Cheese

United States	France
$Q_C = \frac{L_C}{a_{LC}} \frac{[hrs]}{[hrs/lbs]}$	$Q_C^* = \frac{L_C^*}{a_{LC}^*}$

where

- Q_C = quantity of cheese produced in the United States
- L_C = amount of labor applied to cheese production in the United States
- a_{LC} = unit labor requirement in cheese production in the United States (hours of labor necessary to produce one unit of cheese)
- * All starred variables are defined in the same way but refer to the process in France.

Table 2.3.2: Production of Wine

United States	France
$Q_W = \frac{L_W}{a_{LW}} \frac{[hrs]}{[hrs/gal]}$	$Q_W^* = \frac{L_W^*}{a_{LW}^*}$

where

- Q_W = quantity of wine produced in the United States
- L_W = amount of labor applied to wine production in the United States
- a_{LW} = unit labor requirement in wine production in the United States (hours of labor necessary to produce one unit of wine)
- * All starred variables are defined in the same way but refer to the process in France.

The **unit labor requirements** define the technology of production in two countries. Differences in these labor costs across countries represent differences in technology.

Resource Constraint

The resource constraint in this model is also a labor constraint since labor is the only factor of production (see *Table* 2.3.3).

Table 2.3.3: Labor Constraints

United States	France
$L_C + L_W = L$	$L_C^* + L_W^* = L^*$

where

- L = the labor endowment in the United States (the total number of hours the workforce is willing to provide)

When the resource constraint holds with equality, it implies that the resource is fully employed. A more general specification of the model would require only that the sum of labor applied in both industries be less than or equal to the labor endowment. However, the assumptions of the model will guarantee that production uses all available resources, and so we can use the less general specification with the equal sign.

Factor Mobility

The one factor of production, labor, is assumed to be immobile across countries. Thus labor cannot move from one country to another in search of higher wages. However, labor is assumed to be freely and costlessly mobile between industries within a country. This means that workers working in the one industry can be moved to the other industry without any cost incurred by the firms or the workers. The significance of this assumption is demonstrated in the immobile factor model in Chapter 4: Factor Mobility and Income Redistribution.

Transportation Costs

The model assumes that goods can be transported between countries at no cost. This assumption simplifies the exposition of the model. If transport costs are included, it can be shown that the key results of the model may still be obtained.

Exogenous and Endogenous Variables

In describing any model, it is always useful to keep track of which variables are exogenous and which are endogenous. **Exogenous variables** are those variables in a model that are determined by processes that are not described within the model itself. When describing and solving a model, exogenous variables are taken as fixed parameters whose values are known. They are variables over which the agents within the model have no control. In the Ricardian model, the parameters (L, a_{LC}, a_{LW}) are exogenous. The corresponding starred variables are exogenous in the other country.

Endogenous variables are those variables determined when the model is solved. Thus finding the solution to a model means solving for the values of the endogenous variables. Agents in the model can control or influence the endogenous variables through their actions. In the Ricardian model, the variables (L_C, L_W, Q_C, Q_W) are endogenous. Likewise, the corresponding starred variables are endogenous in the other country.

KEY TAKEAWAYS

- The Ricardian model incorporates the standard assumptions of perfect competition.
- The simple Ricardian model assumes two countries producing two goods and using one factor of production.
- The goods are assumed to be identical, or homogeneous, within and across countries.
- The workers are assumed to be identical in the productive capacities within, but not across, countries.
- Workers can move freely and costlessly between industries but cannot move to another country.

Exercise 2.3.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The type of variable whose value is determined as a part of the solution to the model.
   b. The type of variable whose value is determined outside the model and is presumed to be known by the model participants.
   c. The rule used by perfectly competitive firms to determine the profit-maximizing level of output.
   d. What a perfectly competitive firm may do if it experiences substantially negative profit.
   e. The kind of equilibrium in a model in which multiple markets satisfy the equality of supply and demand simultaneously.
2. Suppose that the unit labor requirements for wine and cheese are a_{LC} = 6 hrs./lb. and a_{LW} = 4 hrs./gal., respectively, and that labor hours applied to cheese and wine production are 60 and 80, respectively. What is total output of cheese and wine?

3. Suppose that the unit labor requirements for wine and cheese are a_{LC} = 3 hrs./lb. and a_{LW} = 2 hrs./gal., respectively, and that labor hours applied to cheese and wine production are 60 and 80, respectively. What would the total output of wine be if all the labor hours were shifted to produce wine?

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2.4: The Ricardian Model Production Possibility Frontier 2.4: The Ricardian Model Production Possibility FrontierEdit Update titlecancel

Learning Objectives

1. Learn how the plot of the labor constraint yields the production possibility frontier.

Using the two production functions and the labor constraint, we can describe the **production possibility frontier (PPF)**. First, note that the production functions can be rewritten as $L_C = a_{LC}Q_C$ and $L_W = a_{LW}Q_W$. Plugging these values for L_C and L_W into the labor constraint yields the equation for the PPF:

$$a_{LC}Q_C + a_{LW}Q_W = L.$$

This equation has three exogenous variables (a_{LC}, a_{LW}, and L) that we assume have known values and two endogenous variables (Q_C and Q_W) whose values must be solved for. The PPF equation is a linear equation—that is, it describes a line. With some algebraic manipulation, we can rewrite the PPF equation into the standard form for an equation of a line, generally written as $y = mx + b$, where y is the variable on the vertical axis, x is the variable on the horizontal axis, m is the slope of the line, and b is the y-intercept. The PPF equation can be rewritten as

$$Q_W = \frac{L}{a_{LW}} - \left(\frac{a_{LC}}{a_{LW}}\right) Q_C.$$

We plot the PPF on the diagram in Figure 2.4.1 with Q_C on the horizontal axis and Q_W on the vertical axis. The equation is easily plotted by following three steps.

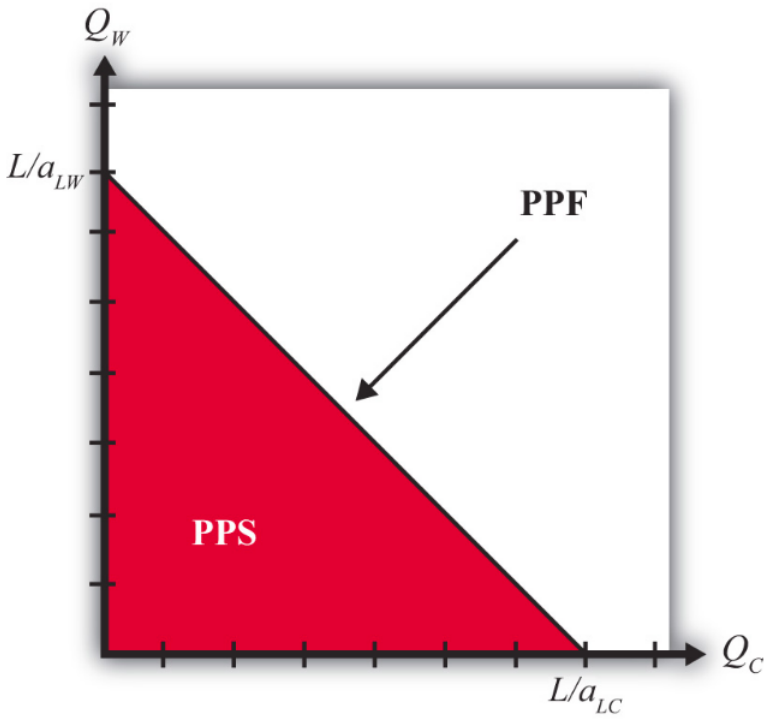


Figure 2.4.1: Production Possibilities

1. Set Q_C = 0 and solve for Q_W. In this case, the solution is $Q_W = \frac{L}{a_{LW}}$. This corresponds to the Q_W-intercept. It tells us the quantity of wine that the United States could produce if it devoted all of its labor force (L) to the production of wine.
2. Set Q_W = 0 and solve for Q_C. In this case, the solution is $Q_C = \frac{L}{a_{LC}}$. This corresponds to the Q_C-intercept. It tells us the quantity of cheese that the United States could produce if it devoted all of its labor force (L) to the production of cheese.
3. Connect the two points with a straight line.

The straight downward-sloping line is the production possibility frontier. It describes all possible quantity combinations of wine and cheese that can be achieved by the U.S. economy. A movement along the curve represents a transfer of labor resources out of

one industry and into another such that all labor remains employed.

Points inside the PPF are production possibilities but correspond to underemployment of labor resources. In fact, all production possibilities regardless of whether full employment is fulfilled are referred to as the production possibility set (PPS). The PPS is represented by all the points within and on the border of the red triangle in Figure 2.4.1.

KEY TAKEAWAYS

- The equation $a_{LC}Q_C + a_{LW}Q_W = L$ is an equation of a line whose plot represents the country's production possibility frontier (PPF).
- A PPF is the combination of outputs of cheese and wine that the country can produce given a production technology (i.e., given that unit labor requirements are exogenous) and assuming all of its labor hours are employed.
- A production possibility set (PPS) is the combination of outputs that a country can produce even if some of the labor is unemployed.

Exercise 2.4.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The term describing the set of all output combinations that can be produced within an economy.
   b. The term describing the set of all output combinations that can be produced within an economy with full employment of all available resources.
2. Suppose that the unit labor requirements for wine and cheese are a_{LC} = 6 hrs./lb., a_{LW} = 4 hrs./gal., respectively, and that total labor hours available for production are 60. What is the maximum output of cheese? What is the maximum output of wine?
3. Suppose that the unit labor requirements for wine and cheese are a_{LC} = 6 hrs./lb. and a_{LW} = 4 hrs./gal., respectively, and that total labor hours available for production are 60. Plot the production possibility frontier.

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2.5: Definitions- Absolute and Comparative Advantage 2.5: Definitions- Absolute and Comparative AdvantageEdit Update titlecancel

Learning Objectives

1. Learn how to define labor productivity and opportunity cost within the context of the Ricardian model.
2. Learn to identify and distinguish absolute advantage and comparative advantage.
3. Learn to identify comparative advantage via two methods: (1) by comparing opportunity costs and (2) by comparing relative productivities.

The basis for trade in the Ricardian model is differences in technology between countries. Below we define two different ways to describe technology differences. The first method, called absolute advantage, is the way most people understand technology differences. The second method, called comparative advantage, is a much more difficult concept. As a result, even those who learn about comparative advantage often will confuse it with absolute advantage. It is quite common to see misapplications of the principle of comparative advantage in newspaper and journal stories about trade. Many times authors write "comparative advantage" when in actuality they are describing absolute advantage. This misconception often leads to erroneous implications, such as a fear that technology advances in other countries will cause our country to lose its comparative advantage in everything. As will be shown, this is essentially impossible.

To define absolute advantage, it is useful to define labor productivity first. To define comparative advantage, it is useful to first define opportunity cost. Next, each of these is defined formally using the notation of the Ricardian model.

Labor Productivity

Labor productivity is defined as the quantity of output that can be produced with a unit of labor. Since a_{LC} represents hours of labor needed to produce one pound of cheese, its reciprocal, $\frac{1}{a_{LC}}$, represents the labor productivity of cheese production in the United States. Similarly, $\frac{1}{a_{LW}}$ represents the labor productivity of wine production in the United States.

Absolute Advantage

A country has an **absolute advantage** in the production of a good relative to another country if it can produce the good at lower cost or with higher productivity. Absolute advantage compares industry productivities across countries. In this model, we would say the United States has an absolute advantage in cheese production relative to France if

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

or if

$$\frac{1}{a_{LC}} > \frac{1}{a^*_{LC}}.$$

The first expression means that the United States uses fewer labor resources (hours of work) to produce a pound of cheese than does France. In other words, the resource cost of production is lower in the United States. The second expression means that labor productivity in cheese in the United States is greater than in France. Thus the United States generates more pounds of cheese per hour of work.

Obviously, if $a^*_{LC} < a_{LC}$, then France has the absolute advantage in cheese. Also, if $a_{LW} < a^*_{LW}$, then the United States has the absolute advantage in wine production relative to France.

Opportunity Cost

Opportunity cost is defined generally as the value of the next best opportunity. In the context of national production, the nation has opportunities to produce wine and cheese. If the nation wishes to produce more cheese, then because labor resources are scarce and fully employed, it is necessary to move labor out of wine production in order to increase cheese production. The loss in wine production necessary to produce more cheese represents the opportunity cost to the economy. The slope of the PPF, $-(\frac{a_{LC}}{a_{LW}})$, corresponds to the opportunity cost of production in the economy.

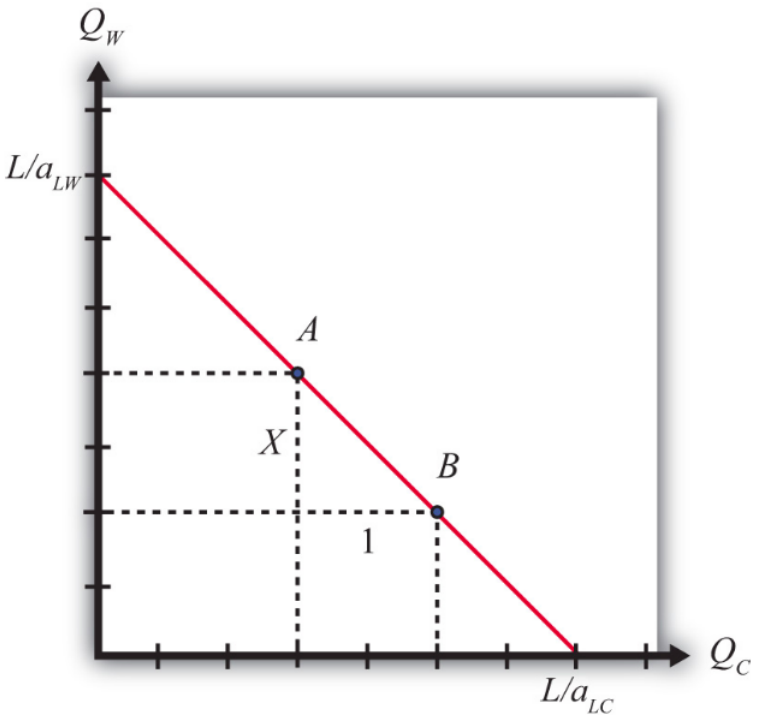


Figure 2.5.1: Defining Opportunity Cost

To see this more clearly, consider points A and B in Figure 2.5.1. Let the horizontal distance between A and B be one pound of cheese. Label the vertical distance X. The distance X then represents the quantity of wine that must be given up to produce one additional pound of cheese when moving from point A to B. In other words, X is the opportunity cost of producing cheese.

Note also that the slope of the line between A and B is given by the formula

$$slope = \frac{rise}{run} = -\frac{X}{1}.$$

Thus the slope of the line between A and B is the opportunity cost, which from above is given by $-(\frac{a_{LC}}{a_{LW}})$. We can more clearly see why the slope of the PPF represents the opportunity cost by noting the units of this expression:

$$-\frac{a_{LC}}{a_{LW}}\frac{[hrs/lb]}{[hrs/gal]} = [gal/lb].$$

Thus the slope of the PPF expresses the number of gallons of wine that must be given up (hence the minus sign) to produce another pound of cheese. Hence it is the opportunity cost of cheese production (in terms of wine). The reciprocal of the slope, $-(\frac{a_{LW}}{a_{LC}})$, in turn represents the opportunity cost of wine production (in terms of cheese).

Since in the Ricardian model the PPF is linear, the opportunity cost is the same at all possible production points along the PPF. For this reason, the Ricardian model is sometimes referred to as a *constant (opportunity) cost* model.

Comparative Advantage

Using Opportunity Costs

A country has a comparative advantage in the production of a good if it can produce that good at a lower opportunity cost relative to another country. Thus the United States has a comparative advantage in cheese production relative to France if

$$\frac{a_{LC}}{a_{LW}} < \frac{a^*_{LC}}{a^*_{LW}}.$$

This means that the United States must give up less wine to produce another pound of cheese than France must give up to produce another pound. It also means that the slope of the U.S. PPF is flatter than the slope of France's PPF.

Starting with the inequality above, cross multiplication implies the following:

$$a_{LC} \quad a^*_{LC} \quad a^*_{LW} \quad a_{LW}$$

$$\frac{a_{LC}}{a_{LW}} < \frac{a_{LC}}{a^*_{LW}} \Rightarrow \frac{a_{LW}}{a^*_{LC}} < \frac{a_{LW}}{a_{LC}}.$$

This means that France can produce wine at a lower opportunity cost than the United States. In other words, France has a comparative advantage in wine production. This also means that if the United States has a comparative advantage in one of the two goods, France must have the comparative advantage in the other good. It is not possible for one country to have the comparative advantage in both of the goods produced.

Suppose one country has an absolute advantage in the production of both goods. Even in this case, each country will have a comparative advantage in the production of one of the goods. For example, suppose $a_{LC} = 10$, $a_{LW} = 2$, $a^*_{LC} = 20$, and $a^*_{LW} = 5$. In this case, $a_{LC}(10) < a^*_{LC}(20)$ and $a_{LW}(2) < a^*_{LW}(5)$, so the United States has the absolute advantage in the production of both wine and cheese. However, it is also true that

$$\frac{a^*_{LC}}{a^*_{LW}}\left(\frac{20}{5}\right) < \frac{a_{LC}}{a_{LW}}\left(\frac{10}{2}\right)$$

so that France has the comparative advantage in cheese production relative to the United States.

Using Relative Productivities

Another way to describe comparative advantage is to look at the relative productivity advantages of a country. In the United States, the labor productivity in cheese is $1/10$, while in France it is $1/20$. This means that the U.S. productivity advantage in cheese is $(1/10)/(1/20) = 2/1$. Thus the United States is twice as productive as France in cheese production. In wine production, the U.S. advantage is $(1/2)/(1/5) = (2.5)/1$. This means the United States is two and one-half times as productive as France in wine production.

The comparative advantage good in the United States, then, is that good in which the United States enjoys the greatest productivity advantage: wine.

Also consider France's perspective. Since the United States is two times as productive as France in cheese production, then France must be $1/2$ times as productive as the United States in cheese. Similarly, France is $2/5$ times as productive in wine as the United States. Since $1/2 > 2/5$, France has a disadvantage in production of both goods. However, France's disadvantage is smallest in cheese; therefore, France has a comparative advantage in cheese.

No Comparative Advantage

The only case in which neither country has a comparative advantage is when the opportunity costs are equal in both countries. In other words, when

$$\frac{a_{LC}}{a_{LW}} = \frac{a^*_{LC}}{a^*_{LW}},$$

then neither country has a comparative advantage. It would seem, however, that this is an unlikely occurrence.

KEY TAKAWAYS

- Labor productivity is defined as the quantity of output produced with one unit of labor; in the model, it is derived as the reciprocal of the unit labor requirement.
- Opportunity cost is defined as the quantity of a good that must be given up in order to produce one unit of another good; in the model, it is defined as the ratio of unit labor requirements between the first and the second good.
- The opportunity cost corresponds to the slope of the country's production possibility frontier (PPF).
- An absolute advantage arises when a country has a good with a lower unit labor requirement and a higher labor productivity than another country.
- A comparative advantage arises when a country can produce a good at a lower opportunity cost than another country.
- A comparative advantage is also defined as the good in which a country's relative productivity advantage (disadvantage) is greatest (smallest).
- It is not possible that a country does not have a comparative advantage in producing something unless the opportunity costs (relative productivities) are equal. In this case, neither country has a comparative advantage in anything.

Exercise 2.5.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The labor productivity in cheese if four hours of labor are needed to produce one pound.
   b. The labor productivity in wine if three kilograms of cheese can be produced in one hour and ten liters of wine can be produced in one hour.
   c. The term used to describe the amount of labor needed to produce a ton of steel.
   d. The term used to describe the quantity of steel that can be produced with an hour of labor.
   e. The term used to describe the amount of peaches that must be given up to produce one more bushel of tomatoes.
   f. The term used to describe the slope of the PPF when the quantity of tomatoes is plotted on the horizontal axis and the quantity of peaches is on the vertical axis.
2. Consider a Ricardian model with two countries, the United States and Ecuador, producing two goods, bananas and machines. Suppose the unit labor requirements are $a_{LB}^{US} = 8$, $a_{LB}^{E} = 4$, $a_{LM}^{US} = 2$, and $a_{LM}^{E} = 4$. Assume the United States has 3,200 workers and Ecuador has 400 workers.
   a. Which country has the absolute advantage in bananas? Why?
   b. Which country has the comparative advantage in bananas? Why?
   c. How many bananas and machines would the United States produce if it applied half of its workforce to each good?
3. Consider a Ricardian model with two countries, England and Portugal, producing two goods, wine and corn. Suppose the unit labor requirements in wine production are $a_{LW}^{Eng} = 1/3$ hour per liter and $a_{LW}^{Port} = 1/2$ hour per liter, while the unit labor requirements in corn are $a_{LC}^{Eng} = 1/4$ hour per kilogram and $a_{LC}^{Port} = 1/2$ hour per kilogram.
   a. What is labor productivity in the wine industry in England and in Portugal?
   b. What is the opportunity cost of corn production in England and in Portugal?
   c. Which country has the absolute advantage in wine? In corn?
   d. Which country has the comparative advantage in wine? In corn?

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2.6: A Ricardian Numerical Example 2.6: A Ricardian Numerical ExampleEdit Update titlecancel

Learning Objectives

1. Using a numerical example similar to one used by David Ricardo, learn how specialization in one's comparative advantage good can raise world productive efficiency.
2. Learn how both countries can consume more of both goods after trade.

The simplest way to demonstrate that countries can gain from trade in the Ricardian model is by use of a numerical example. This is how Ricardo presented his argument originally. The example demonstrates that both countries will gain from trade if they specialize in their comparative advantage good and trade some of it for the other good. We set up the example so that one country (the United States) has an absolute advantage in the production of both goods. Ricardo's surprising result was that a country can gain from trade even if it is technologically inferior in producing every good. Adam Smith explained in *The Wealth of Nations* that trade is advantageous to both countries, but in his example each country had an absolute advantage in one of the goods. That trade could be advantageous if each country specializes in the good in which it has the technological edge is not surprising at all.

Suppose the exogenous variables in the two countries take the values in Table 2.6.1.

Table 2.6.1: Exogenous Variable Values

United States	$a_{LC} = 1$	$a_{LW} = 2$	$L = 24$
France	$a^*_{LC} = 6$	$a^*_{LW} = 3$	$L^* = 24$

where

- L = the labor endowment in the United States (the total number of hours the workforce is willing to provide)
- a_{LC} = unit labor requirement in cheese production in the United States (hours of labor necessary to produce one unit of cheese)
- a_{LW} = unit labor requirement in wine production in the United States (hours of labor necessary to produce one unit of wine)
- * All starred variables are defined in the same way but refer to the process in France.

By assumption, the United States has the absolute advantage in cheese production and wine production because $a_{LC}(1) < a^*_{LC}(6)$ and $a_{LW}(2) < a^*_{LW}(3)$.

The United States also has the comparative advantage in cheese production because $\frac{a_{LC}}{a_{LW}}\left(\frac{1}{2}\right) < \frac{a^*_{LC}}{a^*_{LW}}\left(\frac{6}{3}\right)$. The cost of producing cheese in the United States is one half gallon of wine per pound of cheese. In France, it is two gallons per pound.

France, however, has the comparative advantage in wine production because $\frac{a^*_{LW}}{a^*_{LC}}\left(\frac{3}{6}\right) < \frac{a_{LW}}{a_{LC}}\left(\frac{2}{1}\right)$. The cost of producing wine in France is one half pound of cheese per gallon of wine, while in the United States, it is two pounds per gallon.

The production possibility frontiers for both countries are plotted on Figure 2.6.1. Notice that the U.S. PPF lies outside France's PPF. Since both countries are assumed to be the same size in the example, this indicates the U.S. absolute advantage in the production of both goods.

The absolute value of the slope of each PPF represents the opportunity cost of cheese production. Since the U.S. PPF is flatter than France's, this means that the opportunity cost of cheese production is lower in the United States and thus indicates that the United States has the comparative advantage in cheese production.

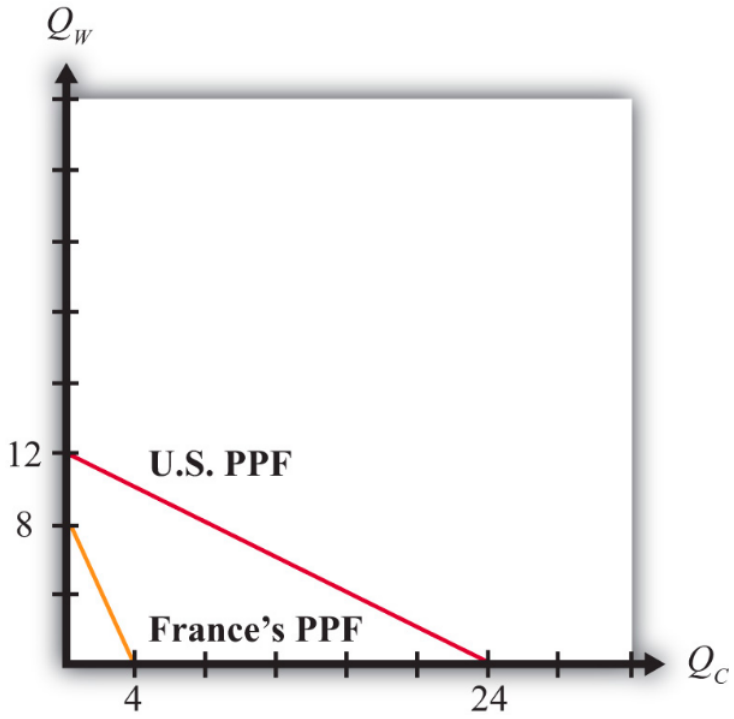


Figure 2.6.1: Production Possibility Frontiers

With full employment of labor, production will occur at some point along the PPF.

To see the effects of specialization and free trade, we must compare it to a situation of no trade, or autarky. Thus we must construct an autarky equilibrium first. To determine the autarky production point requires some information about the consumer demand for the goods. Producers will produce whatever consumers demand at the prevailing prices such that supply of each good equals demand. In autarky, this means that the production and consumption point for a country are the same.

For the purpose of this example, we will simply make up a plausible production and consumption point under autarky. Essentially, we assume that consumer demands are such as to generate the chosen production point. Table 2.6.2 shows the autarky production and consumption levels for the two countries. It also shows total world production for each of the goods.

Table 2.6.2: Autarky Production and Consumption

	Cheese (lbs.)	Wine (gals.)
United States	16	4
France	3	2
World Total	19	6

Autarky Production and Consumption Points

In Figure 2.6.2 we depict the autarky production and consumption points for the United States and France. Each point lies on the interior section of the country's production possibility frontier.

Question: How do you know that the chosen production points are on the country's PPF?

Answer: To verify that a point is on the PPF, we can simply plug the quantities into the PPF equation to see if it is satisfied. The PPF formula is $a_{LC}Q_C + a_{LW}Q_W = L$. If we plug the exogenous variables for the United States into the formula, we get $Q_C + 2Q_W = 24$. Plugging in the production point from Table 2.6.2 yields $16 + 2(4) = 24$, and since $16 + 8 = 24$, the production point must lie on the PPF.

Ricardo argued that trade gains could arise if countries first specialized in their comparative advantage good and then traded with the other country. Specialization in the example means that the United States produces only cheese and no wine, while France produces only wine and no cheese. These quantities are shown in Table 2.6.3. Also shown are the world totals for each of the goods.

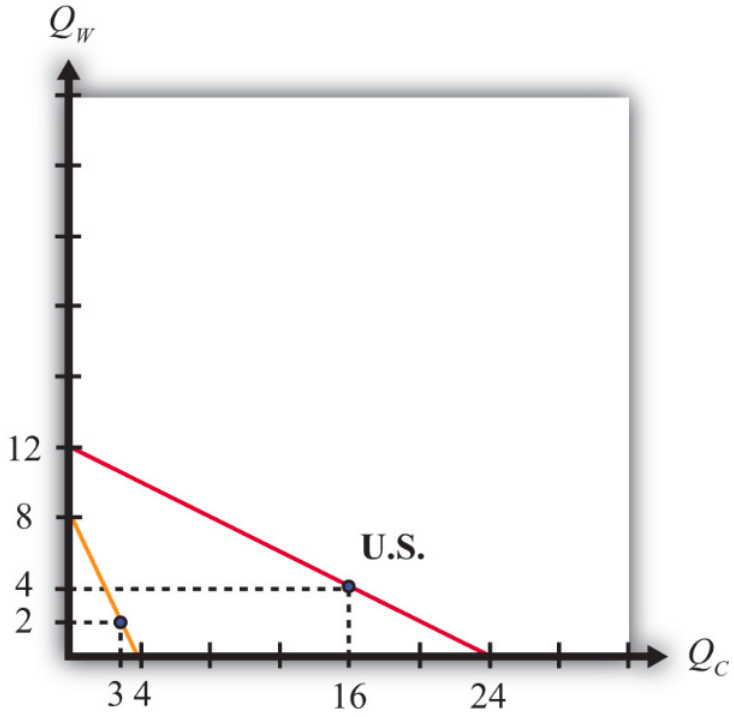


Figure 2.6.2: Autarky Equilibriums

Table 2.6.3: Production with Specialization in the Comparative Advantage Good

	Cheese (lbs.)	Wine (gals.)
United States	24	0
France	0	8
World Total	24	8

At this point, we can already see a remarkable result. When countries specialize in their comparative advantage good, world output of both wine and cheese rises. Cheese output rises from nineteen to twenty-four pounds. Wine output rises from six to eight gallons. What's more, the output increases occur without an increase in the quantity of labor used to produce them. In autarky, it took forty-eight worker hours to produce nineteen pounds of cheese and six gallons of wine. With specialization, the same forty-eight worker hours produce twenty-four pounds of cheese and eight gallons of wine. This means that there is an increase in world productivity—more output per unit of labor. Often this productivity improvement is referred to as an increase or improvement in world production efficiency.

The increase in world production efficiency does not benefit the countries unless they can trade with each other after specialization. Both production points were feasible under autarky, but the countries demanded some of each good. Thus the countries will want some of each good after specialization, and the only way to accomplish this is through trade. Now if the world can produce more of both goods through specialization, clearly there must be a way to divide the surplus between the two countries so that each country ends up with more of both goods after trade than it had in autarky.

The surplus in world production amounts to five extra pounds of cheese and two extra gallons of wine. To assure that trade is advantageous for the two countries, each must have at least as much to consume of one good and more to consume of the other. Suppose we split the wine surplus equally and give three extra pounds of cheese to France and two extra pounds to the United States. Since the United States consumed sixteen pounds of cheese and four gallons of wine in autarky, it would now have eighteen pounds of cheese and five gallons of wine after specialization and trade. France, which began with three pounds of cheese and two gallons of wine in autarky, would now have six pounds of cheese and three gallons of wine. Consumption and production after trade for the two countries is shown in Table 2.6.4.

Table 2.6.4: Consumption and Production after Trade

Country	Cheese (lbs.)		Wine (gals.)	
	Consumption	Production	Consumption	Production
United States	18	24	5	0
France	6	0	3	8
World Total	24	24	8	8

In order for consumption of both goods to be higher in both countries, trade must occur. In the example, the United States is consuming five gallons of wine and producing none, so it must import the five gallons from France. France is consuming six pounds of cheese with no cheese production, so it must import the six pounds from the United States. The terms of trade is TOT = 5 gals./6 lbs., or 5/6 gals./lb.

Exercise Conclusion

The Ricardian model numerical example assumes that countries differ in their production technologies such that one of the countries is absolutely more productive than the other in the production of each of the two goods. If these two countries specialize in their comparative advantage good, then world production rises for both goods. Increased output occurs even though there is no increase in the amount of labor input in the world; thus the example demonstrates that specialization can raise world production efficiency. Because of the increase in output, it is possible to construct a terms of trade between the countries such that each country consumes more of each good with specialization and trade than was possible under autarky. Thus both countries can gain from trade. The surprising result of this example is that a country that is technologically inferior to another in the production of all goods can nevertheless benefit from trade with that country.

Limitations of the Numerical Example

A numerical example can display only one possible outcome for the model. As such, all conclusions should be viewed as possibilities rather than general results of the model. With further thought, there are some problems with the example. First, it is conceivable that with a different choice for the country's autarky production and consumption points, world output might not rise for both goods upon specialization. In this case, we could not be sure that both countries would gain from trade. Second, since we merely made up a terms of trade that generated the interesting conclusion, we could ask whether a favorable terms of trade is likely to arise. Is it possible to make up a different terms of trade such that one country enjoys all the benefits of increased production while the other is made worse off? How can we be sure that this outcome would not arise? Finally, even if the country has more of both goods after trade, can we be sure that all consumers would have more of both goods? Perhaps some consumers would have more and others less.

The answer to some of these questions can be found by describing more carefully some of the features of the model. In particular, we must describe the relationship between prices and wages. Using these relationships, we can explain the impact of free trade on the price ratio and the effect of trade on the distribution of income.

KEY TAKEAWAYS

- In a two-country, two-good, one-factor Ricardian model, specialization in each country's comparative advantage good can raise world output of both goods.
- An increase in world output given the same level of inputs is called an increase in world productive efficiency.
- By choosing an appropriate terms of trade, both countries can consume more of both goods relative to autarky.

Exercise 2.6.1

1. Consider a Ricardian model with two countries, the United States and the EU, producing two goods, soap bars and toothbrushes. Suppose the productivities are $a_{LS}^{US} = 2$ soap bars per worker, $a_{LS}^{E} = 4$ soap bars per worker, $a_{LT}^{US} = 8$ toothbrushes per worker, and $a_{LT}^{E} = 4$ toothbrushes per worker. Assume the United States has 3,200 workers and the EU has 4,000 workers.
   a. Plot the PPFs for both countries.
   b. Determine how much each country would produce if it specialized in its comparative advantage good.

c. Now choose a plausible autarky production point on each country's PPF such that the world output of each good is exceeded by the outputs determined in part b.
d. Determine a terms of trade between the two countries that will assure that both countries can consume more of both goods after trade.

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2.7: Relationship between Prices and Wages 2.7: Relationship between Prices and WagesEdit Update titlecancel

Learning Objectives

1. Learn how worker wages and the prices of the goods are related to each other in the Ricardian model.

The Ricardian model assumes that the wine and cheese industries are both perfectly competitive. Among the assumptions of perfect competition is free entry and exit of firms in response to economic profit. If positive profits are being made in one industry, then because of perfect information, profit-seeking entrepreneurs will begin to open more firms in that industry. The entry of firms, however, raises industry supply, which forces down the product price and reduces profit for every other firm in the industry. Entry continues until economic profit is driven to zero. The same process occurs in reverse when profit is negative for firms in an industry. In this case, firms will close down one by one as they seek more profitable opportunities elsewhere. The reduction in the number of firms reduces industry supply, which raises the product's market price and raises profit for all remaining firms in the industry. Exit continues until economic profit is raised to zero. This implies that if production occurs in an industry, be it in autarky or free trade, then economic profit must be zero.

Profit is defined as total revenue minus total cost. Let Π_C represent profit in the cheese industry. We can write this as

$$\Pi_C = P_C Q_C - w_C L_C = 0,$$

where P_C is the price of cheese in dollars per pound, w_C is the wage paid to workers in dollars per hour, $P_C Q_C$ is total industry revenue, and $w_C L_C$ is total industry cost. By rearranging the zero-profit condition, we can write the wage as a function of everything else to get

$$w_C = \frac{P_C Q_C}{L_C}.$$

Recall that the production function for cheese is $Q_C = \frac{L_C}{a_{LC}}$. Plugging this in for Q_C above yields

$$w_C = \frac{P_C \left(\frac{L_C}{a_{LC}}\right)}{L_C} = \frac{P_C}{a_{LC}}$$

or just

$$w_C = \frac{P_C}{a_{LC}}.$$

If production occurs in the wine industry, then profit will be zero as well. By the same algebra we can get

$$w_W = \frac{P_W}{a_{LW}}.$$

KEY TAKEAWAYS

- The assumption of free entry and exit in perfect competition implies that industry profit will be zero when the market is in equilibrium.
- Nominal wages (meaning wages measured in dollars) to workers in each industry will equal the output price divided by the unit labor requirement in that industry.

Exercise 2.7.1

1. Starting with the zero-profit condition in the wine industry, show why the winemaker's wage depends on the price of wine and wine productivity.

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2.8: Deriving the Autarky Terms of Trade 2.8: Deriving the Autarky Terms of TradeEdit Update titlecancel

Learning Objectives

1. Learn how the autarky terms of trade is determined in a Ricardian model.
2. Learn why free and costless labor mobility and homogeneous labor force wages to be equal in both industries.

The Ricardian model assumes that all workers are identical, or homogeneous, in their productive capacities and that labor is freely mobile across industries. In autarky, assuming at least one consumer demands some of each good, the country will produce on the interior of its PPF. That is, it will produce some wine and some cheese.

Question: Profit-maximizing firms would never set a wage rate above the level set in the other industry. Why?

Answer: Suppose the cheese industry set a higher wage such that $w_C > w_W$. In this case, all the wine workers would want to move to the cheese industry for any wage greater than wW. Since their productivity in cheese is the same as the current cheese workers and since it does not cost anything for them to move to the other industry, the cheese industry could lower their costs and raise profit by paying a lower wage. To maximize profit, they must lower their wage. Thus only equal wage rates can be sustained between two perfectly competitive producing industries in the Ricardian model.

In autarky, then, $w_C = w_W$. Plugging in the relationships derived in the previous section yields

$$\frac{P_W}{a_{LW}} = \frac{P_C}{a_{LC}}$$

or

$$\left(\frac{P_C}{P_W}\right)_{Aut} = \frac{a_{LC}}{a_{LW}}.$$

This means that the autarky price ratio (cheese over wine) or terms of trade equals the opportunity cost of producing cheese. Another way to say the same thing is that the price of cheese (in terms of wine) in autarky equals the opportunity cost of producing cheese (in terms of wine).

Question: Why is there an autarky terms of trade when there is no trade in autarky?

Answer: The Ricardian model represents a barter economy. Even though we define prices and wages in monetary terms, all relevant solutions in the model are described in terms of ratios in which the money or dollars cancel out. Never will we solve explicitly for the dollar price of wine or cheese or the dollar wage rate.

Thus a good way to think about how the model works is to imagine that workers go to work in their respective industries and produce wine or cheese. At the end of the day, they are paid not in dollars but in goods. The cheese workers' wage is a quantity of cheese. The wine workers earn a quantity of wine. Since workers, as consumers, presumably will desire some wine and some cheese for their evening dinner, they must first go to a market to trade some of their wages (goods) for some of the other goods available at the market.

In autarky, cheese workers and wine workers come together on the domestic market to trade their goods. The autarky price ratio or terms of trade represents the amount of wine that exchanges per unit of cheese on the domestic barter market.

KEY TAKEAWAY

- The autarky terms of trade (cheese in terms of wine) equals the opportunity cost (of cheese in terms of wine).

Exercise 2.8.1

1. Use the information below to answer the following questions.

Table 2.8.1: Labor Productivity in Italy and Germany

	Beer	Pizza

	Beer	Pizza
Italian Labor Productivity	6 bottles/hour	6 pizzas/hour
German Labor Productivity	5 bottles/hour	3 pizzas/hour

a. Which country has the absolute advantage in beer? In pizza? Explain why.
b. Explain why Italy's comparative advantage good is the one it can produce "most better," while Germany's comparative advantage good is the one it can produce "least worse."
c. What autarky price ratios $\left(\frac{P_B}{P_P}\right)$ would prevail in each country? Explain. Be sure to include units.

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2.9: The Motivation for International Trade and Specialization 2.9: The Motivation for International Trade and SpecializationEdit Update titlecancel

Learning Objectives

1. Learn that differences in autarky prices (terms of trade) coupled with the profit-seeking motive and the absence of transportation costs induce international trade.
2. Learn how the price changes that occur with trade induce specialization.

The Ricardian model can be used to explain Adam Smith's *invisible hand*. The invisible hand refers to the ability of the market, or the market mechanism, to allocate resources to their best possible uses. In the presentation of the Ricardian model it seems as if one must apply a mathematical formula (comparing opportunity costs) to identify which country has a comparative advantage and then instruct firms (perhaps by government decree) as to which goods they ought to produce.

Fortunately, none of this is necessary if the market, or the invisible hand, is allowed to operate. Instead, firms, or their owners, motivated entirely by profit, would automatically choose the appropriate good to produce and trade. In so doing, they would be led to maximize the output of goods and satisfy consumer demands to the extent possible given the limited resources in the economy. In *The Wealth of Nations*, Adam Smith said, "[An individual is] led by an *invisible hand* to promote an end which was no part of his intention."See Book 4, Chapter 2 in Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, McMaster University Archive for the History of Economic Thought, http://socserv2.socsci.mcmaster.ca/~econ/ugcm/3ll3/smith/wealth/wealbk04. Emphasis mine. Maximizing society's welfare is not the profit seeker's intention; instead, he intends only to do what is best for himself. However, by virtue of the wonders of the market mechanism, everyone is made better off as well. Here's how it works in this context.

The Market Motivation to Trade

Suppose two countries, the United States and France, are initially in autarky. Assume the United States has a comparative advantage in cheese production relative to France. This implies

$$\frac{a_{LC}}{a_{LW}} < \frac{a^*_{LC}}{a^*_{LW}}.$$

This, in turn, implies

$$\left(\frac{P_C}{P_W}\right)_{Aut} < \left(\frac{P^*_C}{P^*_W}\right)_{Aut}.$$

This means that the autarky price of cheese in France (in terms of wine) is greater than the autarky price of cheese in the United States. In other words, you can buy more wine with a pound of cheese in the French market than you can in the U.S. market.

Similarly, by rearranging the above inequality,

$$\left(\frac{P_W}{P_C}\right)_{Aut} > \left(\frac{P^*_W}{P^*_C}\right)_{Aut},$$

which means that the autarky price of wine is higher in the United States (in terms of cheese) than it is in France. In other words, a gallon of wine can be exchanged for more cheese in the United States than it will yield in the French market.

Next, suppose the barriers to trade that induced autarky are suddenly lifted and the United States and France are allowed to trade freely. For simplicity, we assume there are no transportation costs to move the products across borders.

Differences in price ratios between countries and the desire to make more profit are sufficient to generate international trade. To explain why, it is useful to incorporate some friction in the trading process and to tell a dynamic story about how a new free trade equilibrium is reached.

First, note that the higher price of cheese in France means that cheese workers in the United States could get more wine for their cheese in France than in the United States. Suppose one by one over time cheese workers begin to take advantage of the opportunity for trade and begin to sell their cheese in the French market. We assume that some workers are more internationally adroit and thus move first. The motivation here is profit. Workers want to get more for the goods they are selling. As the U.S.

cheese workers appear in the French market, the supply of cheese increases. This also represents exports of cheese from the United States to France. The increased supply will reduce the price of cheese in the French market, meaning that over time, the quantity of wine obtained for a pound of cheese will fall. Thus $\frac{P_C^*}{P_W^*}$ falls once trade is opened.

Next, consider French wine workers immediately after trade opens. Since the price of wine is higher in the United States, French wine workers will one by one over time begin to sell their wine in the U.S. market. This represents exports of wine from France to the United States. The increased supply of wine to the United States lowers its price on the U.S. market. Thus each gallon of wine will trade for less and less cheese. This means $\frac{P_W}{P_C}$ falls, which also means that its reciprocal, $\frac{P_C}{P_W}$, rises.

These shifts in supply will continue as long as the prices for the goods continue to differ between the two markets. Once the prices are equalized, there will be no incentive to trade any additional amount. Equalized prices mean that a pound of cheese will trade for the same number of gallons of wine in both markets. The free trade prices will be those prices that equalize total supply of each good in the world with total demand for each good.

As a result of trade, the price ratio, or terms of trade, will lie in between the two countries' autarky price ratios. In other words, the following inequality will result:

$$\left(\frac{P_C}{P_W}\right)_{Aut} < \left(\frac{P_C}{P_W}\right)_{FT} < \left(\frac{P_C^*}{P_W^*}\right)_{Aut}.$$

Whether the free trade price ratio will be closer to the U.S. or France's autarky price ratio will depend on the relative demands of cheese to wine in the two countries. These demands in turn will depend on the size of the countries. If the United States is a much larger country, in that it has a larger workforce, it will have a larger demand for both wine and cheese. When trade opens, the addition of France's supply and demand will have a relatively small effect on the U.S. price. Thus the free trade price ratio will be closer to the U.S. autarky price ratio.

The Market Motivation for Specialization

Once the prices begin to change because of trade, they will also affect the profitability of producing the two goods. In the United States, the price of cheese, its export good, will rise in moving to trade, while the price of wine, its import good, will fall. As shown above, the final price ratio in the United States (cheese to wine) in free trade will be greater than the autarky price ratio, so that

$$\left(\frac{P_C}{P_W}\right)_{FT} > \left(\frac{P_C}{P_W}\right)_{Aut}.$$

Because the autarky price ratio equals the opportunity cost of cheese production, it follows that

$$\left(\frac{P_C}{P_W}\right)_{FT} > \frac{a_{LC}}{a_{LW}}.$$

Note that this inequality will be true as soon as the price deviates from the autarky price and long before the free trade prices are reached. This also means that shortly after trade begins, the price of cheese (measured in terms of wine) exceeds the cost of producing cheese (also measured in terms of wine). Normally, when we measure the price and cost in dollar terms, when the price per unit exceeds the cost per unit, then positive profit is realized. The same is true when we measure the price and cost in terms of wine. Thus as soon as trade begins to change prices, cheese production becomes more profitable in the United States. And because we assume people are profit seeking, they will therefore seek to expand cheese production. But where will they find the workers to do so? There is only one place: wine workers. To expand cheese production, the country will have to give up wine production. But why do that?

Well, when the price of cheese in terms of wine exceeds the opportunity cost of cheese, it is also true, via cross multiplication, that

$$\frac{a_{LW}}{a_{LC}} > \left(\frac{P_W}{P_C}\right)_{FT}.$$

This means that the cost of producing wine (in terms of cheese) exceeds the price of wine (also in terms of cheese). Because cost is greater than price, profit is negative in the wine industry in the United States. That means wine producers have an incentive to shut down. And when they do, those workers can be moved into the cheese industry, where profit seekers wish to expand.

Thus, as long as individuals are profit seeking, the price differences that arise in autarky will be sufficient to induce export and specialization in the comparative advantage good. There is no need to use the complicated opportunity cost formula to first identify

the comparative advantage good and no need to tell anyone what to do. Instead, the free market mechanism—Adam Smith's invisible hand—is all that it takes.

KEY TAKEAWAYS

- A country with the lower price for a good in terms of the other good and compared to the other country will export that good.
- A country with the higher price for a good in terms of the other good and compared to the other country will import that good.
- Trade will push the lower autarky price ratio up and the higher autarky price ratio down.
- The free trade price ratio (or terms of trade) will be equal in both countries and will lie between the two countries' autarky terms of trade.
- Profit-seeking behavior in a market will induce firms to export the comparative advantage good.
- Profit-seeking behavior in a market will induce a country to specialize in the comparative advantage good.

Exercise 2.9.1

1. Identify which country exports cheese if in autarky 1 lb. of cheese trades for 2 gals. of wine in Australia and 3 gals. of wine in New Zealand.
2. Suppose Canada and Brazil are defined by a Ricardian model and have exogenous variables with the values below.

Table 2.9.1: Exogenous Variable Values

Canada	$a_{LC} = 10$	$a_{LW} = 20$	$L = 24$
Brazil	$a^*_{LC} = 5$	$a^*_{LW} = 15$	$L^* = 24$

where

- L = the labor endowment in Canada (the total number of hours the workforce is willing to provide)
- a_{LC} = unit labor requirement in cheese production in Canada (hours of labor necessary to produce one unit of cheese)
- a_{LW} = unit labor requirement in wine production in Canada (hours of labor necessary to produce one unit of wine)
- * All starred variables are defined in the same way but refer to the process in Brazil.

a. Calculate the autarky terms of trade in each country.
b. Identify the trade pattern that would arise.
c. Specify a plausible free trade price ratio.

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2.10: Welfare Effects of Free Trade- Real Wage Effects 2.10: Welfare Effects of Free Trade- Real Wage EffectsEdit Update titlecancel

Learning Objectives

1. Learn why real wages are an appropriate way to measure individual well-being.
2. Learn how the real wages formulae are derived from zero-profit conditions.

There are two ways to evaluate the welfare effects of trade in the Ricardian model. The first method evaluates the real wages of workers as two countries move from autarky to free trade. It is shown that the purchasing power of all workers' wages in both countries would rise in moving to free trade.

The focus on real wages allows us to see the effect of free trade on individual consumers in the economy. Nominal wages are not sufficient to tell us if workers gain since, even if wages rise, the price of one of the goods also rises when moving to free trade. If the price rises by a greater percentage than the wage, the ability to purchase that good falls and the worker may be worse off.

For this reason, we must consider real wages. The **real wage** represents the purchasing power of wages—that is, the quantity of goods the wages will purchase. Real wages are typically measured by dividing nominal wages by a price index. The price index measures the average level of prices relative to a base year. The nominal wage is the amount of dollars the worker receives.

In this model, we need not construct a price index since there are only two goods. Instead, we will look at the real wage of workers in terms of the purchasing power of each good. In other words, we will solve for a real wage in terms of purchases of both wine and cheese.

Numerical Example: Calculating a Real Wage

Consider the real wage of a worker in terms of cheese. Suppose the worker earns \$10 per hour and the price of cheese is \$5 per pound. The real wage can be found by dividing the wage by the price to get

$$\frac{w}{P_C} = \frac{\$10/hr}{\$5/lb} = 2lbs/hr.$$

This means the worker can buy two pounds of cheese with every hour of work.

The Real Wage of Cheese Workers in Terms of Cheese

The real wage of cheese workers in terms of cheese is the quantity of cheese that a cheese worker can buy with a unit of work. It is calculated by dividing the worker's wage by the price of cheese, written as $\frac{w_C}{P_C}$. Since zero profit results in each producing industry, we can simply rewrite the relationship derived above to construct the following formula for the real wage:

$$\frac{w_C}{P_C} = \frac{1}{a_{LC}}.$$

This means that the real wage of a worker in terms of how much cheese can be purchased is equal to labor productivity in cheese production. In other words, the amount of cheese that a worker can *buy* per period of work is exactly the same as the amount of cheese the worker can *make* in that same period.

The Real Wage of Cheese Workers in Terms of Wine

The real wage of cheese workers in terms of wine is the quantity of wine that a cheese worker can buy with a unit of work. It is calculated by dividing the cheese worker's wage by the price of wine and is written as $\frac{w_C}{P_W}$. Using the relationship between wages and prices when zero profit results in the cheese industry implies that

$$\frac{w_C}{P_W} = \left(\frac{P_C}{a_{LC}}\right)\frac{1}{P_W} = \frac{1}{a_{LC}}\frac{P_C}{P_W}.$$

This means that the real wage of cheese workers in terms of wine is the product of labor productivity in the cheese industry and the price ratio. Labor productivity gives the quantity of cheese a cheese worker makes in an hour of work. The price ratio gives the quantity of wine that exchanges for each unit of cheese. The product gives the quantity of wine that a cheese worker can buy with a

unit of work. To calculate the autarky real wage, simply plug in the autarky price ratio. To calculate the free trade real wage, plug in the free trade price ratio.

The Real Wage of Wine Workers in Terms of Wine

The real wage of wine workers in terms of wine is the quantity of wine that a wine worker can buy with a unit of work. It is calculated by dividing the worker's wage by the price of wine, written as $\frac{w_W}{P_W}$. Since zero profit results in each producing industry, we can rewrite the relationship to get

$$\frac{w_W}{P_W} = \frac{1}{a_{LW}}.$$

As with cheese, the real wage of a worker in terms of how much wine can be purchased is equal to labor productivity in wine production. In other words, the amount of wine that a worker can buy per period of work is exactly the same as the amount of wine the worker can make in that same period.

The Real Wage of Wine Workers in Terms of Cheese

The real wage of wine workers in terms of cheese is the quantity of cheese that a wine worker can buy with a unit of work. It is calculated by dividing the wine worker's wage by the price of cheese, written as $\frac{w_W}{P_C}$. Using the relationship between prices and wages when zero profit results in the wine industry implies that

$$\frac{w_W}{P_C} = \left(\frac{P_W}{a_{LW}}\right)\frac{1}{P_C} = \frac{P_W}{a_{LW}P_C}.$$

This means that the real wage of wine workers in terms of cheese is the product of labor productivity in the wine industry and the price ratio. Labor productivity gives the quantity of wine a wine worker makes in an hour of work. The price ratio gives the quantity of cheese that exchanges for each unit of wine. The product gives the quantity of cheese that a wine worker can buy with a unit of work. To solve for the autarky real wage, simply plug in the autarky price ratio. To find the free trade real wage, plug in the free trade price ratio.

Real Wages in Autarky

To calculate autarky real wages, we simply plug the autarky price ratio into the real wage formulae.

Recall that the autarky price ratio is

$$\left(\frac{P_C}{P_W}\right)_{Aut} = \frac{a_{LC}}{a_{LW}}. \tag{2.10.1}$$

Plugging this in and simplifying yields the results in Table 2.10.1.

Table 2.10.1: Autarky Real Wages

	In Terms of Cheese	In Terms of Wine
Real Wage of Cheese Workers	$\frac{w_C}{P_C} = \frac{1}{a_{LC}}$	$\frac{w_C}{P_W} = \frac{1}{a_{LC}}\left(\frac{a_{LC}}{a_{LW}}\right) = \frac{1}{a_{LW}}$
Real Wage of Wine Workers	$\frac{w_W}{P_C} = \frac{1}{a_{LW}}\left(\frac{a_{LW}}{a_{LC}}\right) = \frac{1}{a_{LC}}$	$\frac{w_W}{P_W} = \frac{1}{a_{LW}}$

where

- P_C = price of cheese
- P_W = price of wine
- w_C = wage paid to cheese workers
- w_W = wage paid to wine workers
- a_{LC} = unit labor requirement in cheese production in the United States (hours of labor necessary to produce one unit of cheese)
- a_{LW} = unit labor requirement in wine production in the United States (hours of labor necessary to produce one unit of wine)

Notice that in autarky, the real wage of cheese workers is exactly the same as the real wage of wine workers with respect to purchases of both goods. This occurs because labor is assumed to be homogeneous—that is, all labor is the same—and because there is free mobility between industries. (If workers were paid different wages, the lower-wage workers would move to the higher-wage industry.)

Comparison of Autarky Real Wages between Countries

Suppose the United States has an absolute advantage in the production of both goods. In this case, $\frac{1}{a_{LC}} > \frac{1}{a^*_{LC}}$ and $\frac{1}{a_{LW}} > \frac{1}{a^*_{LW}}$. This implies that the real wages of workers in both industries in the United States are higher than the real wages in France. Put another way, workers in France earn lower wages in both industries.

Sometimes cross-country wage comparisons are made and it is suggested that firms in a high-wage country cannot compete with firms in low-wage countries. However, wage comparisons of this kind are not sufficient in this model to determine who will produce what or whether trade can be advantageous. Instead, what matters is relative wage comparisons. In this model, a country will tend to specialize in the good in which it has the greatest real wage advantage. Thus if

$$\frac{1/a_{LC}}{1/a^*_{LC}} > \frac{1/a_{LW}}{1/a^*_{LW}},$$

then the United States has relatively higher real wages with respect to cheese purchases than it does in wine purchases. When trade opens, the United States will specialize in its comparative advantage good, which, by rearranging the above inequality, can easily be shown to be cheese.

Effects of Free Trade on Real Wages

Suppose two countries, the United States and France, move from autarky to free trade. If the United States has the comparative advantage in cheese production, then

$$\frac{a_{LC}}{a_{LW}} < \frac{a^*_{LC}}{a^*_{LW}}, \tag{2.10.2}$$

which implies

$$\left(\frac{P_C}{P_W}\right)_{Aut} < \left(\frac{P^*_C}{P^*_W}\right)_{Aut}. \tag{2.10.3}$$

When the two countries move to free trade, the free trade price ratio will lie somewhere between the autarky price ratios. This means that $\left(\frac{P_C}{P_W}\right)$ rises in the United States when moving from autarky to free trade, while $\left(\frac{P^*_C}{P^*_W}\right)$ falls when moving to free trade.

The other major change that occurs is that the United States specializes in cheese production, while France specializes in wine production. This means that real wages in free trade for wine workers in the United States need not be calculated since the United States will no longer have any wine workers. Similarly, real wages for cheese workers in France need not be calculated.

Thus we can calculate the changes in real wages shown in Table 2.10.1.

Table 2.10.1: Changes in Real Wages (Autarky to Free Trade)

	In Terms of Cheese	In Terms of Wine
Real Wage of U.S. Cheese Workers	$\frac{w_C}{P_C} = \frac{1}{a_{LC}}$ (no change)	$\frac{w_C}{P_W} = \frac{1}{a_{LC}}\frac{P_C}{P_W}$ (rises)
Real Wage of French Wine Workers	$\frac{w_W}{P_C} = \frac{1}{a_{LW}}\frac{P_W}{P_C}$ (rises)	$\frac{w_W}{P_W} = \frac{1}{a_{LW}}$ (no change)

First, consider the fate of U.S. cheese workers. Since the unit labor requirement for cheese does not change in moving to free trade, there is also no change in the real wage in terms of cheese. However, since the price of cheese in terms of wine rises, U.S. cheese workers can get more wine for each unit of cheese in exchange. Thus the real wage of cheese workers in terms of wine rises. This means cheese workers are at least as well off in free trade as they were in autarky.

The worst outcome occurs if a cheese worker has no demand for wine. Perhaps an individual abstains from alcohol consumption. In this case, the worker would be able to buy just as much cheese in free trade as in autarky, but no more. Such a person would receive no benefit from free trade. However, every worker who demands both wine and cheese will be able to buy more of both goods.

As for the workers who worked in the wine industry in the United States in autarky, they are now cheesemakers earning cheesemaker wages. Since real wages for wine workers were the same as wages for cheese workers in autarky, and since cheese workers are no worse off with free trade, then wine workers must also be no worse off in free trade. Of course, the model assumes that the movement of workers from one industry to another is costless. In the immobile factor model, we address the implications of adjustment costs across industries.

In France, the real wage of winemakers in terms of how much wine they can buy remains constant, while the real wage in terms of cheese must go up. French cheesemakers have all become winemakers because of specialization, which means all French workers are no worse off and most likely better off as a result of free trade.

The likely welfare effect of free trade, then, is that everyone in both trading countries benefits. At the very worst, some individuals will be just as well off as in autarky. This result occurs for any free trade price ratio that lies between the autarky price ratios.

In David Ricardo's original numerical example, he demonstrated that when both countries specialize in their comparative advantage goods and engage in free trade, both countries can experience gains from trade. However, his demonstration was only true for particular numerical values. By calculating real wage changes, it is shown that it doesn't matter which price ratio emerges in free trade as long as it is between the autarky prices. Also, because all workers receive the same wage in each country, the real wage calculations tell us that everyone benefits equally in each country.

KEY TAKEAWAYS

- Real wages are an appropriate measure of worker well-being because they represent the purchasing power of the wage.
- Real wages are positively related to labor productivity in the Ricardian model.
- When countries move to free trade, the real wage with respect to the exported good remains constant, but the real wage with respect to the imported good rises in both countries.
- If workers prefer to consume a positive amount of both goods, then when a country moves to free trade, every worker will be able to buy more of both goods. In other words, everyone in both countries will benefit from trade.

Exercise 2.10.1

1. Consider a Ricardian model. Suppose the U.S. unit labor requirement for timber is three, its unit labor requirement for videocassette recorders (VCRs) is eight, and it has forty-eight million workers. Suppose Taiwan's unit labor requirement for timber is six, its unit labor requirement for VCRs is two, and it has forty-eight million workers.
   a. Which country has the absolute advantage in each good? Which country has the comparative advantage? Explain.
   b. Calculate each country's autarky price ratio. Then make up a plausible free trade price ratio. What are the levels of production and the pattern of trade when free trade occurs?
   c. Calculate real wages for workers in both countries in autarky and free trade. Explain why everyone benefits from trade.
   d. Suppose the United States implements a costless technology improvement program that lowers the U.S. unit labor requirement for timber to two. What effect would this have on the world supply of timber? What effect would this have on the free trade price ratio? Explain how real wages would change in both the United States and Taiwan.

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2.11: The Welfare Effects of Free Trade- Aggregate Effects 2.11: The Welfare Effects of Free Trade- Aggregate EffectsEdit Update titlecancel

Learning Objectives

1. Learn how national welfare can rise for both countries when moving to free trade in a Ricardian model.

The second and more traditional method to evaluate the effects of free trade uses an aggregate welfare function to depict the overall welfare effects that would accrue to the nation. This method allows one to demonstrate the benefits that arise from increased production and consumption efficiency.

Figure 2.11.1 compares autarky and free trade equilibriums for the United States and France. The U.S. PPF is given by the red line, while France's PPF is given by the green line. We assume both countries share the same aggregate preferences represented by the indifference curves in the diagram. Note also that if the United States and France had the same size labor force, then the relative positions of the PPFs imply that the United States has the absolute advantage in cheese production, while France has the absolute advantage in wine production. Also, if each country has an absolute advantage in one of the two goods, then each country must also have the comparative advantage in that good.

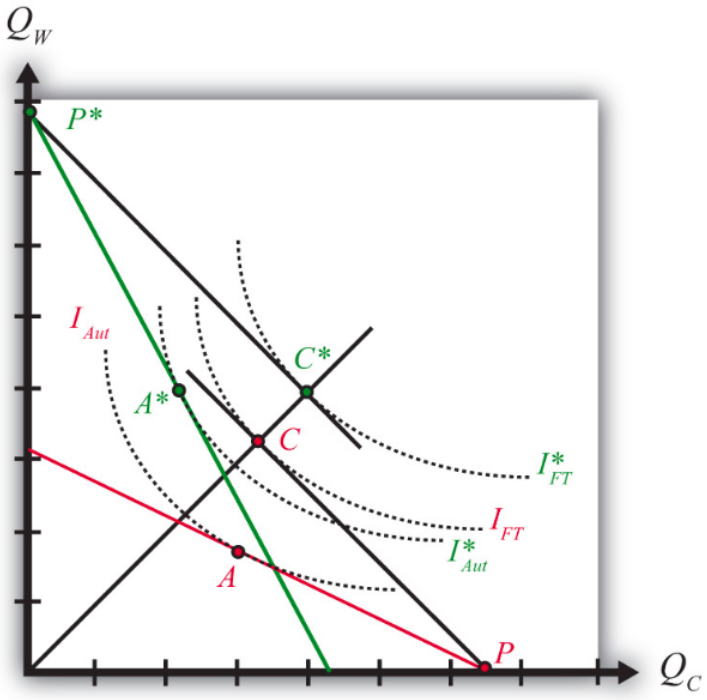


Figure 2.11.1: Comparing Autarky and Free Trade Equilibriums

The U.S. autarky production and consumption points are determined where the aggregate indifference curve is tangent to the U.S. PPF. This occurs at the red point A. The United States realizes a level of aggregate utility that corresponds to the indifference curve I_{Aut}.

The U.S. production and consumption points in free trade are at the red P and C, respectively. The United States specializes in production of its comparative advantage good but trades to achieve its consumption point at the red C. In free trade, the United States realizes a level of aggregate utility that corresponds to the indifference curve I_{FT}. Since the free trade indifference curve I_{FT} lies to the northeast of the autarky indifference curve I_{Aut}, national welfare rises as the United States moves to free trade.

France's autarky production and consumption points are determined by finding the aggregate indifference curve that is tangent to the French PPF. This occurs at the green point A^*. France realizes a level of aggregate utility that corresponds to the indifference curve I^*_{Aut}.

French production and consumption points in free trade are the green P^* and C^*, respectively. In free trade, France realizes a level of aggregate utility that corresponds to the indifference curve I^*_{FT}. Since the free trade indifference curve I^*_{FT} lies to the northeast of

the autarky indifference curve I^*_{Aut}, national welfare rises as France moves to free trade.

KEY TAKEAWAYS

- National welfare can be represented with a set of aggregate indifference curves plotted in a PPF diagram.
- Free trade will raise aggregate welfare for both countries relative to autarky. Both countries are better off with free trade.

Exercise 2.11.1

1. Suppose each country specialized in the wrong good. Depict an equilibrium using the free trade prices in each country to show why national welfare would fall in free trade relative to autarky.

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2.12: Appendix- Robert Torrens on Comparative Advantage 2.12: Appendix- Robert Torrens on Comparative AdvantageEdit Update titlecancel

The first known statement of the principle of comparative advantage and trade appears in an article by Robert Torrens in 1815 titled *Essay on the External Corn Trade*. Torrens begins by describing the basic idea of absolute advantage as described by Adam Smith but goes on to suggest that the simple intuition is erroneous. He wrote,

Suppose that there are in England, unreclaimed districts, from which corn might be raised at as small an expense of labor and capital, as from the fertile plains of Poland. This being the case, and all other things the same, the person who should cultivate our unreclaimed districts, could afford to sell his produce at as cheap a rate as the cultivator of Poland: and it seems natural to conclude, that if industry were left to take its most profitable direction, capital would be employed in raising corn at home, rather than bringing it in from Poland at an equal prime cost, and at much greater expense of carriage. But this conclusion, however obvious and natural it may, at first sight, appear, might, on closer examination, be found entirely erroneous. If England should have acquired such a degree of skill in manufactures, that, with any given portion of her capital, she could prepare a quantity of cloth, for which the Polish cultivator would give a greater quantity of corn, then she could, with the same portion of capital, raise from her own soil, then, tracts of her territory, though they should be equal, nay, even though they should be superior, to the lands in Poland, will be neglected; and a part of her supply of corn will be imported from that country.

In the first part of the passage, Torrens considers a case in which the cost of producing corn, in terms of labor and capital usage, is the same in England as it is in Poland. He points out that producers could afford to sell both English and Polish corn at the same low price. However, since it would cost additional resources to transport the corn from Poland to England (expense of carriage), it makes intuitive sense that corn should be produced in England, rather than imported, since Polish corn would wind up with a higher price than English corn in the English market.

He continues by suggesting that this conclusion is erroneous. Why? Suppose England were to remove some capital (and labor) from the production of corn and move it into the production of manufactured goods. Suppose further that England trades this newly produced quantity of manufactured goods for corn with Poland. This outcome would be better for England if the amount of corn that Poland is willing to trade for the manufactured goods is greater than the amount of corn that England has given up producing. If the excess corn that Poland is willing to trade is sufficiently large, then it may be more than enough to pay for the transportation costs between the two countries. Torrens's final point is that this trading outcome may be superior for England even if the lands of England should be superior to the lands of Poland—in other words, even if corn can be more efficiently produced in England (i.e., at lower cost) than in Poland.

This is the first explicit description of one of the major results from the theory of comparative advantage. It reflects Torrens's understanding that a country might conceivably benefit from free trade while reducing or eliminating production of a good it is technologically superior at producing.

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CHAPTER OVERVIEW

3: The Pure Exchange Model of Trade

The pure exchange model is one of the most basic models of trade and is even simpler than the Ricardian model in Chapter 2. The model develops a simple story: What if one person who possesses one type of good (say apples) meets up with another person who possesses another type of good (say oranges)? What could we say about two people trading apples for oranges?

As it turns out, we can say quite a bit. The pure exchange model demonstrates the advantages of mutually voluntary exchange. And when the simple story is extended to include a second apple seller, the model shows the positive and negative effects associated with competition. When the competition is from another country, the model demonstrates how international trade can generate both winners and losers in the economy. This chapter offers the first example showing that trade can cause a redistribution of income, with some winning from trade and others losing from trade.

3.1: A Simple Pure Exchange Economy
3.2: Determinants of the Terms of Trade
3.3: Example of a Trade Pattern
3.4: Three Traders and Redistribution with Trade
3.5: Three Traders with International Trade
3.6: The Nondiscrimination Argument for Free Trade

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3.1: A Simple Pure Exchange Economy 3.1: A Simple Pure Exchange EconomyEdit Update titlecancel

Learning Objectives

1. Learn the definition of the terms of trade.
2. Learn how the terms of trade between two goods is equivalent to the ratio of dollar prices for the two goods.

The Ricardian model shows that trade can be advantageous for countries. If we inquire deeper and ask what is meant when we say a "country" benefits in this model, we learn it means that every individual, every worker, in both countries is able to consume more goods after specialization and trade. In other words, everyone benefits from trade in the Ricardian model. Everybody wins.

Unfortunately, though, this outcome is dependent on the assumptions made in the model, and in some important ways these assumptions are extreme simplifications. One critical assumption is that the workers in each country are identical; another is the free and costless ability of workers to move from one industry to another. If we relax or change these assumptions, the win-win results may not remain. That's what we will show in the pure exchange model and the immobile factor model.

For a variety of reasons, it is more common for trade to generate both winners and losers instead of all winners. Economists generally refer to a result in which there are both winners and losers as **income redistribution** because the winners can be characterized as receiving a higher real income, while those who lose suffer from a lower real income.

The simplest example of advantageous trade arising from differences in resource endowments can be shown with a pure exchange model. In this model, we ignore the production process and assume more simply that individuals are endowed with a stock of consumption goods. We also show that trade can result in a redistribution of income. The model and story are adapted from a presentation by James Buchanan about the benefits of international trade.James Buchanan, "The Simple Logic of Free Trade," *Proceedings of the First Annual Symposium of the Institute for International Competitiveness* (Radford, VA: Radford University, 1988), iii–x.

A Simple Example of Trade

Suppose there are two individuals: Farmer Smith and Farmer Jones. Farmer Smith lives in an orange grove, while Farmer Jones lives in an apple orchard. For years, these two farmers have sustained themselves and their families by collecting oranges and apples on their properties: Smith eats only oranges and Jones eats only apples.

One day these two farmers go out for a walk. Farmer Smith carries ten oranges with him in case he becomes hungry. Farmer Jones carries ten apples. Suppose these farmers meet. After a short conversation, they discover that the other farmer sustains his family with a different product, and the farmers begin to discuss the possibility of a trade.

The farmers consider trade for the simple reason that each prefers to consume a variety of goods. We can probably imagine the monotony of having to eat only apples or only oranges day after day. We can also probably imagine that having both apples and oranges would be better, although we might also prefer some fried chicken, mashed potatoes, a Caesar salad, and numerous other favorite foods, but that is not included as a choice for these farmers. As such, when we imagine trade taking place, we are also assuming that each farmer has a preference for variety in consumption. In some special cases, this assumption may not be true. For example, Farmer Jones might have a distaste for oranges, or he may be allergic to them. In that special case, trade would not occur.

Assuming trade is considered by the farmers, one question worth asking is, What factors will determine the **terms of trade**? The terms of trade is defined as the quantity of one good that exchanges for a quantity of another. In this case, how many apples can be exchanged for how many oranges? It is typical to express the terms of trade as a ratio. Thus, if one apple can be exchanged for four oranges, we can write the terms of trade as follows:

$$TOT = \frac{1\ apple}{4\ oranges} = \frac{1}{4}\ apple\ /\ orange,$$

where TOT refers to terms of trade. It is immaterial whether the ratio is written apples over oranges or oranges over apples, but to proceed, one or the other must be chosen.

The terms of trade is also equivalent to the ratio of prices between two goods. Suppose P_A is the price of apples (measured in dollars per apple) and P_O is the price of oranges (measured in dollars per orange). Then

$$TOT = \frac{P_O}{P_A} \left[\frac{\frac{\$}{orange}}{\frac{\$}{apple}} = \frac{\$}{orange} \times \frac{apple}{\$} = \frac{apples}{orange} \right].$$

To demonstrate the equivalency, consider the units of this price ratio shown in brackets above. After some manipulation, we can see that the dollars cancel and thus the price of oranges over the price of apples is measured in units of apples per orange. We can refer to this price ratio as the price of oranges in terms of apples—that is, how many apples one can get in exchange for every orange. Notice that the price of *oranges* over apples is in units of *apples* per orange. Similarly, $\frac{P_A}{P_O}$ has units of oranges per apple.This model and many others we will consider are actually barter economies. This means that no money is being exchanged between the agents. Instead, one good is exchanged for another good. However, since we are accustomed to evaluating values in monetary terms, we will often write important expressions, like the terms of trade, in terms of their monetary equivalents as we have done here.

KEY TAKEAWAYS

- The terms of trade is defined as how much of one good trades for one unit of another good in the market.
- The terms of trade between two goods (e.g., apples and oranges) is equivalent to the ratio of the dollar prices of apples and oranges.

Exercise 3.1.1

1. If two bushels of apples can be traded for three bushels of oranges, what is the terms of trade between apples and oranges?
2. If two bushels of apples can be traded for three bushels of oranges, how many bushels of oranges can be purchased with one bushel of apples?
3. If the price of ice cream is $3.50 per quart and the price of cheesecake is $4.50 per slice, what is the terms of trade between cheesecake and ice cream?

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3.2: Determinants of the Terms of Trade 3.2: Determinants of the Terms of TradeEdit Update titlecancel

Learning Objectives

1. Understand how the terms of trade for any two products between any two people will be affected by a wide variety of factors.
2. Recognize that many of the determinants correspond to well-known concerns in business and ethics.

The terms of trade ultimately decided on by the two trading farmers will depend on a variety of different and distinct factors. Next we describe many of these factors.

Preferences

The strength of each farmer's desire for the other product will influence how much he is willing to give up to obtain the other product. Economists assume that most products exhibit diminishing marginal utility. This means that the tenth orange consumed by Farmer Smith adds less utility than the first orange he consumes. In effect, we expect people to get tired of eating too many oranges. Since for most people the tenth orange consumed will be worth less than the first apple consumed, Farmer Smith would be willing to trade at least one orange for one apple. As long as the same assumption holds for Farmer Jones, the tenth apple for him will be worth less than the first orange, and he will be willing to trade at least one for one. How many more oranges might trade for how many more apples will depend on how much utility each farmer gets from successive units of both products: in other words, it depends on the farmers' preferences.

Uncertainty

In this situation, each farmer is unlikely to have well-defined preferences. Farmer Smith may never have tasted an apple, and Farmer Jones may never have tasted an orange. One simple way to resolve this uncertainty is for the farmers to offer free samples of their products before an exchange is agreed on. Without a sample, the farmers would have to base their exchanges on their expectations of how they will enjoy the other product. Free samples, on the other hand, can be risky. Suppose a sample of oranges is provided and Farmer Jones learns that he hates the taste of oranges. He might decide not to trade at all.

To overcome uncertainty in individual preferences, many consumer products are offered in sample sizes to help some consumers recognize that they do have a preference for the product. This is why many supermarkets offer free samples in their aisles and why drink companies sometimes give away free bottles of their products.

Scarcity

The relative quantities of the two goods available for trade will affect the terms of trade. If Farmer Smith came to the market with one hundred oranges to Farmer Jones's ten apples, then the terms of trade would likely be different than if the farmers came to the market with an equal number. Similarly, if the farmers came to the market with ten oranges and ten apples, respectively, but recognized that they had an entire orchard of apples and an entire grove of oranges waiting back at home, then the farmers would be more likely to give up a larger amount of their product in exchange.

Size

The sizes of the apples and oranges are likely to influence the terms of trade. One would certainly expect that Farmer Smith would get more apples for each orange if the oranges were the size of grapefruits and the apples the size of golf balls than if the reverse were true.

Quality

The quality of the fruits will influence the terms of trade. Suppose the apples are sweet and the oranges are sour. Suppose the apples are filled with worm holes. Suppose the oranges are green rather than orange. Or consider the vitamin, mineral, and calorie contents of each of the fruits. Quality could also be assessed by the variety of uses for each product. For example, apples can be eaten raw, turned into applesauce, squeezed into juice, made into pies, or covered with caramel.

Effort

Although a pure exchange model assumes that no production takes place, imagine momentarily that some effort is required to harvest the fruit. What if apples grew at the top of tall trees that required a precarious climb? What if predatory wolves lived in the orange grove? Surely these farmers would want to take these factors into account when deciding the terms for exchange. Of course, this factor is related to scarcity. The more difficult it is to produce something, the scarcer that item will be.

Persuasion

The art of persuasion can play an important role in determining the terms of trade. Each farmer has an incentive to embellish the quality and goodness of his product and perhaps diminish the perception of quality of the other product. Farmer Smith might emphasize the high quantities of vitamin C found in oranges while noting that apples are relatively vitamin deficient. He might argue that oranges are consumed by beautiful movie stars who drive fast cars, while apples are the food of peasants. He might also underemphasize his own desire for apples. The more persuasive Farmer Smith is, the more likely he is to get a better deal in exchange. Note that the farmer's statements need not be truthful as long as the other farmer is uncertain about the quality of the other product. In this case, differences in the persuasive abilities of the two farmers can affect the final terms of trade.

Expectations of Utility

Decisions about how much to trade are based on the utility one expects to obtain upon consuming the good. The utility one ultimately receives may be less. Indeed, in some cases the value of what one receives may be less than the value of what one gives up. However, this outcome will arise only if expectations are not realized.

For example, a person may choose to voluntarily pay $10 to see a movie that has just been released. Perhaps the person has read some reviews of the movie or has heard from friends that the movie is very good. Based on prior evaluation, the person decides that the movie is worth at least $10. However, suppose this person winds up hating the movie and feels like it was a complete waste of time. In hindsight, with perfect knowledge about his own preferences for the movie, he might believe it is only worth $5 or maybe just $2, in which case he is clearly worse off after having paid $10 to see the movie. This is one reason individuals may lose from trade, but it can only occur if information is imperfect.

Expectations of a Future Relationship

If the farmers expect that the current transaction will not be repeated in the future, then there is a potential for the farmers to misrepresent their products to each other. Persuasion may take the form of outright lies if the farmers do not expect to meet again. Consider the traveling medicine man portrayed in U.S. Western movies. He passes through town with a variety of elixirs and promises that each will surely cure your ailment and possibly do much more. Of course, chances are good that the elixirs are little more than colored water with some alcohol and are unlikely to cure anything. But this type of con game is more likely when only one transaction is expected. However, if the transaction is hoped to be the first of many to come, then untruthful embellishments will be less likely.

Government Policies

If a taxman stands ready to collect a tax based on the amounts traded between the two farmers, this is likely to affect the terms of trade. Also, if laws impose penalties for misrepresentation of a product, then this will also affect the farmers' behavior in determining the terms of trade.

Morality

Imagine that Farmer Smith was raised to always tell the truth, while Farmer Jones missed those lessons during his upbringing. In this case, Farmer Jones might be more likely to misrepresent his apples in order to extract a more favorable terms of trade.

Coercion

Finally, the terms of trade can also be affected by coercion. If Farmer Jones threatens Farmer Smith with bodily injury, he might be able to force an exchange that Farmer Smith would never agree to voluntarily. At the extreme, he could demand all of Farmer Smith's oranges and not give up any apples in exchange. Of course, once coercion enters a transaction, it may no longer be valid to call it trade—it would be more accurate to call it theft.

Summary

Notice that many of these determinants relate to good business practices and ethical behavior. Business schools have classes in marketing and product promotion, sales advertising, and quality control, all of which can be thought of as ways to improve the terms of trade for the product the business is selling. Ethics teaches one to be truthful and to represent one's products honestly. It also teaches one not to steal or use force to obtain what one desires.

How all these factors play into the matter ultimately influences what the terms of trade will be between products. As such, this simple model of trade can be embellished into a fairly complex model of trade. That some terms of trade will arise is simple to explain. But what precisely will be the terms of trade involves a complex mixture of factors.

KEY TAKEAWAY

- The terms of trade is influenced by many different factors, including product preferences, uncertainties over preferences, quantities and qualities of the goods, persuasive capabilities, regularity of the trading relationship, and government policies.

Exercise 3.2.1

1. Give an example, from your own experience perhaps, in which the expected benefits from trade are positive but the actual benefits from trade are negative.
2. Suppose Larry initially proposes to give Naomi twenty music CDs in exchange for a ride to Atlanta. How would the final terms of trade change if each of the following occurs before the deal is settled?
   a. Larry learns that Naomi's car has no air conditioning and the temperature that day will be ninety-five degrees.
   b. Naomi tells Larry that her beautiful cousin may travel with them.
   c. Naomi mentions that none of the CDs are by her favorite artists.
   d. Larry learns that Naomi will also be bringing her two dogs and three cats.
   e. Naomi tells Larry that she will be able to borrow her Dad's 600 series BMW.
   f. Larry hopes to be able to get rides from Naomi in the future too.

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3.3: Example of a Trade Pattern 3.3: Example of a Trade PatternEdit Update titlecancel

Learning Objectives

1. Learn how to describe a mutually voluntary exchange pattern and specify both the terms of trade and the final consumption bundles for two traders.

Suppose after some discussion Farmer Smith and Farmer Jones agree to a **mutually voluntary exchange** of six apples for six oranges (see Figure 3.3.1). The terms of trade is six apples per six oranges, or one apple per orange. After trade, Farmer Smith will have four oranges and six apples to consume, while Farmer Jones will have six oranges and four apples to consume. As long as the trade is voluntary, it must hold that both farmers expect to be better off after trade since they are free not to trade. Thus mutually voluntary trade must be beneficial for both farmers

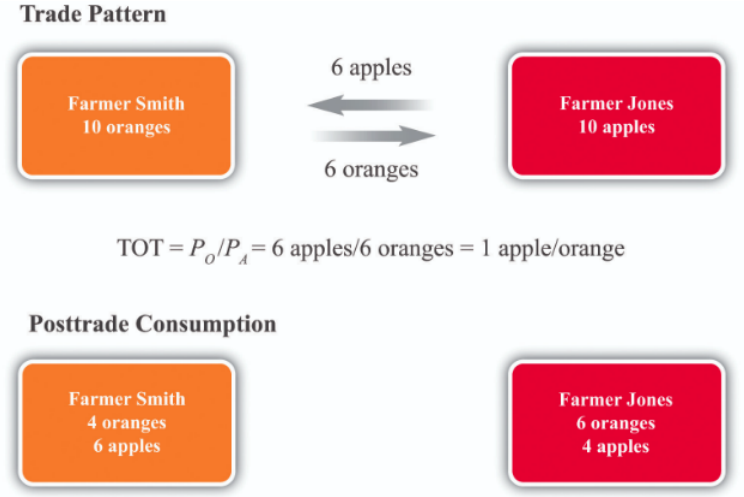


Figure 3.3.1: Two-Farmer Trade Pattern

Sometimes people talk about trade as if it were adversarial, with one side competing against the other. With this impression, one might believe that trade would generate a winner and a loser as if trade were a contest. However, a pure exchange model demonstrates that trade is not a zero-sum game. Instead, when two individuals make a voluntary exchange, they will both benefit. This is sometimes calls a positive-sum game.A zero-sum game is a contest whose outcome involves gains and losses of equal value so that the sum of the gains and losses is zero. In contrast, a positive-sum game is one whose outcome involves total gains that exceed the total losses so that the sum of the gains and losses is positive.

Sometimes the pure exchange model is placed in the context of two trading countries. Suppose instead of Farmer Smith and Farmer Jones, we imagine the United States and Canada as the two “individuals” who trade with each other. Or, better still, we might recognize that international trade between countries consists of millions, or billions, of individual trades much like the one described here. If each individual trade is mutually advantageous, then the summation of billions of such trades must also be mutually advantageous. Thus, as long as the people within each country can choose not to trade if they so desire, trade must be beneficial for every trader in both countries.

Nonetheless, although this conclusion is sound, it is incorrect to assert that everyone in each country will necessarily benefit from free trade. Although the national effects will be positive, a country is composed of many individuals, many of whom do not engage in international trade. Trade can make some of them worse off. In other words, trade is likely to cause a redistribution of income, generating both winners and losers. This outcome is first shown in Chapter 3: The Pure Exchange Model of Trade, Section 3.4: Three Traders and Redistribution with Trade.

KEY TAKEAWAYS

- Any trade pattern between individuals may be claimed to be mutually advantageous as long as the trade is mutually voluntary.
- The terms of trade is defined as the ratio of the trade quantities of the two goods.
- The final consumption bundles are found by subtracting what one gives away and adding what one receives to one's original endowment.

Exercise 3.3.1

1. Suppose Kendra has ten pints of milk and five cookies and Thomas has fifty cookies and one pint of milk.
   a. Specify a plausible mutually advantageous trading pattern.
   b. Identify the terms of trade in your example (use units of pints per cookie).
   c. Identify the final consumption bundles for Kendra and Thomas.
   d. Which assumption or assumptions guarantee that the final consumption bundles provide greater utility than the initial endowments for both Kendra and Thomas?

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3.4: Three Traders and Redistribution with Trade 3.4: Three Traders and Redistribution with TradeEdit Update titlecancel

Learning Objectives

1. Learn how changes in the numbers of traders changes the terms of trade and affects the final consumption possibilities.
2. Learn that an increase in competition causes a redistribution of income.
3. Learn the importance of the profit-seeking assumption to the outcome.
4. Learn how one's role as a seller or buyer in a market, affects one's preference for competition.

Suppose for many days, months, or years, Farmer Smith and Farmer Jones are the only participants in the market. However, to illustrate the potential for winners and losers from trade, let us extend the pure exchange model to include three farmers rather than two. Suppose that one day a third farmer arrives at the market where Farmer Jones and Farmer Smith conduct their trade. The third farmer is Farmer Kim, and he arrives at the market with an endowment of ten apples.

The main effect of Farmer Kim's arrival is to change the relative scarcity of apples to oranges. On this day, the total number of apples available for sale has risen from ten to twenty. Thus apples are relatively more abundant, while oranges are relatively scarcer. The change in relative scarcities will undoubtedly affect the terms of trade that is decided on during this second day of trading.

Farmer Smith, as a seller of oranges (the relatively scarcer good), now has a stronger negotiating position than he had on the previous day. Farmer Jones and Farmer Kim, as sellers of apples, are now competing against each other. With the increased supply of apples at the market, the price of apples in exchange for oranges can be expected to fall. Likewise, the price of oranges in exchange for apples is likely to rise. This means that Farmer Smith can negotiate exchanges that yield more apples for each orange compared with the previous day.

Suppose Farmer Smith negotiates a trade of three oranges for six apples with each of the two apple sellers (see Figure 3.4.1). After trade, Farmer Smith will have twelve apples and four oranges for consumption. Farmers Jones and Kim will each have three oranges and four apples to consume.

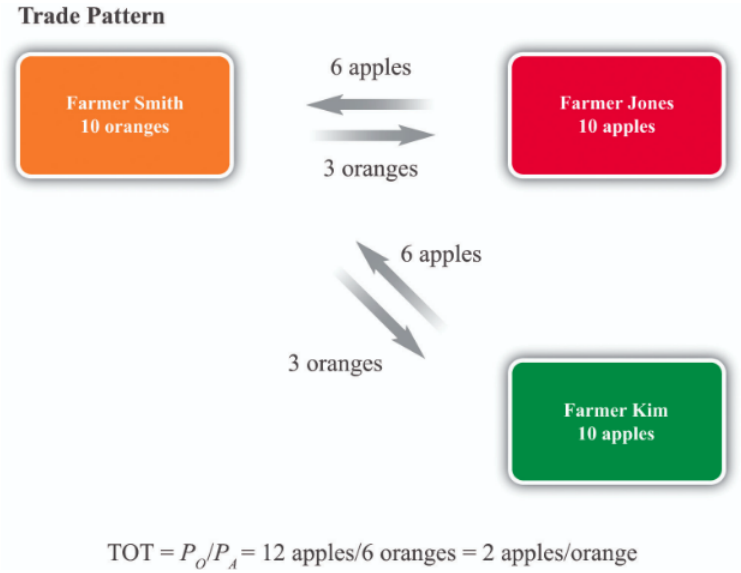


Figure 3.4.1: Three-Farmer Trade Pattern

As before, assuming that all three farmers entered into these trades voluntarily, it must hold that each one is better off than he would be in the absence of trade. However, we can also compare the fate of each farmer relative to the previous week. Farmer Smith is a clear winner. He can now consume twice as many apples and the same number of oranges as in the previous week. Farmer Jones, on the other hand, loses due to the arrival of Farmer Kim. He now consumes fewer oranges and the same number of apples as in the previous week. As for Farmer Kim, presumably he made no earlier trades. Since he was free to engage in trade during the second week, and he agreed to do so, he must be better off.

It is worth noting that we assume here that each of the farmers, but especially Farmer Smith, is motivated by profit. Farmer Smith uses his bargaining ability because he knows that by doing so he can get a better deal and, ultimately, more goods to consume. Suppose for a moment, however, that Farmer Smith is *not* motivated by profit but instead cares about friendship. Because he and Farmer Jones had been the only traders in a market for a long period of time before the arrival of Farmer Kim, surely they got to know each other well. When Farmer Kim arrives, it is conceivable Smith will recognize that by pursuing profit, his friend Farmer Jones will lose out. In the name of friendship, Smith might refuse to trade with Kim and continue to trade at the original terms of trade with Jones. In this case, the outcome is different because we have changed the assumptions. The trade that does occur remains mutually voluntary and both traders are better off than they were with no trade. Indeed, Smith is better off than he would be trading with Jones and Kim; he must value friendship more than more goods or else he wouldn't have voluntarily chosen this. The sole loser from this arrangement is Farmer Kim, who doesn't get to enjoy the benefits of trade.

Going back to the assumption of profit seeking, however, the example demonstrates a number of important principles. The first point is that free and open competition is not necessarily in the interests of everyone. The arrival of Farmer Kim in the market generates benefits for one of the original traders and losses for the other. We can characterize the winners and losers more generally by noting that each farmer has two roles in the market. Each is a *seller* of one product and a *buyer* of another. Farmer Smith is a seller of oranges but a buyer of apples. Farmer Jones and Farmer Kim are sellers of apples but buyers of oranges.

Farmer Kim's entrance into the market represents an addition to the number of sellers of apples and the number of buyers of oranges. First, consider Farmer Jones's perspective as a seller of apples. When an additional seller of apples enters the market, Farmer Jones is made worse off. Thus, in a free market, sellers of products are worse off the larger the number of other sellers of similar products. Open competition is simply not in the best interests of the sellers of products. At the extreme, the most preferred position of a seller is to have the market to himself—that is, to have a **monopoly** position in the market. Monopoly profits are higher than could ever be obtained in a duopoly, in an oligopoly, or with perfect competition.

Next, consider Farmer Smith's perspective as a buyer of apples. When Farmer Kim enters the market, Farmer Smith has more sources of apples than he had previously. This results in a decrease in the price he must pay and makes him better off. Extrapolating, buyers of a product will prefer to have as many sellers of the products they buy as possible. The very worst position for a buyer is to have a single monopolistic supplier. The best position is to face a perfectly competitive market with lots of individual sellers, where competition may generate lower prices.

Alternatively, consider Farmer Jones's position as a buyer of oranges. When Farmer Kim enters the market there is an additional buyer. The presence of more buyers makes every original buyer worse off. Thus we can conclude that buyers of products would prefer to have as few other buyers as possible. The best position for a buyer is a **monopsony**—a situation in which he is the single buyer of a product.

Finally, consider Farmer Smith's role as a seller of oranges. When an additional buyer enters the market, Farmer Smith becomes better off. Thus sellers of products would like to have as many buyers for their product as possible.

More generally, we can conclude that producers of products (sellers) should have little interest in free and open competition in their market, preferring instead to restrict the entry of any potential competitors. However, producers also want as large a market of consumers for their products as possible. Consumers of these products (buyers) should prefer free and open competition with as many producers as possible. However, consumers also want as few other consumers as possible for the products they buy. Note well that the interests of producers and consumers are diametrically opposed. This simple truth means that it will almost assuredly be impossible for any change in economic conditions, arising either out of natural dynamic forces in the economy or as a result of government policies, to be in the best interests of everyone in the country.

KEY TAKEAWAYS

- Greater competition (more sellers) in a market reduces the price of that good and lowers the well-being of the previous sellers. (Sellers dislike more sellers of the goods they sell.)
- Greater competition (more sellers) in a market raises the price of the buyer's goods and increases the well-being of the previous buyers. (Buyers like more sellers of the goods they buy.)
- The changes described above assume individuals are profit seeking.

Exercise 3.4.1

1. Consider two farmers, one with an endowment of five pounds of peaches, the other with an endowment of five pounds of cherries. Suppose these two farmers meet daily and make a mutually agreeable exchange of two pounds of peaches for three pounds of cherries.
   a. Write down an expression for the terms of trade. Explain how the terms of trade relates to the dollar prices of the two goods.

      Consider the following shocks (or changes). Explain how each of these shocks may influence the terms of trade between the farmers. Assume that each farmer's sole interest is to maximize her own utility.

   b. The cherry farmer arrives at the market with five extra pounds of cherries.
   c. The peach farmer has just finished reading a book titled *How to Influence People*.
   d. Damp weather causes mold to grow on 40 percent of the peaches.
   e. News reports indicate that cherry consumption can reduce the risk of cancer.

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3.5: Three Traders with International Trade 3.5: Three Traders with International TradeEdit Update titlecancel

Learning Objectives

1. Learn how international trade with competitor firms affects the distribution of income.

The farmer story can be placed in an international trade context with a simple adjustment. If we assume that Farmer Kim is from Korea, then the exchanges that take place in the second week reflect trade between countries. Farmer Smith's trade of oranges for apples with Farmer Kim represents U.S. exports of oranges in exchange for imports of apples from Korea. In the previous week, Farmer Kim was not present, thus all trade took place domestically. The change from week one to week two corresponds to a country moving from autarky to free trade.

Now consider the effects of trade in the United States. International trade makes Farmer Smith better off and Farmer Jones worse off compared to autarky. The critical point here is that free trade does not improve the well-being of everyone in the economy. Some individuals lose from trade.

We can characterize the winners and losers in a trade context by noting the relationship of the farmers to the trade pattern. Farmer Smith is an exporter of oranges. Farmer Jones must compete with imports on sales to Smith, thus we call Jones an import competitor. Our conclusion, then, is that export industries will benefit from free trade, while import-competing industries will suffer losses from free trade.

This result corresponds nicely with observations in the world. Generally, the most outspoken advocates of protection are the import-competing industries, while the avid free trade supporters tend to be affiliated with the export industries. In the United States, it is usually the importing textile, steel, and automobile industries calling for protection, while exporting companies like Boeing and Microsoft and the film industry preach the virtues of free trade.

KEY TAKEAWAYS

- Because export industries find more buyers for their products with international trade, export industries benefit from trade.
- Because trade increases the number of competitors import-competing industries face, trade harms import-competing industries.

Exercise 3.5.1

1. Choose a country. On the Internet, find the main exports and imports for that country and use this to indicate which industries are the likely winners and losers from trade

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3.6: The Nondiscrimination Argument for Free Trade 3.6: The Nondiscrimination Argument for Free TradeEdit Update titlecancel

Learning Objectives

1. Learn how the constraint that trade policies be nondiscriminatory can lead people to choose free trade.

Each person has two roles in an economy: he or she is the maker and seller of some goods or services and the buyer of other goods and services. Most people work in a single industry. That means that each person's seller interest is rather limited. A steelworker's industry sells steel. A garment worker's industry sells clothes. A realtor sells realty services. Although some people may hold several jobs in different industries, most of the time a worker's income is tied to one particular industry and the products that industry sells. At the same time, most people's buying interests are quite diverse. Most individuals purchase hundreds of products every week—from food, books, and movies to cellular service, housing, and insurance.

We learned that it is in the best interests of sellers of goods to have as few other sellers of similar products as possible. We also learned that it is in the interests of buyers to have as many sellers of the goods they buy as possible. We can use this information to identify the very best economic situation for an individual with both buyer and seller interests.

Consider a worker in the insurance industry. This worker's income would be higher the less competition there was in the insurance sector. In the best of all circumstances, this worker's income would be the highest if his firm were a monopoly. However, as a buyer or consumer, this person would purchase hundreds or thousands of different products over the year. One such product would be clothing. The best situation here would be for all these products to be sold in markets with extensive competition—we might say perfect competition—since this would reduce the prices of the products he buys. Thus a monopoly in your own industry but perfect competition everywhere else is best from the individual's perspective.

However, consider a worker in the clothing industry. She too would be best served with a monopoly in her own industry and perfect competition everywhere else. But for her, the monopoly would have to be in the clothing sector, while everything else would need to be competitive.

Every country has workers in many different industries. Each one of these workers would be best served with a monopoly in his or her own industry and competition everywhere else. But clearly this is impossible unless the country produces only one good and imports everything else—something that's highly unlikely. That means there is no way for a government to satisfy everyone's interests by regulating competition.

However, we could demand that the government implement competition policies to satisfy one simple rule: nondiscrimination. Suppose we demand that the government treat everyone equally. Nondiscrimination rules out the scenarios benefiting individual workers. To allow steel to have a monopoly but to force competition in the clothing industry favors the steelworker at the expense of the clothing worker. The same applies if you allow a monopoly in the clothing industry but force competition in the steel sector.

Nondiscrimination would allow for only two competition policies in the extreme: either regulate so that all industries have a monopoly or regulate so that all industries face perfect competition. In terms of international trade policy, the nondiscriminatory options are either to allow free trade and open competition or to restrict trade equally by imposing tariffs that are so high that they completely restrict imports in every industry.

If people were forced to choose from the set of nondiscriminatory policies only, what would they choose? For every worker, there are plusses and minuses to each outcome. For the steelworker, for example, heavy protectionism would reduce competition in steel and raise his income. However, protectionism would also raise the prices of all the products he buys since competition would be reduced in all those industries as well. In short, protectionism means high income and high prices.

In contrast, free trade would mean the steel industry would face competition and thus steelworkers would get lower wages. However, all the goods the steelworker buys would be sold in more competitive markets and would therefore have lower prices. In short, the free trade scenario means low income and low prices.

So which nondiscriminatory outcome is better for a typical worker: high income and high prices or low income and low prices? Well, the Ricardian model in Chapter 2: The Ricardian Theory of Comparative Advantage and other models of trade provide an answer. Those models show that when free trade prevails, countries will tend to specialize in their comparative advantage goods, which will cause an overall increase in production. In other words, free trade promotes **economic efficiency**. There will be more

goods and services to be distributed to people under free trade than there would be with no trade. Since the no-trade scenario corresponds to the protectionist choice, this outcome would leave people with fewer goods and services overall.

This means that the high-income and high-price scenario would leave people worse off than the low-income and low-price scenario. If people were well informed about these two outcomes and if they were asked to choose between these two nondiscriminatory policies, it seems reasonable to expect people would choose free trade. It is not hard to explain why a lower income might be tolerable as long as the prices of the hundreds of goods and services you purchase are low. Also, despite having the higher income with protection, what good is that if the prices of all the goods and services you purchase are also much higher?

Of course, there are also some intermediate nondiscriminatory trade policies the government could choose. For example, the government could do what Chile does and set a uniform tariff; Chile's is 6 percent currently. This would offer the same level of protection, or the same degree of restriction of competition, to all import-competing industries. However, since this would just be intermediate between the overall net benefits of free trade and the benefits of complete protection, the effects will be intermediate as well. Even with these options, then, the best nondiscriminatory choice to make is free trade.

Key takeaways

- Nondiscriminatory trade policies involve setting the same tariff on all imported products. The two extreme cases are either zero tariffs (free trade), or prohibitive tariffs (no trade).
- A free trade policy will cause lower income for each worker but also lower prices for all the goods and services purchased.
- A protectionist policy will cause higher incomes but also high prices for all the goods and services purchased.
- Given the choice between high income and high prices or low income and low prices, monopoly concerns suggest the latter would be chosen.

Exercise 3.6.1

1. Look at an individual country's bound tariff rates at the World Trade Organization (WTO). These can be found on the country pages of the WTO Web site. Go to http://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm, click on any country on the page, scroll down to the "Bound Tariffs" link, and click. It will load a PDF file with all the country's maximum tariffs.

   Choose a country and determine whether the country applies discriminatory trade policies. If it does, identify several products that are highly protected and several that are not protected.

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CHAPTER OVERVIEW

4: Factor Mobility and Income Redistribution

This chapter continues the theme of income redistribution as a consequence of international trade. The focus here is the effect of factor immobility. In the Ricardian model presented in Chapter 2, it is assumed that workers can move freely and costlessly to another industry. In addition, it is assumed that each worker has the same productivity as every other worker in every other industry. This assumption makes it inconsequential if one industry shuts down because, if it does, the workers simply move to another industry where they will be just as productive and will likely earn a higher wage.

This chapter asks, “What happens if free and costless factor mobility does not hold?” The answer is provided by the results of the immobile factor model. This model is helpful for two important reasons. First, from a practical perspective, the model provides a reason why there can be both winners and losers as a result of international trade. Second, the model highlights an important technique used in economic analysis. Because the immobile factor model is identical to the Ricardian model in all but one assumption, the model demonstrates how changes in model assumptions directly impact the model implications and results. This is an important lesson about the method of economic analysis more generally.

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4.1: Factor Mobility Overview 4.1: Factor Mobility OverviewEdit Update titlecancel

Learning Objectives

1. Identify the three dimensions across which factors of production may be mobile.

Factor mobility refers to the ability to move factors of production—labor, capital, or land—out of one production process into another. Factor mobility may involve the movement of factors between firms within an industry, as when one steel plant closes but sells its production equipment to another steel firm. Mobility may involve the movement of factors across industries within a country, as when a worker leaves employment at a textile firm and begins work at an automobile factory. Finally, mobility may involve the movement of factors between countries either within industries or across industries, as when a farm worker migrates to another country or when a factory is moved abroad.

The standard assumptions in the trade literature are that factors of production are freely (i.e., without obstruction) and costlessly mobile between firms within an industry and between industries within a country but are immobile between countries.

The rationale for the first assumption—that factors are freely mobile within an industry—is perhaps closest to reality. The skills acquired by workers and the productivity of capital are likely to be very similar across firms producing identical or closely substitutable products. Although there would likely be some transition costs incurred, such as search, transportation, and transaction costs, it remains reasonable to assume for simplicity that the transfer is costless. As a result, this assumption is rarely relaxed.

The assumption that factors are easily movable across industries within a country is somewhat unrealistic, especially in the short run. Indeed, this assumption has been a standard source of criticism for traditional trade models. In the Ricardian and Heckscher-Ohlin models, factors are assumed to be homogeneous and freely and costlessly mobile between industries. When changes occur in the economy requiring the expansion of one industry and the contraction of another, it just happens. There are no search, transportation, or transaction costs. There is no unemployment of resources. Also, since the factors are assumed to be homogeneous, once transferred to a completely different industry, they immediately become just as productive as the factors that had originally been employed in that industry. Clearly, these conditions cannot be expected to hold in very many realistic situations. For some, this inconsistency is enough to cast doubt on all the propositions that result from these theories.

It is important to note, however, that trade theory has attempted to deal with this concern to some extent. The immobile factor model (in Chapter 4: Factor Mobility and Income Redistribution) and the specific factor model (in Chapter 5: The Heckscher-Ohlin (Factor Proportions) Model, Section 5.15: The Specific Factor Model- Overview) represent attempts to incorporate factor immobility precisely because of the concerns just mentioned. Although these models do not introduce resource transition in a complicated way, they do demonstrate important income redistribution results and allow one to infer the likely effects of more complex adjustment processes by piecing together the results of several models. (See Chapter 5: The Heckscher-Ohlin (Factor Proportions) Model, Section 5.17: Dynamic Income Redistribution and Trade, especially.)

Another important aspect of factor mobility involves the mobility of factors between countries. In most international trade models, factors are assumed to be immobile across borders. Traditionally, most workers remain in their country of national origin due to immigration restrictions, while government controls on capital have in some periods restricted international movements of capital. When international factor mobility is not possible, trade models demonstrate how national gains can arise through trade in goods and services.

Of course, international mobility can and does happen to varying degrees. Workers migrate across borders, sometimes in violation of immigration laws, while capital flows readily across borders in today's markets. The implications of international factor mobility have been addressed in the context of some trade models. A classic result by Robert A. Mundell (1957) demonstrates that international factor mobility can act as a substitute for international trade in goods and services. In other words, to realize all the gains from international exchange and globalization, countries need to *either* trade freely *or* allow factors to move freely between countries.Robert A. Mundell, "International Trade and Factor Mobility," *American Economic Review* 47 (1957): 321–35. It is not necessary to have both. Mundell's result contradicts a popular argument that free trade can only benefit countries if they also allow workers to move freely across borders.

Key Takeaways

- Factors of production are potentially mobile in three distinct ways:
  - Between firms within the same industry
  - Between industries within the same country
  - Between firms or industries across countries
- A standard simplifying assumption in many trade models is that factors of production are freely and costlessly mobile between firms and between industries but not between countries.
- The immobile factor model and the specific factor model are two models that assume a degree of factor *im*mobility between industries.

Exercise 4.1.1

1. Name several impediments to the free movement of workers between two industries.
2. Name several costs associated with the movement of workers between two industries.

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4.2: Domestic Factor Mobility 4.2: Domestic Factor MobilityEdit Update titlecancel

Learning Objectives

1. Understand how the different types of factors display different degrees of factor mobility.

Domestic factor mobility refers to the ease with which productive factors like labor, capital, land, natural resources, and so on can be reallocated across sectors within the domestic economy. Different degrees of mobility arise because there are different costs associated with moving factors between industries.

As an example of how the adjustment costs vary across factors as factors move between industries, consider a hypothetical textile firm that is going out of business.

The textile firm employs a variety of workers with different types of specialized skills. One of these workers is an accountant. Fortunately for the accountant, she has skills that are used by all businesses. Although there may be certain specific accounting techniques associated with the textile industry, it is likely that this worker could find employment in a variety of industries. The worker would still suffer some adjustment costs such as a short-term reduction in salary, search costs to find another job, and the anxiety associated with job loss. However, assuming there is no glut of accountants in the economy, this worker is likely to be fairly mobile.

Consider another worker who is employed as a seamstress in the textile firm. If the textile industry as a whole is downsizing, then it is unlikely that she will find a job in another textile plant. Also, the skills of a seamstress are not widely used in other industries. For this worker, finding another job may be very difficult. It may require costs beyond those incurred by the accountant. This worker may decide to learn a new profession by attending a vocational school or going to college. All of this requires more time and incurs a greater cost.

Next consider the capital equipment used in the textile plant. The looms that are used to weave cloth are unlikely to be very useful or productive in any other industry. Remaining textile firms might purchase them, but only if the prices are very low. Ultimately, these machines are likely to fall into disuse and be discarded. Looms exhibit very low mobility to other industries.

However, consider a light truck owned and operated by the firm. This truck could easily be sold and used by another firm in a completely different industry. The only costs would be the cost of making the sale (advertisements, sales contracts, etc.) and perhaps the cost of relabeling the truck with the new company name. The truck is relatively costlessly transferable across industries.

Finally, consider the land on which the textile plant operates. Depending on the location of the firm and the degree of new business creations or expansions in the area, the land may or may not be transferred easily. One possible outcome is that the property could be sold to another business that would recondition it to suit its needs. In this case, the cost of mobility includes the transactions costs to complete the sale plus the renovation costs to fix up the property for its new use. Alternatively, the land could remain for sale for a very long time during which the plant merely becomes an eyesore. In this case, the land's immobility may last for years.

These examples suggest that the cost of factor mobility varies widely across factors of production. Some factors such as accountants and trucks may be relatively costless to move. Other factors like looms and seamstresses may be very costly to move. Some factors like land may be easy to move in some instances but not in others.

key takeaway

- The ability and cost of factor mobility across industries depends largely on how widespread the demands are for that particular factor.

Exercise 4.2.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. Between *truck driver* and *bricklayer*, this occupation is likely to be more easily adapted for use in an alternative industry.

b. Between *accountant* and *robotics engineer*, this occupation is likely to be more easily adapted for use in an alternative industry.
c. Between *professional baseball player* and *chemist*, this occupation is likely to be more easily adapted for use in an alternative industry.

2. Suppose a chemist loses her job at a pharmaceutical company. What other industries are most likely to demand the services of a chemist? What other industries are least likely to demand the services of a chemist?

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4.3: Time and Factor Mobility 4.3: Time and Factor MobilityEdit Update titlecancel

Learning Objectives

1. Learn why time passage is a very important element affecting a particular factor's mobility across industries.

The degree of mobility of factors across industries is greatly affected by the passage of time. In the very, very short run—say, over a few weeks' time—most unemployed factors are difficult to move to another industry. Even the worker whose skills are readily adaptable to a variety of industries would still have to take time to search for a new job. Alternatively, a worker in high demand in another industry might arrange for a brief vacation between jobs. This means that over the very short run, almost all factors are relatively immobile.

As time passes, the most mobile factors begin to find employment in other industries. At the closed textile plant, some of the managers, the accountants, and some others may find new jobs within four to six months. The usable capital equipment may be sold to other firms. Looms in good working condition may be bought by other textile plants still operating. Trucks and other transport equipment will be bought by firms in other industries. As time progresses, more and more factors find employment elsewhere.

But what about the seamstress near retirement whose skills are not in demand and who is unwilling to incur the cost of retraining? Or the capital equipment that is too old, too outdated, or just inapplicable elsewhere in the economy? These factors, too, can be moved to other industries given enough time. The older workers will eventually retire from the workforce. Their replacements will be their grandchildren, who are unlikely to seek the skills or jobs of their grandparents.

Merely recall the decline of family farms in America. For generations, children followed parents as farmers until it eventually became unprofitable to continue to operate the same way. As the number of farmers declined, the children of farmers began to move into the towns and cities. They went to colleges and often learned skills very different from their parents and grandparents.

In this way, as generations age and retire, the children acquire the new skills in demand in the modern economy, and the distribution of skills in the workforce changes. Labor automatically becomes mobile across industries if we allow enough time to pass.

Consider also the capital equipment that is unusable in any other industry. This capital is also mobile in a strange sort of way. Generally, as capital equipment is used, its value declines. Often the cost of repairs rises for an older machine. Older machines may be less productive than newer models, also reducing their relative worth. When capital depreciates, or loses its value, sufficiently, a firm continuing to produce would likely invest in a new machine. Investment requires the owners of the firm to forgo profits in order to purchase new capital equipment.

Now suppose the firm is a textile plant and the owners are shutting it down. The capital equipment at the firm will suddenly depreciate more rapidly than originally anticipated.

As this equipment depreciates, however, new investments will not be directed at the same type of capital. Instead, investors will purchase different types of capital that have the potential for profits in other industries. In this way, over time, as the current capital stock depreciates, new investment is made in the types of capital needed for production in the future. With enough time, the capital stock is moved out of declining, unprofitable industries and into expanding, profitable industries.

In summary, virtually all factors are immobile across industries in the very short run. As time progresses and at some cost of adjustment, factors become mobile across sectors of the economy. Some factors move more readily and at less cost than others. In the long run, all factors are mobile at some cost. For workers, complete mobility may require the passing of a generation out of the workforce. For capital, complete mobility requires depreciation of the unproductive capital stock, followed by new investment in profitable capital.

key takeaway

- The ability of a factor to find employment in a new industry tends to increase as time passes.

Exercise 4.3.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. Between *short run* and *long run*, this time frame is more associated with unlimited factor mobility.
   b. The term used to describe the fact that machines wear out over time.
   c. Of *10 percent*, *50 percent*, or *100 percent*, this is the more likely percentage of production factors that can adjust between diverse industries in the short run.
   d. Of *10 percent*, *50 percent*, or *100 percent*, this is the more likely percentage of production factors that can adjust between diverse industries in the long run.
   e. The term used to describe the period of time in which production factors cannot move between industries within a country.

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4.4: Immobile Factor Model Overview and Assumptions 4.4: Immobile Factor Model Overview and AssumptionsEdit Update titlecancel

Learning Objectives

1. Learn how the immobile factor model differs from the Ricardian model.
2. Learn the assumptions of a standard immobile factor trade model.

Overview

The **immobile factor model** highlights the effects of factor immobility between industries within a country when a country moves to free trade. The model is the standard Ricardian model with one variation in its assumptions. Whereas in the Ricardian model, labor can move costlessly between industries, in the immobile factor model, we assume that the cost of moving a factor is prohibitive. This implies that labor, the only factor, remains stuck in its original industry as the country moves from autarky to free trade.

The assumption of labor immobility allows us to assess the short-run impact of movements to free trade where the short run is defined as the period of time when all factors of production are incapable of moving between sectors. The main result of the model is that free trade will cause a redistribution of income such that some workers gain from trade, while others lose from trade.

Assumptions

The immobile factor model assumptions are identical to the Ricardian model assumptions with one exception. In this model, we assume that L_C and L_W are exogenous. This means that there is a fixed supply of cheese workers and wine workers. Cheese workers know how to make cheese but cannot be used productively in the wine industry, and wine workers cannot be used productively in the cheese industry. This assumption differs from the Ricardian model, which assumed that labor was freely mobile across industries. In the Ricardian model, a cheese worker who moved to the wine industry would be immediately as productive as a longtime wine worker.

Neither assumption—**free and costless mobility** nor complete immobility—is entirely realistic. Instead, they represent two extreme situations. The Ricardian assumption can be interpreted as a long-run scenario. Given enough time, all factors can be moved and become productive in other industries. The immobile factor assumption represents an extreme short-run scenario. In the very short run, it is difficult for any factor to be moved and become productive in another industry. By understanding the effects of these two extremes, we can better understand what effects to expect in the real world, characterized by incomplete and variable factor mobility.

What follows is a description of the standard assumptions in the immobile factor model. We assume perfect competition prevails in all markets.

Number of Countries

The model assumes two countries to simplify the model analysis. Let one country be the United States, the other France. Note that anything related exclusively to France in the model will be marked with an asterisk.

Number of Goods

The model assumes there are two goods produced by both countries. We assume a barter economy. This means that no money is used to make transactions. Instead, for trade to occur, goods must be traded for other goods. Thus we need at least two goods in the model. Let the two produced goods be wine and cheese.

Number of Factors

The model assumes there are two factors of production used to produce wine and cheese. Wine production requires wine workers, while cheese production requires cheese workers. Although each of these factors is a kind of labor, they are different types because their productivities differ across industries.

Consumer Behavior

Factor owners are also the consumers of the goods. We assume the factor owners have a well-defined utility function defined over the two goods. Consumers maximize utility to allocate income between the two goods.

A General Equilibrium

The immobile factor model is a general equilibrium model. The income earned by the factor is used to purchase the two goods. The industries' revenue in turn is used to pay for the factor services. The prices of the outputs and the factor are determined such that supply and demand are equalized in all markets simultaneously.

Demand

We will assume that aggregate demand is homothetic in this model. This implies that the marginal rate of substitution between the two goods is constant along a ray from the origin. We will assume further that aggregate demand is identical in both of the trading countries.Note that this assumption is a technical detail that affects how the trading equilibrium is depicted but is not very important in understanding the main results.

Supply

The production functions in Table 4.4.1 and Table 4.4.2 represent industry production, not firm production. The industry consists of many small firms in light of the assumption of perfect competition.

Table 4.4.1: Production of Cheese

United States	France
$Q_C = \frac{\bar{L}_C[hrs]}{a_{LC}[hrs/lb]}$	$Q^*_C = \frac{\bar{L}^*_C}{a^*_{LC}}$

where

- Q_C = quantity of cheese produced in the United States
- $\bar{L}_C$= fixed amount of labor applied to cheese production in the United States
- a_{LC} = unit labor requirement in cheese production in the United States (hours of labor necessary to produce one unit of cheese)
- * All starred variables are defined in the same way but refer to the production process in France.

Table 4.4.2: Production of Wine

United States	France
$Q_W = \frac{\bar{L}_W[hrs]}{a_{LW}[hrs/gal]}$	$Q^*_W = \frac{\bar{L}^*_W}{a^*_{LW}}$

where

- Q_W = quantity of wine produced in the United States
- $\bar{L}_W$ = fixed amount of labor applied to wine production in the United States
- a_{LW} = unit labor requirement in wine production in the United States (hours of labor necessary to produce one unit of wine)
- * All starred variables are defined in the same way but refer to the production process in France.

The unit labor requirements define the technology of production in the two countries. Differences in these labor costs across countries represent differences in technology.

key takeaway

- The immobile factor model is a two-country, two-good, two-factor, perfectly competitive general equilibrium model that is identical to the Ricardian model except that labor cannot move across industries.

Exercise 4.4.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The assumption that distinguishes the immobile factor model from the Ricardian model.
   b. The term describing the period of time encompassed by the immobile factor model.
   c. The firms' objective in the immobile factor model.
   d. The consumers' objective in the immobile factor model.
   e. The term for the entire collection of assumptions made in the immobile factor model.

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4.5: The Production Possibility Frontier in the Immobile Factor Model 4.5: The Production Possibility Frontier in the Immobile Factor ModelEdit Update titlecancel

Learning Objectives

1. Learn how the immobile factor model's production possibility frontier (PPF) is drawn and how it compares with the Ricardian model's PPF.

To derive the production possibility frontier (PPF) in the immobile factor model, it is useful to begin with a PPF from the Ricardian model. In the Ricardian model, the PPF is drawn as a straight line with endpoints given by L/a_{LC} and L/a_{LW}, where L is the total labor endowment available for use in the two industries (see Figure 4.5.1). Since labor is moveable across industries, any point along the PPF is a feasible production point that maintains full employment of labor.

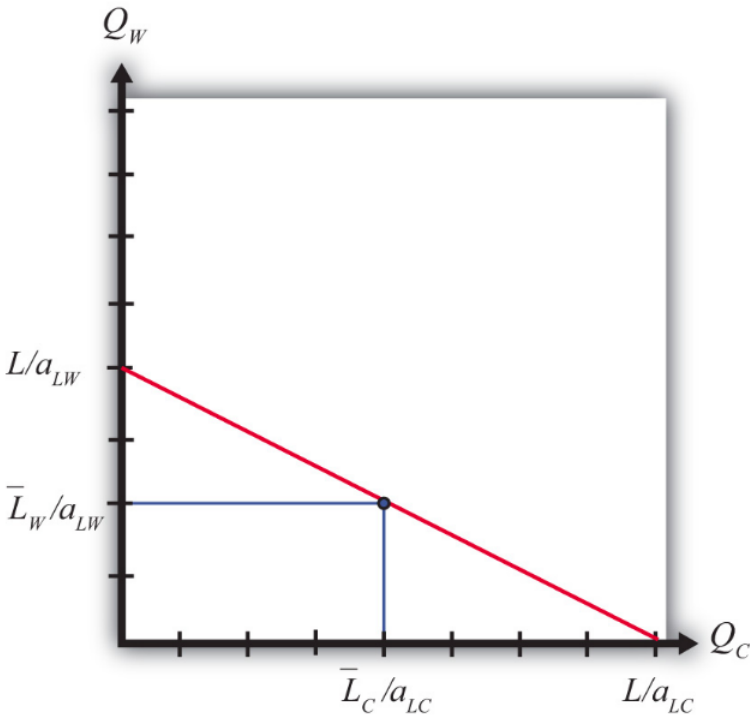


Figure 4.5.1: The Immobile Factor Model PPF

Next, let's suppose that some fraction of the L workers are cheesemakers, while the remainder are winemakers. Let $\bar{L}_C$ be the number of cheesemakers and $\bar{L}_W$ be the number of winemakers such that $\bar{L}_C + \bar{L}_W = L$. If we assume that these workers cannot be moved to the other industry, then we are in the context of the immobile factor model.

In the immobile factor model, the PPF reduces to a single point represented by the blue dot in Figure 4.5.1. This is the only production point that generates full employment of both wine workers and cheese workers. The production possibility set (PPS) consists of the set of points that is feasible whether or not full employment is maintained. The PPS is represented by the rectangle formed by the blue lines and the Q_C and Q_W axes.

Notice that in the immobile factor model, the concept of opportunity cost is not defined because it is impossible, by assumption, to increase the output of either good. No opportunity cost also means that neither country has a comparative advantage as defined in the Ricardian model. However, this does not mean there is no potential for advantageous trade.

Key takeaways

- The PPF in an immobile factor model consists of a single point because a fixed labor supply in each industry leads to a fixed quantity of each good that can be produced with full employment.
- Opportunity cost is not defined in the immobile factor model.

Exercise 4.5.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. A description of the production possibility set in the immobile factor model.
   b. Of *true* or *false*, the opportunity cost of cheese production is not defined in the immobile factor model.
   c. Of *true* or *false*, the production point (0, 0) is a part of the production possibility set in the immobile factor model.
   d. Of *true* or *false*, the production point (0, 0) is a part of the production possibility frontier in the immobile factor model.

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4.6: Autarky Equilibrium in the Immobile Factor Model 4.6: Autarky Equilibrium in the Immobile Factor ModelEdit Update titlecancel

Learning Objectives

1. Depict an autarky equilibrium in the immobile factor model.
2. Determine the autarky terms of trade given particular assumptions concerning technology, endowments, and demands.

Suppose two countries, the United States and France, have the exactly the same number of winemakers and cheesemakers. This means $\bar{L}_C = \bar{L}_C^*$ and $\bar{L}_W = \bar{L}_W^*$. Suppose also that the United States has an absolute advantage in the production of cheese, while France has the absolute advantage in the production of wine. This means $a_{LC} < a_{LC}^*$ and $a_{LW}^* < a_{LW}$. Also, assume that the preferences for the two goods in both countries are identical.

For simplicity, let aggregate preferences be represented by a homothetic utility function. These functions have the property that for any price ratio, the ratio of the two goods consumed is equal to a constant. One function with this property is $\frac{Q_W^D}{Q_C^D} = \frac{P_C}{P_W}$, where Q_C^D is the aggregate quantity of cheese demanded and Q_W^D is the aggregate quantity of wine demanded. This function says that the ratio of the quantity of wine demanded to the quantity of cheese demanded must equal the price ratio.

For example, suppose that consumers face a price ratio $\frac{P_C}{P_W}$ = 2 gallons of wine per pound of cheese. In this case, consumers will demand wine to cheese in the same ratio: two gallons per pound. Suppose the price ratio rises to $\frac{P_C}{P_W}$ = 3. This means that cheese becomes more expensive than wine. At the higher price ratio, consumers will now demand three gallons of wine per pound of cheese. Thus as the relative price of cheese rises, the relative demand for wine rises as consumers substitute less expensive wine for more expensive cheese. Similarly, as the price of wine falls, the relative demand for wine rises.

The PPFs for the two countries in this case are plotted in Figure 4.6.1. The United States produces more cheese than France, while France produces more wine than the United States. Because the factors are immobile, the ratio of wine to cheese production in the United States must be:

$$\frac{Q_W}{Q_C} = \frac{(\bar{L}_W/a_{LW})}{(\bar{L}_C/a_{LC})}. \tag{4.6.1}$$

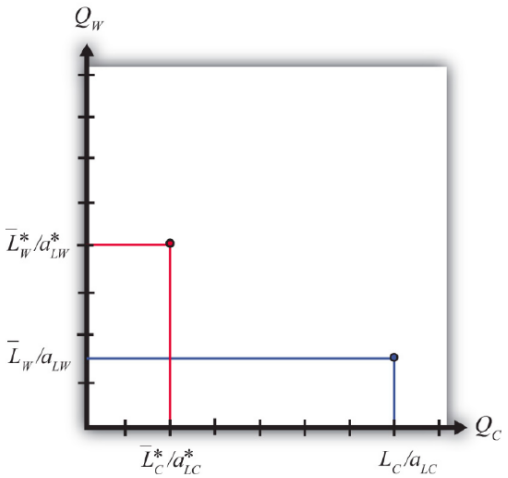


Figure 4.6.1: The U.S. and France's PPFs

In autarky, the quantity demanded of each good must equal the quantity supplied. This implies that the ratios of quantities must also be equalized such that:

$$\frac{Q_W^D}{Q_C^D} = \frac{Q_W}{Q_C}. \tag{4.6.2}$$

Substituting Equation 4.6.1 in Equation 4.6.2 yields the autarky price ratio in the United States:

$$\left(\frac{P_C}{P_W}\right)_{Aut} = \frac{(\bar{L}_W/a_{LW})}{(\bar{L}_C/a_{LC})} = \frac{a_{LC}}{a_{LW}}\frac{\bar{L}_W}{\bar{L}_C}.$$

Similarly, France's autarky price ratio is the following:

$$\left(\frac{P_C^*}{P_W^*}\right)_{Aut} = \frac{a_{LC}^*}{a_{LW}^*}\frac{\bar{L}_W^*}{\bar{L}_C^*}.$$

Since by assumption the two countries have identical labor endowments, the United States has an absolute advantage in cheese production, and France has an absolute advantage in wine production, it follows that

$$\left(\frac{P_C}{P_W}\right)_{Aut} < \left(\frac{P_C^*}{P_W^*}\right)_{Aut}.$$

Note that the same terms of trade relationship would follow if instead we assumed that the unit labor requirements, and hence the technologies, were the same in both countries but allowed the endowment of cheesemakers to be greater in the United States while the endowment of winemakers was larger in France.

In autarky, each country will produce at its production possibility point and, since there is no trade, will consume the same quantities of cheese and wine. The price of cheese is lower in the United States in autarky because it produces relatively more cheese than France given its absolute advantage, and that extra supply tends to force the price of cheese down relative to France. Similarly, France's absolute advantage in wine causes it to produce more wine than the United States, which causes the price of wine in France to be lower than in the United States.

Key Takeaways

- In autarky, in the immobile factor model, consumption will occur at the only production point possible in the model.
- The autarky terms of trade for a good will be lower in the country with the productivity advantage (or the greater factor endowment in that product).

? Exercise 4.6.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. This happens to the demand for cheese if the price ratio $\frac{P_C}{P_W}$ rises.
   b. This happens to the demand for cheese if one kilogram of cheese now trades for one liter of wine rather than two liters.
   c. This happens to the demand for cheese if one liter of wine now trades for three kilograms of cheese rather than four kilograms.
   d. With homothetic preferences, the ratio of consumer demands of wine to cheese will equal *this other ratio*.

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4.7: Depicting a Free Trade Equilibrium in the Immobile Factor Model 4.7: Depicting a Free Trade Equilibrium in the Immobile Factor ModelEdit Update titlecancel

Learning Objectives

1. Depict the production, consumption, and trade patterns for two countries in an immobile factor model in free trade.

Differences in price ratios are all that's needed to stimulate trade once the barriers to trade are removed. Since the price of cheese is higher in France upon the opening of free trade, U.S. cheese producers will begin to export cheese to the French market, where they will make a greater profit. Similarly, French wine producers will export wine to the U.S. market, where it commands a higher price. The effect of the shift in supply is to force the price of cheese relative to wine down in France and up in the United States until they meet at a price ratio that equalizes world supply of wine and cheese with world demand for wine and cheese.

When a free trade equilibrium is reached, the following conditions will prevail:

1. Both countries face the same terms of trade: $\left(\frac{P_C}{P_W}\right)_{FT}$.
2. Both countries will demand the same ratio of wine to cheese: $\frac{Q_W^D}{Q_C^D}$.
3. Exports of cheese by the United States will equal imports of cheese by France.
4. Exports of wine by France will equal imports of wine by the United States.

The free trade equilibrium is depicted in Figure 4.7.1. The countries produce at the points P^* and P and consume after trade at the points C^* and C, respectively. Thus the United States exports ZP units of cheese, while France imports the equivalent, C^*Z^*. Similarly, France exports Z^*P^* units of wine, while the United States imports the equivalent, CZ. Each country trades with the other in the ratio CZ/ZP gallons of wine per pound of cheese. This corresponds to the free trade price ratio, $\left(\frac{P_C}{P_W}\right)_{FT}$, represented by the slope of the lines C^*P^* and CP.

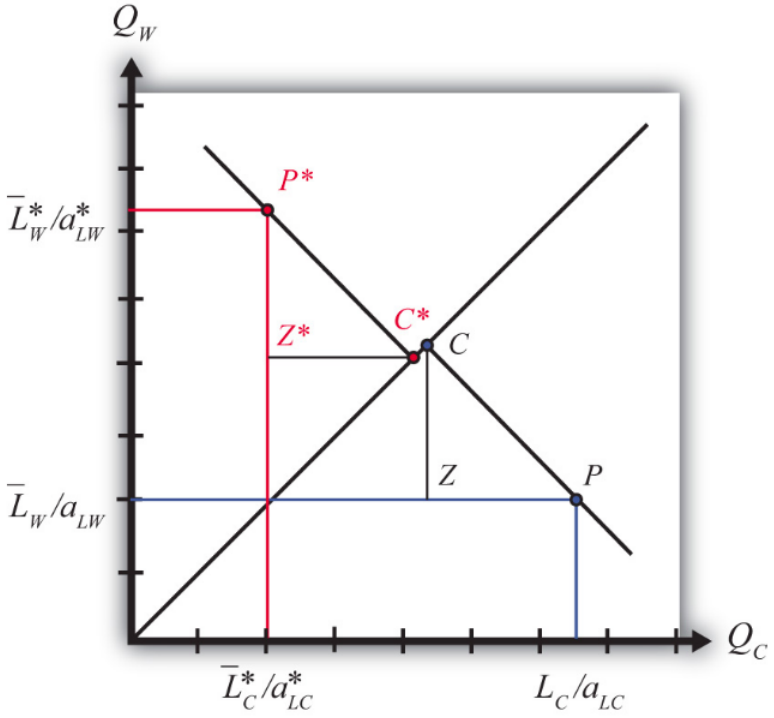


Figure 4.7.1: A Free Trade Equilibrium in the Immobile Factor Model

The equilibrium demonstrates that with trade both countries are able to consume at a point that lies outside their production possibility set (PPS). In other words, trade opens up options that were not available to the countries before.

Key Takeaway

- In an immobile factor model, free trade enables both countries to consume a mix of goods that were not available to them before trade.

Exercise 4.7.1

1. Suppose two countries, Brazil and Argentina, can be described by an immobile factor model. Assume they each produce wheat and chicken using labor as the only input. Suppose the two countries move from autarky to free trade with each other. Assume the terms of trade change in each country as indicated below. In the remaining boxes, indicate the effect of free trade on the variables listed in the first column in both Brazil and Argentina. You do not need to show your work. Use the following notation:

   + the variable increases

   − the variable decreases

   0 the variable does not change

   A the variable change is ambiguous (i.e., it may rise, it may fall)

Table 4.7.1: Effects of Free Trade

	In Brazil	In Argentina
$\frac{P_c}{P_w}$	+	−
Output of Wheat		
Output of Chicken		
Exports of Wheat		
Imports of Wheat		

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4.8: Effect of Trade on Real Wages 4.8: Effect of Trade on Real WagesEdit Update titlecancel

Learning Objectives

1. Learn how to measure real wages in the immobile factor model.
2. Learn how real wages change when a country moves from autarky to free trade.

We calculate real wages to determine whether there are any income redistribution effects in moving to free trade. The real wage formulas in the immobile factor model are the same as in the Ricardian model since perfect competition prevails in both industries. However, the wage paid to cheese workers no longer must be the same as the wage of wine workers. Cheese workers' wages could be higher since wine workers cannot shift to the cheese industry to take advantage of the higher wage.

When the countries move from autarky to free trade, the price ratio in the United States, $\frac{P_C}{P_W}$, rises.

The result is a redistribution of income as shown in Table 4.8.1. Cheese workers face no change in their real wage in terms of cheese and experience an increase in their real wage in terms of wine.

Table 4.8.1: Changes in Real Wages (Autarky to Free Trade): $\frac{P_C}{P_W}$ Rises

	In Terms of Cheese	In Terms of Wine
Real Wage of U.S. Cheese Workers	$\frac{w_C}{P_C} = \frac{1}{a_{LC}}$(no change)	$\frac{w_C}{P_C} = \frac{1}{a_{LC}} \frac{P_C}{P_W}$ (rises)
Real Wage of U.S. Wine Workers	$\frac{w_W}{P_C} = \frac{1}{a_{LW}} \frac{P_W}{P_C}$ (falls)	$\frac{w_W}{P_W} = \frac{1}{a_{LW}}$ (no change)

where

- P_C = price of cheese
- P_W = price of wine
- w_C = wage paid to cheese workers
- w_W = wage paid to wine workers
- a_{LC} = unit labor requirement in cheese production in the United States (hours of labor necessary to produce one unit of cheese)
- a_{LW} = unit labor requirement in wine production in the United States (hours of labor necessary to produce one unit of wine)

Thus cheese workers are most likely better off in free trade. Wine workers face no change in their real wage in terms of wine but suffer a decrease in their real wage in terms of cheese. This means wine workers are likely to be worse off as a result of free trade.

Since one group of workers realizes real income gains while another set suffers real income losses, *free trade causes a redistribution of income within the economy. Free trade results in winners and losers in the immobile factor model*.

In France, the price ratio, $\frac{P_C}{P_W}$, falls when moving to free trade. The result is a redistribution of income similar to the United States as shown in Table 4.8.2. Cheese workers face no change in their real wage in terms of cheese and experience a decrease in their real wage in terms of wine.

Table 4.8.2: Changes in Real Wages (Autarky to Free Trade): $\frac{P_C}{P_W}$ Falls

	In Terms of Cheese	In Terms of Wine
Real Wage of French Cheese Workers	$\frac{w_C}{P_C} = \frac{1}{a_{LC}}$(no change)	$\frac{w_C}{P_C} = \frac{1}{a_{LC}} \frac{P_C}{P_W}$ (falls)
Real Wage of French Wine Workers	$\frac{w_W}{P_C} = \frac{1}{a_{LW}} \frac{P_W}{P_C}$ (rises)	$\frac{w_W}{P_W} = \frac{1}{a_{LW}}$ (no change)

Thus cheese workers are most likely worse off in free trade. Wine workers face no change in their real wage in terms of wine but realize an increase in their real wage in terms of cheese. This means wine workers are likely to be better off as a result of free trade.

Since one group of workers realizes real income gains while another set suffers real income losses, free trade causes a redistribution of income within the economy. *Free trade results in winners and losers in both the United States and France*. In both countries, the winners are those workers who work in the industry whose output price rises, while the losers work in the industry whose output price falls. But because the price changes are due to the movement to free trade, it is also true that the output price

increases occur in the export industries in both countries, while the price declines occur in the import-competing industries. Thus it follows that *a movement to free trade will benefit those workers who work in the export industry and harm those workers who work in the import-competing industry*.

Key Takeaways

- When countries move to free trade and labor is immobile, in the export industry the real wage with respect to the exported good remains constant, but the real wage with respect to the import good rises in both countries.
- When countries move to free trade and labor is immobile, in the import industry the real wage with respect to the imported good remains constant, but the real wage with respect to the import good falls in both countries.
- When countries move to free trade and labor is immobile, in general, workers in the export industry benefit, while workers in the import-competing industry lose.

? Exercise 4.8.1

1. According to an immobile factor model, which groups are likely to benefit very shortly after trade liberalization occurs? Which groups are likely to lose very shortly after trade liberalization occurs?
2. Suppose two countries, Brazil and Argentina, can be described by an immobile factor model. Assume they each produce wheat and chicken using labor as the only input. Suppose the two countries move from autarky to free trade with each other. Assume the terms of trade change in each country as indicated below. In the remaining boxes, indicate the effect of free trade on the variables listed in the first column in both Brazil and Argentina. You do not need to show your work. Use the following notation:

   + the variable increases

   − the variable decreases

   0 the variable does not change

   A the variable change is ambiguous (i.e., it may rise, it may fall)

Table 4.8.3: Real Wage Effects

	In Brazil	In Argentina
$\frac{P_c}{P_w}$	+	−
Real Wage of Chicken Workers in Terms of Chicken		
Real Wage of Chicken Workers in Terms of Wheat		
Real Wage of Wheat Workers in Terms of Chicken		
Real Wage of Wheat Workers in Terms of Wheat		

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4.9: Intuition of Real Wage Effects 4.9: Intuition of Real Wage EffectsEdit Update titlecancel

Learning Objectives

1. Understand intuitively why real wages change differently in the immobile factor model.

When the United States and France move from autarky to free trade, the U.S. price of cheese rises and the United States begins to export cheese. The French price of wine rises and France begins to export wine. In both of these industries, the higher prices generate higher revenue, and since profits must remain equal to zero because of competition in the industry, higher wages are paid to the workers. As long as the factors remain immobile, other workers do not enter the higher wage industry, so these higher wages can be maintained. Thus in both countries *real wages rise for workers in the export industries*.

The movement from autarky to free trade also causes the price of wine to fall in the United States while the United States imports wine and the price of cheese to fall in France while France imports cheese. Lower prices reduce the revenue to the industry, and to maintain zero profit, wages are reduced proportionally. Since workers are assumed to be immobile, workers cannot flee the low-wage industry and thus low wages are maintained. Thus in both countries *real wages fall for workers in the import-competing industries*.

But isn't it possible for the owners of the firms in the export industries to claim all the extra revenue for themselves? In other words, maybe when the price rises the owners of the export firms simply pay the CEO and the rest of management a few extra million dollars and do not give any of the extra revenue to the ordinary workers. Actually, this is unlikely under the assumptions of the model. First of all, the model has no owners or management. Instead, all workers are assumed to be the same, and no workers have any special ownership rights. But let's suppose that there is an owner. The owner can't claim a huge pay increase because the industry is assumed to be perfectly competitive. This means that there are hundreds or thousands of other export firms that have all realized a price increase. Although workers are assumed to be immobile across industries, they are not immobile *between firms* within an industry.

So let's suppose that all the firm's owners simply pocket the extra revenue. If one of these owners wants to make even more money, it is now possible. All she must do is reduce her pay somewhat and offer her workers a higher wage. The higher wage will entice other workers in the industry to move to the generous firm. By increasing workers' wages, this owner can expand her own firm's output at the expense of other firms in the industry. Despite a lower wage for the owner, as long as the increased output is sufficiently large, the owner will make even more money for herself than she would have had she not raised worker wages. However, these extra profits will only be temporary since other owners would soon be forced to raise worker wages to maintain their own output and profit. It is this competition within the industry that will force wages for workers up and the compensation for owners down. In the end, economic profit will be forced to zero. Zero economic profit assures that owners will receive just enough to prevent them from moving to another industry.

Key Takeaways

- The assumption of immobile labor means that workers cannot take advantage of higher wages paid in another industry after opening to trade. Lack of competition in the labor market allows export industry wages to rise and import-competing industry wages to fall.
- Competition between firms within an industry assures that all workers receive an identical wage and no one group within the industry can enjoy above-normal profit in the long run.

Exercise 4.9.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. Of *true* or *false*, factors can move freely and costlessly between industries in an immobile factor model.
   b. Of *true* or *false*, factors can move freely and costlessly between firms within an industry in an immobile factor model.

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4.10: Interpreting the Welfare Effects 4.10: Interpreting the Welfare EffectsEdit Update titlecancel

Learning Objectives

1. Understand how national welfare is affected by free trade in an immobile factor model and why compensation cannot assure everyone gains.

The real wage calculations show that some workers gain from trade, while others lose from trade. On the other hand, we showed that the economy is able to jump to a higher aggregate indifference as a result of free trade. The increase in aggregate welfare is attributable entirely to an increase in consumption efficiency. A reasonable question to ask at this juncture is whether the winners from trade could compensate the losers such that every worker is left no worse off from free trade. The answer to this question is no in the context of this model.

In the immobile factor model, there is no increase in world productive efficiency. The immobility of factors implies that world output is the same with trade as it was in autarky. This means that the best that compensation could provide is to return everyone to their autarky consumption levels. And the only way to do that is to eliminate trade. There simply is no way to increase the total consumption of each good for every worker after trade begins.

Sometimes economists argue that since the model displays an increase in consumption efficiency, this means that the country is better off with trade. While technically this is true, it is important to realize that statements about what's best for a country in the aggregate typically mask the effects on particular individuals. The immobile factor model suggests that in the very short run, movements to free trade will very likely result in a redistribution of income with some groups of individuals suffering real income losses. It will be very difficult to convince those who will lose that free trade is a good idea because the aggregate effects are positive.

Furthermore, since there is no way for the winners to compensate the losers such that everyone gains, the model implies that the movement to free trade can be a zero-sum game, at least in the very short run. This means that the sum of the gains to the winners is exactly equal to the sum of the losses to the losers.

In the Heckscher-Ohlin model, we will show that income redistribution is possible even in the long run when an economy moves to free trade. However, in that case, free trade will be a positive-sum game in that the sum of the gains will exceed the sum of the losses.

Key Takeaways

- In the immobile factor model, because there is no increase in output of either good when moving to free trade, there is no way for compensation to make everyone better off after trade.

Exercise 4.10.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. Of *increase*, *decrease*, or *stay the same*, this is what happens to the output of cheese in France in an immobile factor model when it moves to free trade.
   b. Of *increase*, *decrease*, or *stay the same*, this is what happens to the output of wine in France in an immobile factor model when it moves to free trade.
   c. Of *increase*, *decrease*, or *stay the same*, this is what happens to world productive efficiency in an immobile factor model when two countries move to free trade.
   d. Of *true* or *false*, compensation provided to the losers from trade can assure that everyone gains from trade in an immobile factor model.

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4.11: Aggregate Welfare Effects of Free Trade in the Immobile Factor Model 4.11: Aggregate Welfare Effects of Free Trade in the Immobile Factor ModelEdit Update titlecancel

Learning Objectives

1. Use aggregate indifference curves to demonstrate that a movement to free trade will cause an increase in national welfare in both countries in an immobile factor model.
2. Use national indifference curves to demonstrate the efficiency effects that arise because of free trade in an immobile factor model.

Figure 4.11.1 compares autarky and free trade equilibria for the United States and France. The US PPF is given by the red dot at A, while the French PPF is given by the green dot at A^*. We assume both countries share the same aggregate preferences represented by the indifference curves in the diagram.

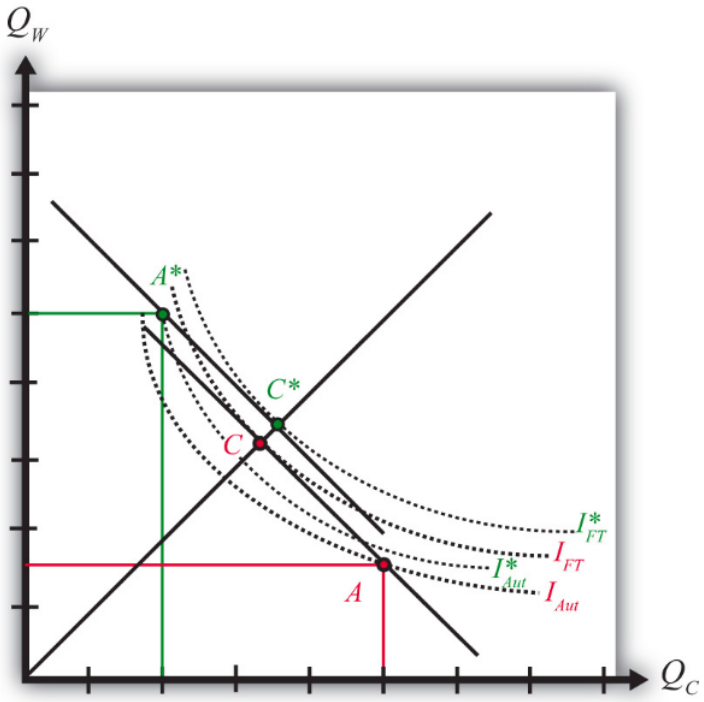


Figure 4.11.1: Comparing Free Trade to Autarky

The U.S. autarky production and consumption points are determined where the aggregate indifference curve touches the U.S. PPF at point A. The United States realizes a level of aggregate utility that corresponds to the indifference curve I_{Aut}.

The U.S. production and consumption points in free trade are A and C, respectively. The United States continues to produce at A since factors are immobile between industries but trades to achieve its consumption point at C. In free trade, the United States realizes a level of aggregate utility that corresponds to the indifference curve I_{FT}. Since the free trade indifference curve I_{FT} lies to the northeast of the autarky indifference curve I_{Aut}, national welfare rises as the United States moves to free trade.

France's autarky production and consumption points are determined where the aggregate indifference curve touches France's PPF at point A^*. France realizes a level of aggregate utility that corresponds to the indifference curve I^*_{Aut}.

French production and consumption in free trade occurs at A^* and C^*, respectively. In free trade France realizes a level of aggregate utility that corresponds to the indifference curve I^*_{FT}. Since the free trade indifference curve I^*_{FT} lies to the northeast of the autarky indifference curve I^*_{Aut}, national welfare also rises as France moves to free trade.

This means that free trade will raise aggregate welfare for both countries relative to autarky. Both countries are better off with free trade.

Finally, the aggregate welfare gains from free trade can generally be decomposed into production efficiency gains and consumption efficiency gains. However, since production cannot shift in either country when moving to free trade, there are no production efficiency gains in the immobile factor model. Thus, in the United States, the increase in utility between I_{FT} and I_{Aut} shown in Figure 4.11.1 represents an increase in consumption efficiency only.

Key Takeaways

- In an immobile factor model, both countries benefit from free trade because they can both reach a higher aggregate indifference curve.
- In an immobile factor model, there are consumption efficiency improvements but no production efficiency improvements when moving to free trade.

? Exercise 4.11.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. Of points A, A^*, C, or C^* in Figure 4.11.1, this point provides the highest level of national welfare.
   b. Of points A, A^*, C, or C^* in Figure 4.11.1, this point provides the lowest level of national welfare.
   c. Of *production efficiency*, *consumption efficiency*, or *both*, improvements in this are shown in the Ricardian model.
   d. Of *production efficiency*, *consumption efficiency*, or *both*, improvements in this are shown in the immobile factor model.

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CHAPTER OVERVIEW

5: The Heckscher-Ohlin (Factor Proportions) Model

The Heckscher-Ohlin (H-O; aka the factor proportions) model is one of the most important models of international trade. It expands upon the Ricardian model largely by introducing a second factor of production. In its two-by-two-by-two variant, meaning two goods, two factors, and two countries, it represents one of the simplest general equilibrium models that allows for interactions across factor markets, goods markets, and national markets simultaneously.

These interactions across markets are one of the important economics lessons displayed in the results of this model. With the H-O model, we learn how changes in supply or demand in one market can feed their way through the factor markets and, with trade, the national markets and influence both goods and factor markets at home and abroad. In other words, all markets are everywhere interconnected.

Among the important results are that international trade can improve economic efficiency but that trade will also cause a redistribution of income between different factors of production. In other words, some will gain from trade, some will lose, but the net effects are still likely to be positive.

The end of the chapter discusses the specific factor model, which represents a cross between the H-O model and the immobile factor model. The implications for income distribution and trade are highlighted.

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5.1: Chapter Overview 5.1: Chapter OverviewEdit Update titlecancel

Learning Objectives

1. Learn the basic assumptions of the Heckscher-Ohlin (H-O) model, especially factor intensity within industries and factor abundancy within countries.
2. Identify the four major theorems in the H-O model.

The factor proportions model was originally developed by two Swedish economists, Eli Heckscher and his student Bertil Ohlin, in the 1920s. Many elaborations of the model were provided by Paul Samuelson after the 1930s, and thus sometimes the model is referred to as the Heckscher-Ohlin-Samuelson (HOS) model. In the 1950s and 1960s, some noteworthy extensions to the model were made by Jaroslav Vanek, and so occasionally the model is called the Heckscher-Ohlin-Vanek model. Here we will simply call all versions of the model either the Heckscher-Ohlin (H-O) model, or simply the more generic "factor proportions model."

The H-O model incorporates a number of realistic characteristics of production that are left out of the simple Ricardian model. Recall that in the simple Ricardian model only one factor of production, labor, is needed to produce goods and services. The productivity of labor is assumed to vary across countries, which implies a difference in technology between nations. It was the difference in technology that motivated advantageous international trade in the model.

The standard H-O model begins by expanding the number of factors of production from one to two. The model assumes that labor and capital are used in the production of two final goods. Here, capital refers to the physical machines and equipment that are used in production. Thus machine tools, conveyers, trucks, forklifts, computers, office buildings, office supplies, and much more are considered capital.

All productive capital must be owned by someone. In a capitalist economy, most of the physical capital is owned by individuals and businesses. In a socialist economy, productive capital would be owned by the government. In most economies today, the government owns some of the productive capital, but private citizens and businesses own most of the capital. Any person who owns common stock issued by a business has an ownership share in that company and is entitled to dividends or income based on the profitability of the company. As such, that person is a capitalist—that is, an owner of capital.

The H-O model assumes private ownership of capital. Use of capital in production will generate income for the owner. We will refer to that income as capital "rents." Thus, whereas the worker earns "wages" for his or her efforts in production, the capital owner earns rents.

The assumption of two productive factors, capital and labor, allows for the introduction of another realistic feature in production: differing factor proportions both across and within industries. When one considers a range of industries in a country, it is easy to convince oneself that the proportion of capital to labor applied in production varies considerably. For example, steel production generally involves large amounts of expensive machines and equipment spread over perhaps hundreds of acres of land, but it also uses relatively few workers. (Note that *relative* here means relative to other industries.) In the tomato industry, in contrast, harvesting requires hundreds of migrant workers to hand-pick and collect each fruit from the vine. The amount of machinery used in this process is relatively small.

In the H-O model, we define the ratio of the quantity of capital to the quantity of labor used in a production process as the **capital-labor ratio**. We imagine, and therefore assume, that different industries producing different goods have different capital-labor ratios. It is this ratio (or proportion) of one factor to another that gives the model its generic name: the factor proportions model.

In a model in which each country produces two goods, an assumption must be made as to which industry has the larger capital-labor ratio. Thus if the two goods that a country can produce are steel and clothing and if steel production uses more capital per unit of labor than is used in clothing production, we would say the steel production is **capital intensive** relative to clothing production. Also, if steel production is capital intensive, then it implies that clothing production must be **labor intensive** relative to steel.

Another realistic characteristic of the world is that countries have different quantities—that is, endowments—of capital and labor available for use in the production process. Thus some countries like the United States are well endowed with physical capital relative to their labor force. In contrast, many less-developed countries have much less physical capital but are well endowed with large labor forces. We use the ratio of the aggregate endowment of capital to the aggregate endowment of labor to define relative factor abundancy between countries. Thus if, for example, the United States has a larger ratio of aggregate capital per unit of labor

than France's ratio, we would say that the United States is capital abundant relative to France. By implication, France would have a larger ratio of aggregate labor per unit of capital and thus France would be labor abundant relative to the United States.

The H-O model assumes that the only differences between countries are these variations in the relative endowments of factors of production. It is ultimately shown that (1) trade will occur, (2) trade will be nationally advantageous, and (3) trade will have characterizable effects on prices, wages, and rents when the nations differ in their relative factor endowments and when different industries use factors in different proportions.

It is worth emphasizing here a fundamental distinction between the H-O model and the Ricardian model. Whereas the Ricardian model assumes that production technologies differ between countries, the H-O model assumes that production technologies are the same. The reason for the identical technology assumption in the H-O model is perhaps not so much because it is believed that technologies are really the same, although a case can be made for that. Instead, the assumption is useful in that it enables us to see precisely how differences in resource endowments are sufficient to cause trade and it shows what impacts will arise entirely due to these differences.

The Main Results of the H-O Model

There are four main theorems in the H-O model: the Heckscher-Ohlin (H-O) theorem, the Stolper-Samuelson theorem, the Rybczynski theorem, and the factor-price equalization theorem. The Stolper-Samuelson and Rybczynski theorems describe relationships between variables in the model, while the H-O and factor-price equalization theorems present some of the key results of the model. The application of these theorems also allows us to derive some other important implications of the model. Let us begin with the H-O theorem.

The Heckscher-Ohlin Theorem

The H-O theorem predicts the pattern of trade between countries based on the characteristics of the countries. The H-O theorem says that a capital-abundant country will export the capital-intensive good, while the labor-abundant country will export the labor-intensive good.

Here's why. A country that is **capital abundant** is one that is well endowed with capital relative to the other country. This gives the country a propensity for producing the good that uses relatively more capital in the production process—that is, the capital-intensive good. As a result, if these two countries were not trading initially—that is, they were in autarky—the price of the capital-intensive good in the capital-abundant country would be bid down (due to its extra supply) relative to the price of the good in the other country. Similarly, in the country that is **labor abundant**, the price of the labor-intensive good would be bid down relative to the price of that good in the capital-abundant country.

Once trade is allowed, profit-seeking firms will move their products to the markets that temporarily have the higher price. Thus the capital-abundant country will export the capital-intensive good since the price will be temporarily higher in the other country. Likewise, the labor-abundant country will export the labor-intensive good. Trade flows will rise until the prices of both goods are equalized in the two markets.

The H-O theorem demonstrates that differences in resource endowments as defined by national abundancies are one reason that international trade may occur.

The Stolper-Samuelson Theorem

The **Stolper-Samuelson theorem** describes the relationship between changes in output prices (or prices of goods) and changes in factor prices such as wages and rents within the context of the H-O model. The theorem was originally developed to illuminate the issue of how tariffs would affect the incomes of workers and capitalists (i.e., the distribution of income) within a country. However, the theorem is just as useful when applied to trade liberalization.

The theorem states that if the price of the capital-intensive good rises (for whatever reason), then the price of capital—the factor used intensively in that industry—will rise, while the wage rate paid to labor will fall. Thus, if the price of steel were to rise and if steel were capital intensive, the rental rate on capital would rise, while the wage rate would fall. Similarly, if the price of the labor-intensive good were to rise, then the wage rate would rise, while the rental rate would fall.

The theorem was later generalized by Ronald Jones, who constructed a magnification effect for prices in the context of the H-O model. The magnification effect allows for analysis of any change in the prices of both goods and provides information about the magnitude of the effects on wages and rents. Most importantly, the magnification effect allows one to analyze the effects of price changes on real wages and real rents earned by workers and capital owners. This is instructive since real returns indicate the

purchasing power of wages and rents after accounting for price changes and thus are a better measure of well-being than the wage rate or rental rate alone.

Since prices change in a country when trade liberalization occurs, the magnification effect can be applied to yield an interesting and important result. A movement to free trade will cause the real return of a country's relatively abundant factor to rise, while the real return of the country's relatively scarce factor will fall. Thus if the United States and France are two countries that move to free trade and if the United States is capital abundant (while France is labor abundant), then capital owners in the United States will experience an increase in the purchasing power of their rental income (i.e., they will gain), while workers will experience a decline in the purchasing power of their wage income (i.e., they will lose). Similarly, workers will gain in France, but capital owners will lose.

What's more, the country's abundant factor benefits regardless of the industry in which it is employed. Thus capital owners in the United States would benefit from trade even if their capital is used in the declining import-competing sector. Similarly, workers would lose in the United States even if they are employed in the expanding export sector.

The reasons for this result are somewhat complicated, but the gist can be given fairly easily. When a country moves to free trade, the price of its exported goods will rise, while the price of its imported goods will fall. The higher prices in the export industry will inspire profit-seeking firms to expand production. At the same time, the import-competing industry, suffering from falling prices, will want to reduce production to cut its losses. Thus capital and labor will be laid off in the import-competing sector but will be in demand in the expanding export sector. However, a problem arises in that the export sector is intensive in the country's abundant factor—let's say capital. This means that the export industry wants relatively more capital per worker than the ratio of factors that the import-competing industry is laying off. In the transition there will be an excess demand for capital, which will bid up its price, and an excess supply of labor, which will bid down its price. Hence, the capital owners in both industries experience an increase in their rents, while the workers in both industries experience a decline in their wages.

The Factor-Price Equalization Theorem

The factor-price equalization theorem says that when the prices of the output goods are equalized between countries, as when countries move to free trade, the prices of the factors (capital and labor) will also be equalized between countries. This implies that free trade will equalize the wages of workers and the rents earned on capital throughout the world.

The theorem derives from the assumptions of the model, the most critical of which are the assumptions that the two countries share the same production technology and that markets are perfectly competitive. In a perfectly competitive market, factors are paid on the basis of the value of their marginal productivity, which in turn depends on the output prices of the goods. Thus when prices differ between countries, so will their marginal productivities and hence so will their wages and rents. However, once goods' prices are equalized, as they are in free trade, the value of marginal products is also equalized between countries and hence the countries must also share the same wage rates and rental rates.

Factor-price equalization formed the basis for some arguments often heard in the debates leading up to the approval of the North American Free Trade Agreement (NAFTA) between the United States, Canada, and Mexico. Opponents of NAFTA feared that free trade with Mexico would lower U.S. wages to the level in Mexico. Factor-price equalization is consistent with this fear, although a more likely outcome would be a reduction in U.S. wages coupled with an increase in Mexican wages.

Furthermore, we should note that factor-price equalization is unlikely to apply perfectly in the real world. The H-O model assumes that technology is the same between countries in order to focus on the effects of different factor endowments. If production technologies differ across countries, as we assumed in the Ricardian model, then factor prices would not equalize once goods' prices equalize. As such, a better interpretation of the factor-price equalization theorem applied to real-world settings is that free trade should cause a tendency for factor prices to move together if some of the trade between countries is based on differences in factor endowments.

The Rybczynski Theorem

The **Rybczynski theorem** demonstrates the relationship between changes in national factor endowments and changes in the outputs of the final goods within the context of the H-O model. Briefly stated, it says that an increase in a country's endowment of a factor will cause an increase in output of the good that uses that factor intensively and a decrease in the output of the other good. In other words, if the United States experiences an increase in capital equipment, then that would cause an increase in output of the capital-intensive good (steel) and a decrease in the output of the labor-intensive good (clothing). The theorem is useful in

addressing issues such as investment, population growth and hence labor force growth, immigration, and emigration, all within the context of the H-O model.

The theorem was also generalized by Ronald Jones, who constructed a magnification effect for quantities in the context of the H-O model. The magnification effect allows for analysis of any change in both endowments and provides information about the magnitude of the effects on the outputs of the two goods.

Aggregate Economic Efficiency

The H-O model demonstrates that when countries move to free trade, they will experience an increase in aggregate efficiency. The change in prices will cause a shift in production of both goods in both countries. Each country will produce more of its export good and less of its import good. Unlike the Ricardian model, however, neither country will necessarily specialize in production of its export good. Nevertheless, the production shifts will improve productive efficiency in each country. Also, due to the changes in prices, consumers, in the aggregate, will experience an improvement in consumption efficiency. In other words, national welfare will rise for both countries when they move to free trade.

However, this does not imply that everyone benefits. As the Stolper-Samuelson theorem shows, the model clearly demonstrates that some factor owners will experience an increase in their real incomes, while others will experience a decrease in their factor incomes. Trade will generate winners and losers. The increase in national welfare essentially means that the sum of the gains to the winners will exceed the sum of the losses to the losers. For this reason, economists often apply the compensation principle.

The compensation principle states that as long as the total benefits exceed the total losses in the movement to free trade, then it must be possible to redistribute income from the winners to the losers such that everyone has at least as much as they had before trade liberalization occurred.

Note that the “standard” H-O model refers to the case of two countries, two goods, and two factors of production. The H-O model has been extended to many countries, many goods, and many factors, but most of the exposition in this text, and by economists in general, is in reference to the standard case.

Key Takeaways

- The H-O model is a two-country, two-good, two-factor model that assumes production processes differ in their factor intensities, while countries differ in their factor abundancies.
- The Rybczynski theorem states there is a positive relationship between changes in a factor endowment and changes in the output of the product that uses that factor intensively.
- The Stolper-Samuelson theorem states there is a positive relationship between changes in a product’s price and changes in the payment made to the factor used intensively in that industry.
- The Heckscher-Ohlin theorem predicts the pattern of trade: it says that a capital-abundant (labor-abundant) country will export the capital-intensive (labor-intensive) good and import the labor-intensive (capital-intensive) good.
- The factor-price equalization theorem demonstrates that when product prices are equalized through trade, the factor prices (wages and rents) will be equalized as well.

? Exercise 5.1.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The term used to describe the income earned on capital usage.
   b. The term used to describe the ratio of capital usage to labor usage in an industry.
   c. The term used to describe an industry that uses more capital per worker than another industry.
   d. This is by which industries differ from each other in the H-O model.
   e. This is by which countries differ between each other in the H-O model.
   f. The name given to the theorem in the H-O model that describes the pattern of trade.
   g. The name given to the theorem in the H-O model that describes the effects on wages and rents caused by a change in an output price.
   h. The name given to the theorem in the H-O model that describes the effects on the quantities of the outputs caused by a change in an endowment.

i. The name given to the theorem in the H-O model that describes the relationship between factor prices across countries in free trade.

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5.2: Heckscher-Ohlin Model Assumptions 5.2: Heckscher-Ohlin Model AssumptionsEdit Update titlecancel

Learning Objectives

1. Learn the main assumptions of a two-country, two-good, two-factor Heckscher-Ohlin (or factor proportions) model.

Perfect Competition

Perfect competition in all markets means that the following conditions are assumed to hold.

1. Many firms produce output in each industry such that each firm is too small for its output decisions to affect the market price. This implies that when choosing output to maximize profit, each firm takes the price as given or exogenous.
2. Firms choose output to maximize profit. The rule used by perfectly competitive firms is to choose the output level that equalizes the price (P) with the marginal cost (MC). That is, set $P = MC$.
3. Output is homogeneous across all firms. This means that goods are identical in all their characteristics such that a consumer would find products from different firms indistinguishable. We could also say that goods from different firms are perfect substitutes for all consumers.
4. There is free entry and exit of firms in response to profits. Positive profit sends a signal to the rest of the economy and new firms enter the industry. Negative profit (losses) leads existing firms to exit, one by one, out of the industry. As a result, in the long run economic profit is driven to zero in the industry.
5. Information is perfect. For example, all firms have the necessary information to maximize profit and to identify the positive profit and negative profit industries.

Two Countries

The case of two countries is used to simplify the model analysis. Let one country be the United States, the other France. Note that anything related exclusively to France in the model will be marked with an asterisk.

Two Goods

Two goods are produced by both countries. We assume a barter economy. This means that there is no money used to make transactions. Instead, for trade to occur, goods must be traded for other goods. Thus we need at least two goods in the model. Let the two produced goods be clothing and steel.

Two Factors

Two factors of production, labor and capital, are used to produce clothing and steel. Both labor and capital are homogeneous. Thus there is only one type of labor and one type of capital. The laborers and capital equipment in different industries are exactly the same. We also assume that labor and capital are freely mobile across industries within the country but immobile across countries. Free mobility makes the Heckscher-Ohlin (H-O) model a long-run model.

Factor Constraints

The total amount of labor and capital used in production is limited to the endowment of the country.

The **labor constraint** is

$$L_C + L_S = L,$$

where L_C and L_S are the quantities of labor used in clothing and steel production, respectively. L represents the **labor endowment** of the country. Full employment of labor implies the expression would hold with equality.

The **capital constraint** is

$$K_C + K_S = K,$$

where K_C and K_S are the quantities of capital used in clothing and steel production, respectively. K represents the **capital endowment** of the country. Full employment of capital implies the expression would hold with equality.

Endowments

The only difference between countries assumed in the model is a difference in endowments of capital and labor.

Definition

A country is **capital abundant** relative to another country if it has more capital endowment per labor endowment than the other country. Thus in this model the United States is *capital abundant* relative to France if

$$\frac{K}{L} > \frac{K^*}{L^*},$$

where K is the capital endowment and L the labor endowment in the United States and K^* is the capital endowment and L^* the labor endowment in France.

Note that if the United States is capital abundant, then France is labor abundant since the above inequality can be rewritten to get

$$\frac{L^*}{K^*} > \frac{L}{K},$$

This means that France has more labor per unit of capital for use in production than the United States.

Demand

Factor owners are the consumers of the goods. The factor owners have a well-defined utility function in terms of the two goods. Consumers maximize utility to allocate income between the two goods.

In Chapter 5: The Heckscher-Ohlin (Factor Proportions) Model, Section 5.9: The Heckscher-Ohlin Theorem, we will assume that aggregate preferences can be represented by a homothetic utility function of the form $U = C_S C_C$, where C_S is the amount of steel consumed and C_C is the amount of clothing consumed.

General Equilibrium

The H-O model is a general equilibrium model. The income earned by the factors is used to purchase the two goods. The industries' revenue in turn is used to pay for the factor services. The prices of outputs and factors in an equilibrium are those that equalize supply and demand in all markets simultaneously.

Heckscher-Ohlin Model Assumptions: Production

The production functions in Table 5.2.1 and Table 5.2.2 represent industry production, not firm production. The industry consists of many small firms in light of the assumption of perfect competition.

Table 5.2.1: Production of Clothing

United States	France
$Q_C = f(L_C, K_C)$	$Q_C^* = f(L_C^*, K_C^*)$

where

- Q_C = quantity of clothing produced in the United States, measured in racks
- L_C = amount of labor applied to clothing production in the United States, measured in labor hours
- K_C = amount of capital applied to clothing production in the United States, measured in capital hours
- $f()$ = the clothing production function, which transforms labor and capital inputs into clothing output
- * All starred variables are defined in the same way but refer to the production process in France.

Table 5.2.2: Production of Steel

United States	France
$Q_S = g(L_S, K_S)$	$Q_S^* = g(L_S^*, K_S^*)$

where

- Q_S = quantity of steel produced in the United States, measured in tons

- L_S = amount of labor applied to steel production in the United States, measured in labor hours
- K_S = amount of capital applied to steel production in the United States, measured in capital hours
- $g()$ = the steel production function, which transforms labor and capital inputs into steel output
- * All starred variables are defined in the same way but refer to the production process in France.

Production functions are assumed to be identical across countries within an industry. Thus both the United States and France share the same production function $f()$ for clothing and $g()$ for steel. This means that the countries share the same technologies. Neither country has a technological advantage over the other. This is different from the Ricardian model, which assumed that technologies were different across countries.

A simple formulation of the production process is possible by defining the unit factor requirements.

Let

$$a_{LC}\left[\frac{labor \cdot hrs}{rack}\right]$$

represent the unit labor requirement in clothing production. It is the number of labor hours needed to produce a rack of clothing.

Let

$$a_{KC}\left[\frac{capital \cdot hrs}{rack}\right]$$

represent the unit capital requirement in clothing production. It is the number of capital hours needed to produce a rack of clothing.

Similarly,

$$a_{LS}\left[\frac{labor \cdot hrs}{ton}\right]$$

is the unit labor requirement in steel production. It is the number of labor hours needed to produce a ton of steel.

And

$$a_{KS}\left[\frac{capital \cdot hrs}{ton}\right]$$

is the unit capital requirement in steel production. It is the number of capital hours needed to produce a ton of steel.

By taking the ratios of the unit factor requirements in each industry, we can define a capital-labor (or labor-capital) ratio. These ratios, one for each industry, represent the proportions in which factors are used in the production process. They are also the basis for the model's name.

First, $\frac{a_{KC}}{a_{LC}}$ is the capital-labor ratio in clothing production. It is the proportion in which capital and labor are used to produce clothing.

Similarly, $\frac{a_{KS}}{a_{LS}}$ is the capital-labor ratio in steel production. It is the proportion in which capital and labor are used to produce steel.

Definition

We say that steel production is **capital intensive** relative to clothing production if

$$\frac{a_{KS}}{a_{LS}} > \frac{a_{KC}}{a_{LC}}.$$

This means steel production requires more capital per labor hour than is required in clothing production. Notice that if steel is capital intensive, clothing must be labor intensive.

Clothing production is labor intensive relative to steel production if

$$\frac{a_{LC}}{a_{KC}} > \frac{a_{LS}}{a_{KS}}.$$

This means clothing production requires more labor per capital hour than steel production.

Remember

Factor intensity is a comparison of production processes *across industries* but within a country. Factor abundancy is a comparison of endowments *across countries*.

Heckscher-Ohlin Model Assumptions: Fixed versus Variable Proportions

Two different assumptions can be applied in an H-O model: fixed and variable proportions. A fixed proportions assumption means that the capital-labor ratio in each production process is fixed. A variable proportions assumption means that the capital-labor ratio can adjust to changes in the wage rate for labor and the rental rate for capital.

Fixed proportions are more simplistic and also less realistic assumptions. However, many of the primary results of the H-O model can be demonstrated within the context of fixed proportions. Thus the fixed proportions assumption is useful in deriving the fundamental theorems of the H-O model. The variable proportions assumption is more realistic but makes solving the model significantly more difficult analytically. To derive the theorems of the H-O model under variable proportions often requires the use of calculus.

Fixed Factor Proportions

In fixed factor proportions, a_{KC}, a_{LC}, a_{KS}, and a_{LS} are exogenous to the model and are fixed. Since the capital-output and labor-output ratios are fixed, the capital-labor ratios, $\frac{a_{KC}}{a_{LC}}$ and $\frac{a_{KS}}{a_{LS}}$, are also fixed. Thus clothing production must use capital to labor in a particular proportion regardless of the quantity of clothing produced. The ratio of capital to labor used in steel production is also fixed but is assumed to be different from the proportion used in clothing production.

Variable Factor Proportions

Under variable proportions, the capital-labor ratio used in the production process is endogenous. The ratio will vary with changes in the factor prices. Thus if there were a large increase in wage rates paid to labor, producers would reduce their demand for labor and substitute relatively cheaper capital in the production process. This means a_{KC} and a_{LC} are variable rather than fixed. So as the wage and rental rates change, the capital output ratio and the labor output ratio are also going to change.

Key Takeaways

- The production process can be simply described by defining unit factor requirements in each industry.
- The capital-labor ratio in an industry is found by taking the ratio of the unit capital and unit labor requirements.
- Factor intensities are defined by comparing capital-labor ratios between industries.
- Factor abundancies are defined by comparing the capital-labor endowment ratios between countries.
- The simple variant of the H-O model assumes the factor proportions are fixed in each industry; a more complex, and realistic, variant assumes factor proportions can vary.

? Exercise 5.2.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The term used to describe Argentina if Argentina has more land per unit of capital than Brazil.
   b. The term used to describe aluminum production when aluminum production requires more energy per unit of capital than steel production.
   c. The two key terms used in the Heckscher-Ohlin model; one to compare industries, the other to compare countries.
   d. The term describing the ratio of the unit capital requirement and the unit labor requirement in production of a good.
   e. The term used to describe when the capital-labor ratio in an industry varies with changes in market wages and rents.
   f. The assumption in the Heckscher-Ohlin model about unemployment of capital and labor.

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5.3: The Production Possibility Frontier (Fixed Proportions) 5.3: The Production Possibility Frontier (Fixed Proportions)Edit Update titlecancel

Learning Objectives

1. Plot the labor and capital constraint to derive the production possibility frontier (PPF).

The production possibility frontier (PPF) can be derived in the case of fixed proportions by using the exogenous factor requirements to rewrite the labor and capital constraints. The labor constraint with full employment can be written as

$$a_{LC}Q_C + a_{LS}Q_S = L.$$

The capital constraint with full employment becomes

$$a_{KC}Q_C + a_{KS}Q_S = K.$$

Each of these constraints contains two endogenous variables: Q_C and Q_S. The remaining variables are exogenous.

We graph the two constraints in Figure 5.3.1. The red line is the labor constraint. The endpoints $\frac{L}{a_{LC}}$ and $\frac{L}{a_{LS}}$ represent the maximum quantities of clothing and steel that could be produced if all the labor endowments were allocated to clothing and steel production, respectively. All points on the line represent combinations of clothing and steel outputs that could employ all the labor available in the economy. Points outside the constraint, such as B and D, are not feasible production points since there are insufficient labor resources. All points on or within the line, such as A, C, and E, are feasible. The slope of the labor constraint is $-\frac{a_{LC}}{a_{LS}}$.

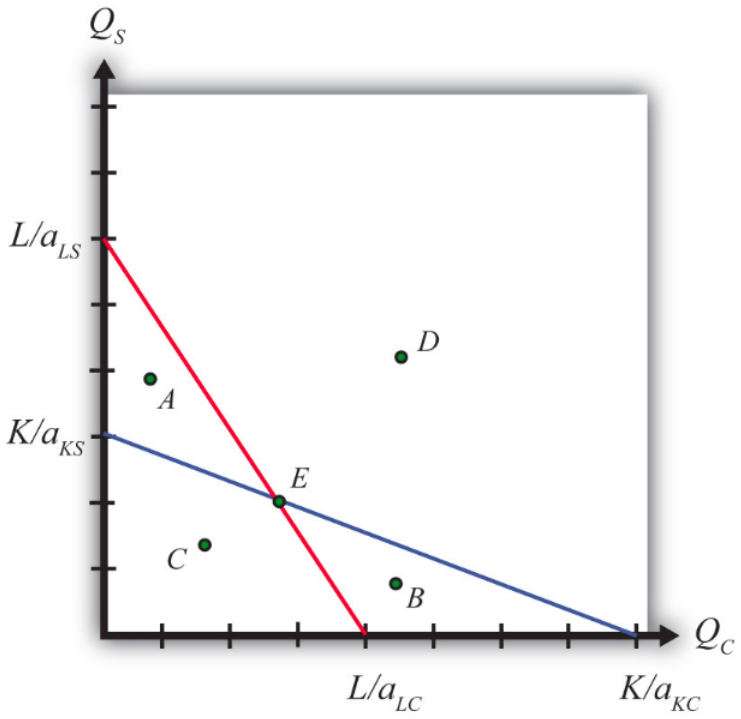


Figure 5.3.1: The Labor and Capital Constraints

The blue line is the capital constraint. The endpoints $\frac{K}{a_{KC}}$ and $\frac{K}{a_{KS}}$ represent the maximum quantities of clothing and steel that could be produced if all the capital endowments were allocated to clothing and steel production, respectively. Points on the line represent combinations of clothing and steel production that would employ all the capital in the economy. Points outside the constraint, such as A and D, are not feasible production points since there are insufficient capital resources. Points on or within the line, such as B, C, and E, are feasible. The slope of the capital constraint is $-\frac{a_{KC}}{a_{KS}}$.

The PPF is the set of output combinations that generates full employment of resources—in this case, both labor and capital. Only one point, point E, can simultaneously generate full employment of both labor and capital. Thus point E is the PPF. The production possibility set is the set of all feasible output combinations. The PPS is the area bounded by the axes and the interior section of the

labor and capital constraints. Thus at points like A, there is sufficient labor to make production feasible but insufficient capital; thus point A is not a feasible production point. Similarly, at point B there is sufficient capital but not enough labor. Points like C, however, which lie inside (or on) both factor constraints, do represent feasible production points.

Note that the labor constraint is drawn with a steeper slope than the capital constraint. This implies $\frac{a_{LC}}{a_{LS}} > \frac{a_{KC}}{a_{KS}}$, which in turn implies (with cross multiplication) $\frac{a_{KS}}{a_{LS}} > \frac{a_{KC}}{a_{LC}}$. This means that steel is assumed to be capital intensive and clothing production is assumed to be labor intensive. If the slope of the capital constraint had been steeper, then the factor intensities would have been reversed.

Key Takeaways

- The PPF in the fixed proportions Heckscher-Ohlin (H-O) model consists of the one point found at the intersection of the linear labor and capital constraints.
- Only those output combinations inside both factor constraint lines are feasible production points within the production possibility set.
- With clothing plotted on the horizontal axis, when the labor constraint is steeper than the capital constraint, clothing is labor intensive.

Exercise 5.3.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The description of the PPF in the case of fixed proportions in the Heckscher-Ohlin model.
   b. The equation for the capital constraint if the unit capital requirement in steel is ten hours per ton, the unit capital requirement in clothing is five hours per rack, and the capital endowment is ten thousand hours.
   c. The slope of the capital constraint given the information described in Exercise 1b. Include units.
   d. The equation for the labor constraint if the unit labor requirement in steel is one hour per ton, the unit labor requirement in clothing is three hours per rack, and the labor endowment is one thousand hours.
   e. The slope of the labor constraint given the information described in Exercise 1d. Include units.
   f. The capital labor ratio in clothing given the information described in Exercise 1b and Exercise 1d.
   g. The capital labor ratio in steel given the information described in Exercise 1b and Exercise 1d.

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5.4: The Rybczynski Theorem 5.4: The Rybczynski TheoremEdit Update titlecancel

Learning Objectives

1. Use the PPF diagram to show how changes in factor endowments affect production levels at full employment.

The Rybczynski theorem demonstrates how changes in an endowment affect the outputs of the goods when full employment is maintained. The theorem is useful in analyzing the effects of capital investment, immigration, and emigration within the context of a Heckscher-Ohlin (H-O) model. Consider Figure 5.4.1, depicting a labor constraint in red (the steeper lower line) and a capital constraint in blue (the flatter line). Suppose production occurs initially on the PPF at point A.

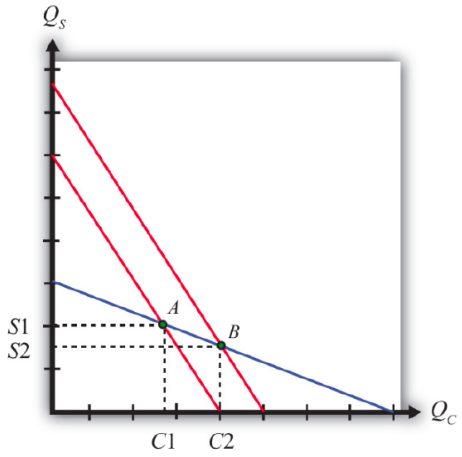


Figure 5.4.1: Graphical Depiction of Rybczynski Theorem

Next, suppose there is an increase in the labor endowment. This will cause an outward parallel shift in the labor constraint. The PPF and thus production will shift to point B. Production of clothing, the labor-intensive good, will rise from $C1$ to $C2$. Production of steel, the capital-intensive good, will fall from $S1$ to $S2$.

If the endowment of capital rose, the capital constraint would shift out, causing an increase in steel production and a decrease in clothing production. Recall that since the labor constraint is steeper than the capital constraint, steel is capital intensive and clothing is labor intensive.

This means that, in general, an increase in a country's endowment of a factor will cause an increase in output of the good that uses that factor intensively and a decrease in the output of the other good.

Key Takeaways

- The Rybczynski theorem shows there is a positive relationship between changes in a factor endowment and changes in the output of the product that uses that factor intensively.
- The Rybczynski theorem shows there is a negative relationship between changes in a factor endowment and changes in the output of the product that does not use that factor intensively.

Exercise 5.4.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. Of *increase*, *decrease*, or *stay the same*, the effect on the output of the capital-intensive good caused by a decrease in the labor endowment in a two-factor H-O model.
   b. Of *increase*, *decrease*, or *stay the same*, the effect on the output of the labor-intensive good caused by a decrease in the labor endowment in a two-factor H-O model.
   c. Of *increase*, *decrease*, or *stay the same*, the effect on the output of the capital-intensive good caused by an increase in the capital endowment in a two-factor H-O model.
   d. Of *increase*, *decrease*, or *stay the same*, the effect on the output of the labor-intensive good caused by a decrease in the capital endowment in a two-factor H-O model.

2. Consider an H-O economy in which there are two countries (United States and France), two goods (wine and cheese), and two factors (capital and labor). Suppose an increase in the labor force in the United States causes cheese production to increase. Which factor is used intensively in wine production? Which H-O theorem is applied to get this answer? Explain.

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5.5: The Magnification Effect for Quantities 5.5: The Magnification Effect for QuantitiesEdit Update titlecancel

Learning Objectives

1. Learn how the magnification effect for quantities represents a generalization of the Rybczynski theorem by incorporating the relative magnitudes of the changes.

The magnification effect for quantities is a more general version of the Rybczynski theorem. It allows for changes in both endowments simultaneously and allows a comparison of the magnitudes of the changes in endowments and outputs.

The simplest way to derive the magnification effect is with a numerical example.

Suppose the exogenous variables of the model take the values in Table 5.5.1 for one country.

Table 5.5.1: Numerical Values for Exogenous Variables

$a_{LC} = 2$	$a_{LS} = 3$	$L = 120$
$a_{KC} = 1$	$a_{KS} = 4$	$K = 120$

where

- L = labor endowment of the country
- K = capital endowment of the country
- a_{LC} = unit labor requirement in clothing production
- a_{KC} = unit capital requirement in clothing production
- a_{LS} = unit labor requirement in steel production
- a_{KS} = unit capital requirement in steel production

With these numbers, $\frac{a_{KS}}{a_{LS}}\left(\frac{4}{3}\right) > \frac{a_{KC}}{a_{LC}}\left(\frac{1}{2}\right)$, which means that steel production is capital intensive and clothing is labor intensive.

The following are the labor and capital constraints:

- Labor constraint: $2Q_C + 3Q_S = 120$
- Capital constraint: $Q_C + 4Q_S = 120$

We graph these in Figure 5.5.1. The steeper red line is the labor constraint and the flatter blue line is the capital constraint. The output quantities on the PPF can be found by solving the two constraint equations simultaneously.

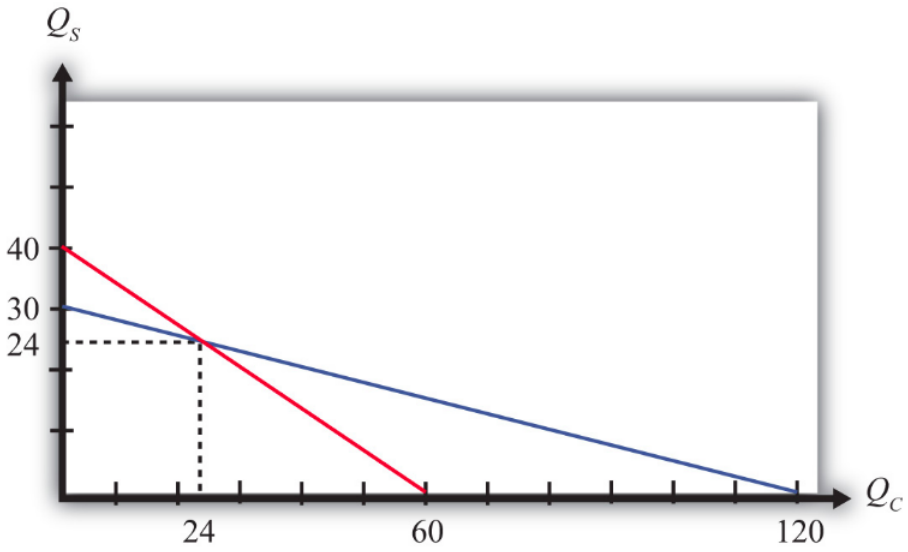


Figure 5.5.1: Numerical Labor and Capital Constraints

A simple method to solve these equations follows.

First, multiply the second equation by (−2) to get

$$2Q_C + 3Q_S = 120$$

and

$$-2Q_C - 8Q_S = -240.$$

Adding these two equations vertically yields

$$0Q_C - 5Q_S = -120,$$

which implies $Q_S = \frac{-120}{-5} = 24$. Plugging this into the first equation above (any equation will do) yields $2Q_C + 3 \times 24 = 120$. Simplifying, we get $Q_C = 120 - 722 = 24$. Thus the solutions to the two equations are $Q_C = 24$ and $Q_S = 24$.

Next, suppose the capital endowment, K, increases to 150. This changes the capital constraint but leaves the labor constraint unchanged. The labor and capital constraints now are the following:

- Labor constraint: $2Q_C + 3Q_S = 120$
- Capital constraint: $Q_C + 4Q_S = 150$

Follow the same procedure to solve for the outputs in the new full employment equilibrium.

First, multiply the second equation by (−2) to get

$$2Q_C + 3Q_S = 120$$

and

$$-2Q_C - 8Q_S = -300.$$

Adding these two equations vertically yields

$$0Q_C - 5Q_S = -180,$$

which implies $Q_S = -180 - 5 = 36$. Plugging this into the first equation above (any equation will do) yields $2Q_C + 3 \times 36 = 120$. Simplifying, we get $Q_C = \frac{120-108}{2} = 6$. Thus the new solutions are $Q_C = 6$ and $Q_S = 36$.

The Rybczynski theorem says that if the capital endowment rises, it will cause an increase in output of the capital-intensive good (in this case, steel) and a decrease in output of the labor-intensive good (clothing). In this numerical example, Q_S rises from 24 to 36 and Q_C falls from 24 to 6.

Percentage Changes in the Endowments and Outputs

The magnification effect for quantities ranks the percentage changes in endowments and the percentage changes in outputs. We'll denote the percentage change by using a ^ above the variable (i.e., $\hat{X}$ = percentage change in X).

Table 5.5.2: Calculating Percentage Changes in the Endowments and Outputs

$\hat{K} = \frac{150-120}{120} \times 100 = +25\%$	The capital stock rises by 25 percent.
$\hat{Q}_S = \frac{36-24}{24} \times 100 = +50\%$	The quantity of steel rises by 50 percent.
$\hat{Q}_C = \frac{6-24}{24} \times 100 = -75\%$	The quantity of clothing falls by 75 percent.
$\hat{L} = +0\%$	The labor stock is unchanged.

The rank order of the changes in Table 5.5.2 is the **magnification effect for quantities**:

$$\hat{Q}_S > \hat{K} > \hat{L} > \hat{Q}_C.$$

The effect is initiated by changes in the endowments. If the endowments change by some percentage, ordered as above, then the quantity of the capital-intensive good (steel) will rise by a *larger* percentage than the capital stock change. The size of the effect is *magnified* relative to the cause.

The quantity of cloth (Q_C) changes by a smaller percentage than the smaller labor endowment change. Its effect is magnified downward.

Although this effect was derived only for the specific numerical values assumed in the example, it is possible to show, using more advanced methods, that the effect will arise for any endowment changes that are made. Thus if the labor endowment were to rise with no change in the capital endowment, the magnification effect would be

$$\hat{Q}_C > \hat{L} > \hat{K} > \hat{Q}_S.$$

This implies that the quantity of the labor-intensive good (clothing) would rise by a greater percentage than the quantity of labor, while the quantity of steel would fall.

The magnification effect for quantities is a generalization of the Rybczynski theorem. The effect allows for changes in both endowments simultaneously and provides information about the magnitude of the effects. The Rybczynski theorem is one special case of the magnification effect that assumes one of the endowments is held fixed.

Although the magnification effect is shown here under the special assumption of fixed factor proportions and for a particular set of parameter values, the result is much more general. It is possible, using calculus, to show that the effect is valid under any set of parameter values and in a more general variable proportions model.

Key Takeaways

- The magnification effect for quantities shows that if the factor endowments change by particular percentages with one greater than the other, then the outputs will change by percentages that are larger than the larger endowment change and smaller than the smaller. It is in this sense that the output changes are magnified relative to the factor changes.
- If the percentage change of the capital endowment exceeds the percentage change of the labor endowment, for example, then output of the good that uses capital intensively will change by a greater percentage than capital changed, while the output of the good that uses labor intensively will change by less than labor changed.

? Exercise 5.5.1

1. Consider a two-factor (capital and labor), two-good (beer and peanuts) H-O economy. Suppose beer is capital intensive. Let Q_B and Q_P represent the outputs of beer and peanuts, respectively.
   a. Write the magnification effect for quantities if the labor endowment increases and the capital endowment decreases
   b. Write the magnification effect for quantities if the capital endowment increases by 10 percent and the labor endowment increases by 5 percent.
   c. Write the magnification effect for quantities if the labor endowment decreases by 10 percent and the capital endowment decreases by 15 percent.
   d. Write the magnification effect for quantities if the capital endowment decreases while the labor endowment does not change.
2. Consider a country producing milk and cookies using labor and capital as inputs and described by a Heckscher-Ohlin model. The following table provides outputs for goods and factor endowments before and after a change in the endowments.

Table 5.5.3: Outputs and Endowments

	Initial	After Endowment Change
Milk Output (QM)	100 gallons	110 gallons
Cookie Output (QC)	100 pounds	80 pounds
Labor Endowment (L)	4,000 hours	4,200 hours
Capital Endowment (K)	1,000 hours	1,000 hours

   a. Calculate and display the magnification effect for quantities in response to the endowment change.
   b. Which product is capital intensive?
   c. Which product is labor intensive?
3. Consider the following data in a Heckscher-Ohlin model with two goods (wine and cheese) and two factors (capital and labor).

   a_{KC} = 5 hours per pound (unit capital requirement in cheese)

a_{KW} = 10 hours per gallon (unit capital requirement in wine)

a_{LC} = 15 hours per pound (unit labor requirement in cheese)

a_{LW} = 20 hours per gallon (unit labor requirement in wine)

L = 5,500 hours (labor endowment)

K = 2,500 hours (capital endowment)

a. Solve for the equilibrium output levels of wine and cheese.
b. Suppose the labor endowment falls by 100 hours to 5,400 hours. Solve for the new equilibrium output levels of wine and cheese.
c. Calculate the percentage changes in the outputs and endowments and write the magnification effect for quantities.
d. Identify which good is labor intensive and which is capital intensive.

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5.6: The Stolper-Samuelson Theorem 5.6: The Stolper-Samuelson TheoremEdit Update titlecancel

Learning Objectives

1. Plot the zero-profit conditions to show how changes in product prices affect factor prices.

The Stolper-Samuelson theorem demonstrates how changes in output prices affect the prices of the factors when positive production and zero economic profit are maintained in each industry. It is useful in analyzing the effects on factor income either when countries move from autarky to free trade or when tariffs or other government regulations are imposed within the context of a Heckscher-Ohlin (H-O) model.

Due to the assumption of perfect competition in all markets, if production occurs in an industry, then economic profit is driven to zero. The zero-profit conditions in each industry imply

$$P_S = a_{LS}w + a_{KS}r$$

and

$$P_C = a_{LC}w + a_{KC}r,$$

where P_S and P_C are the prices of steel and clothing, respectively; w is the wage paid to labor, and r is the rental rate on capital. Note that $a_{LS}w\ [\frac{labor \cdot hrs}{ton}\frac{\$}{labor \cdot hr} = \frac{\$}{ton}]$ is the dollar payment to workers per ton of steel produced, while $a_{KS}r\ [\frac{capital \cdot hrs}{ton}\frac{\$}{capital \cdot hr} = \frac{\$}{ton}]$ is the dollar payment to capital owners per ton of steel produced. The right-hand-side sum then is the dollars paid to all factors per ton of steel produced. If the payments to factors for each ton produced equal the price per ton, then profit must be zero in the industry. The same logic is used to justify the zero-profit condition in the clothing industry.

We imagine that firms treat prices exogenously since any one firm is too small to affect the price in its market. Because the factor output ratios are also fixed, wages and rentals remain as the two unknowns. In Figure 5.6.1, we plot the two zero-profit conditions in wage-rental space.

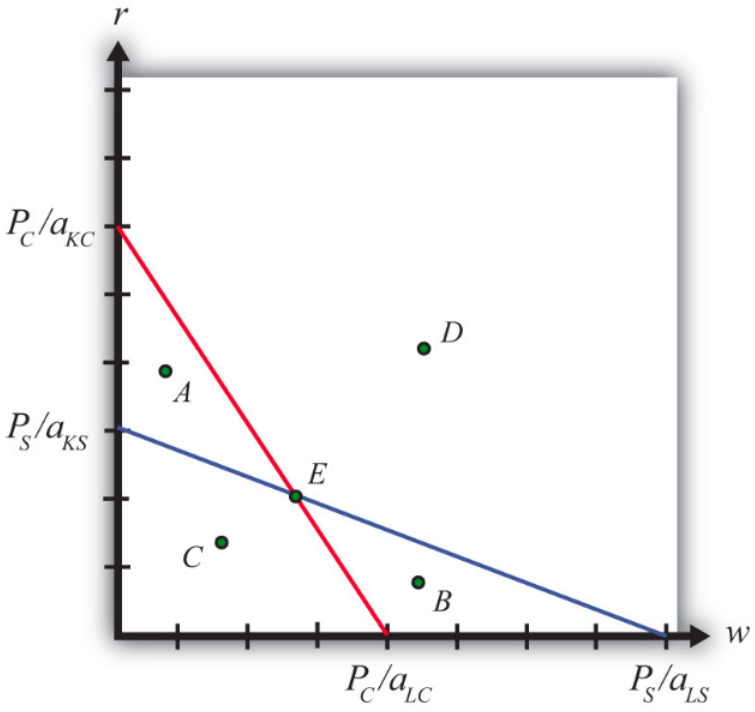


Figure 5.6.1: Zero Profit Lines in Clothing and Steel

The set of all wage and rental rates that will generate zero profit in the steel industry at the price P_S is given by the flatter blue line. At wage and rental combinations above the line, as at points A and D, the per-unit cost of production would exceed the price, and

profit would be negative. At wage-rental combinations below the line, as at points B and C, the per-unit cost of production would fall short of the price, and profit would be positive. Notice that the slope of the flatter blue line is $-\frac{P_S/a_{KS}}{P_S/a_{LS}} = -\frac{a_{LS}}{a_{KS}}$.

Similarly, the set of all wage-rental rate combinations that will generate zero profit in the clothing industry at price P_C is given by the steeper red line. All wage-rental combinations above the line, as at points B and D, generate negative profit, while wage-rental combinations below the line, as at A and C, generate positive profit. The slope of the steeper red line is $-\frac{P_C/a_{KC}}{P_C/a_{LC}} = -\frac{a_{LC}}{a_{KC}}$.

The only wage-rental combination that can simultaneously support zero profit in both industries is found at the intersection of the two zero-profit lines—point E. This point represents the equilibrium wage and rental rates that would arise in an H-O model when the price of steel is P_S and the price of clothing is P_C.

Now, suppose there is an increase in the price of one of the goods. Say the price of steel, P_S, rises. This could occur if a country moves from autarky to free trade or if a tariff is placed on imports of steel. The price increase will cause an outward parallel shift in the blue zero-profit line for steel, as shown in Figure 5.6.2. The equilibrium point will shift from E to F, causing an increase in the equilibrium rental rate from $r1$ to $r2$ and a decrease in the equilibrium wage rate from $w1$ to $w2$. Only with a higher rental rate and a lower wage can zero profit be maintained in both industries at the new set of prices. Using the slopes of the zero-profit lines, we can show that $\frac{a_{LC}}{a_{KC}} > \frac{a_{LS}}{a_{KS}}$, which means that clothing is labor intensive and steel is capital intensive. Thus, when the price of steel rises, the payment to the factor used intensively in steel production (capital) rises, while the payment to the other factor (labor) falls.

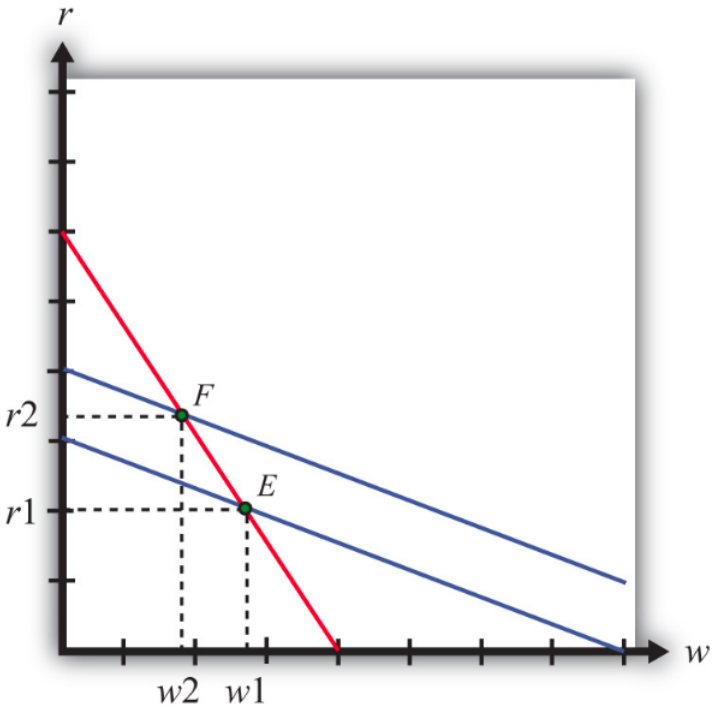


Figure 5.6.2: Graphical Depiction of Stolper-Samuelson Theorem

If the price of clothing had risen, the zero-profit line for clothing would have shifted right, causing an increase in the equilibrium wage rate and a decrease in the rental rate. Thus an increase in the price of clothing causes an increase in the payment to the factor used intensively in clothing production (labor) and a decrease in the payment to the other factor (capital).

This gives us the Stolper-Samuelson theorem: an increase in the price of a good will cause an increase in the price of the factor used intensively in that industry and a decrease in the price of the other factor.

Key takeaways

- The Stolper-Samuelson theorem shows there is a positive relationship between changes in the price of an output and changes in the price of the factor used intensively in producing that product.
- The Stolper-Samuelson theorem shows there is a negative relationship between changes in the price of an output and changes in the price of the factor not used intensively in producing that product.

Exercise 5.6.1

1. Consider an H-O economy in which there are two countries (United States and France), two goods (wine and cheese), and two factors (capital and labor). Suppose a decrease in the price of cheese causes a decrease in the wage rate in the U.S. economy. Which factor is used intensively in cheese production in France? Which H-O theorem is used to get this answer? Explain.
2. State what is true about profit in the steel and clothing industry at the wage-rental combination given by the following points in Figure 5.6.1 in the text.
   a. Point A
   b. Point B
   c. Point C
   d. Point D
   e. Point E

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5.7: The Magnification Effect for Prices 5.7: The Magnification Effect for PricesEdit Update titlecancel

Learning Objectives

1. Learn how the magnification effect for prices represents a generalization of the Stolper-Samuelson theorem by incorporating the relative magnitudes of the changes.

The magnification effect for prices is a more general version of the Stolper-Samuelson theorem. It allows for simultaneous changes in both output prices and compares the magnitudes of the changes in output and factor prices.

The simplest way to derive the magnification effect is with a numerical example.

Suppose the exogenous variables of the model take the values in Table 5.7.1 for one country.

5.7.1: Numerical Values for Exogenous Variables

$a_{LS} = 3$	$a_{KS} = 4$	$P_S = 120$
$a_{LC} = 2$	$a_{KC} = 1$	$P_C = 40$

where

- a_{LC} = unit labor requirement in clothing production
- a_{LS} = unit labor requirement in steel production
- a_{KC} = unit capital requirement in clothing production
- a_{KS} = unit capital requirement in steel production
- P_S = the price of steel
- P_C = the price of clothing

With these numbers, $\frac{a_{KS}}{a_{LS}}\left(\frac{4}{3}\right) > \frac{a_{KC}}{a_{LC}}\left(\frac{1}{2}\right)$, which means that steel production is capital intensive and clothing is labor intensive.

The following are the zero-profit conditions in the two industries:

- Zero-profit steel: $3w + 4r = 120$
- Zero-profit clothing: $2w + r = 40$

The equilibrium wage and rental rates can be found by solving the two constraint equations simultaneously.

A simple method to solve these equations follows.

First, multiply the second equation by (−4) to get

$$3w + 4r = 120$$

and

$$-8w - 4r = -160.$$

Adding these two equations vertically yields

$$-5w - 0r = -40,$$

which implies $w = \frac{-40}{-5} = 8$. Plugging this into the first equation above (any equation will do) yields $3 \times 8 + 4r = 120$. Simplifying, we get $r = \frac{120-24}{4} = 24$. Thus the initial equilibrium wage and rental rates are $w = 8$ and $r = 24$.

Next, suppose the price of clothing, P_C, rises from \$40 to \$60 per rack. This changes the zero-profit condition in clothing production but leaves the zero-profit condition in steel unchanged. The zero-profit conditions now are the following:

- Zero-profit steel: $3w + 4r = 120$
- Zero-profit clothing: $2w + r = 60$

Follow the same procedure to solve for the equilibrium wage and rental rates.

First, multiply the second equation by (–4) to get

$$3w + 4r = 120$$

and

$$-8w - 4r = -240.$$

Adding these two equations vertically yields

$$-5w - 0r = -120,$$

which implies $w = \frac{-120}{-5} = 24$. Plugging this into the first equation above (any equation will do) yields $3 \times 24 + 4r = 120$. Simplifying, we get $r = \frac{120-72}{4} = 12$. Thus the new equilibrium wage and rental rates are $w = 24$ and $r = 12$.

The Stolper-Samuelson theorem says that if the price of clothing rises, it will cause an increase in the price paid to the factor used intensively in clothing production (in this case, the wage rate to labor) and a decrease in the price of the other factor (the rental rate on capital). In this numerical example, w rises from $8 to $24 per hour and r falls from $24 to $12 per hour.

Percentage Changes in the Goods and Factor Prices

The magnification effect for prices ranks the percentage changes in output prices and the percentage changes in factor prices. We'll denote the percentage change by using a ^ above the variable (i.e., $\hat{X}$= percentage change in X).

Table 5.7.2: Calculating Percentage Changes in the Goods and Factor Prices

$\hat{P}_C = \frac{60-40}{40} \times 100 = +50\%$	The price of clothing rises by 50 percent.
$\hat{w} = \frac{24-8}{8} \times 100 = +200\%$	The wage rate rises by 200 percent.
$\hat{r} = \frac{12-24}{24} \times 100 = -50\%$	The rental rate falls by 50 percent.
$\hat{P}_S = +0\%$	The price of steel is unchanged.

where

- w = the wage rate
- r = the rental rate

The rank order of the changes in Table 5.7.2 is the **magnification effect for prices**:

$$\hat{w} > \hat{P}_C > \hat{P}_S > \hat{r}.$$

The effect is initiated by changes in the output prices. These appear in the middle of the inequality. If output prices change by some percentage, ordered as above, then the wage rate paid to labor will rise by a *larger* percentage than the price of steel changes. The size of the effect is *magnified* relative to the cause.

The rental rate changes by a smaller percentage than the price of steel changes. Its effect is magnified downward.

Although this effect was derived only for the specific numerical values assumed in the example, it is possible to show, using more advanced methods, that the effect will arise for any output price changes that are made. Thus if the price of steel were to rise with no change in the price of clothing, the magnification effect would be

$$\hat{r} > \hat{P}_S > \hat{P}_C > \hat{w}.$$

This implies that the rental rate would rise by a greater percentage than the price of steel, while the wage rate would fall.

The magnification effect for prices is a generalization of the Stolper-Samuelson theorem. The effect allows for changes in both output prices simultaneously and provides information about the magnitude of the effects. The Stolper-Samuelson theorem is a special case of the magnification effect in which one of the endowments is held fixed.

Although the magnification effect is shown here under the special assumption of fixed factor proportions and for a particular set of parameter values, the result is much more general. It is possible, using calculus, to show that the effect is valid under any set of parameter values and in a more general variable proportions model.

The magnification effect for prices can be used to determine the changes in real wages and real rents whenever prices change in the economy. These changes would occur as a country moves from autarky to free trade and when trade policies are implemented,

removed, or modified.

Key Takeaways

- The magnification effect for prices shows that if the product prices change by particular percentages with one greater than the other, then the factor prices will change by percentages that are larger than the larger product price change and smaller than the smaller. It is in this sense that the factor price changes are magnified relative to the product price changes.
- If the percentage change in the price of the capital-intensive good exceeds the percentage change in the price of the labor-intensive good, for example, then the rental rate on capital will change by a greater percentage than the price of the capital-intensive good changed, while the wage will change by less than the price of the labor-intensive good.

Exercise 5.7.1

1. Consider a country producing milk and cookies using labor and capital as inputs and described by a Heckscher-Ohlin model. The following table provides prices for goods and factors before and after a tariff is eliminated on imports of cookies.

Table 5.7.3: Goods and Factor Prices

	Initial ($)	After Tariff Elimination ($)
Price of Milk (PM)	5	6
Price of Cookies (PC)	10	8
Wage (w)	12	15
Rental rate (r)	20	15

   a. Calculate and display the magnification effect for prices in response to the tariff elimination.
   b. Which product is capital intensive?
   c. Which product is labor intensive?

2. Consider the following data in a Heckscher-Ohlin model with two goods (wine and cheese) and two factors (capital and labor).

   a_{KC} = 5 hours per pound (unit capital requirement in cheese)

   a_{KW} = 10 hours per gallon (unit capital requirement in wine)

   a_{LC} = 15 hours per pound (unit labor requirement in cheese)

   a_{LW} = 20 hours per gallon (unit labor requirement in wine)

   P_C = \$80 (price of cheese)

   P_W = \$110 (price of wine)

   a. Solve for the equilibrium wage and rental rate.
   b. Suppose the price of cheese falls from \$80 to \$75. Solve for the new equilibrium wage and rental rates.
   c. Calculate the percentage changes in the goods prices and factor prices and write the magnification effect for prices.
   d. Identify which good is labor intensive and which is capital intensive.

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5.8: The Production Possibility Frontier (Variable Proportions) 5.8: The Production Possibility Frontier (Variable Proportions)Edit Update titlecancel

Learning Objectives

1. Learn how the shift from a fixed proportions to a variable proportions model affects the presentation of the Heckscher-Ohlin (H-O) model.

The production possibility frontier can be derived in the case of variable proportions by using the same labor and capital constraints used in the case of fixed proportions, but with one important adjustment. Under variable proportions, the unit factor requirements are functions of the wage-rental ratio (w/r). This implies that the capital-labor ratios (which are the ratios of the unit factor requirements) in each industry are also functions of the wage-rental ratio. If there is a change in the equilibrium (for some reason) such that the wage-rental rate rises, then labor will become relatively more expensive compared to capital. Firms would respond to this change by reducing their demand for labor and raising their demand for capital. In other words, firms will substitute capital for labor and the capital-labor ratio will rise in each industry. This adjustment will allow the firm to maintain minimum production costs and thus the highest profit possible. This is the first important distinction between variable and fixed proportions.

The second important distinction is that variable proportions change the shape of the economy's PPF. The labor constraint with full employment can be written as

$$a_{LC}(w/r)Q_C + a_{LS}(w/r)Q_S = L,$$

where a_{LC} and a_{LW} are functions of (w/r).

The capital constraint with full employment becomes

$$a_{KC}(w/r)Q_C + a_{KS}(w/r)Q_S = K,$$

where a_{KC} and a_{KW} are functions of (w/r).

Under variable proportions, the production possibility frontier takes the traditional bowed-out shape, as shown in Figure 5.8.1. All points on the PPF will maintain full employment of both labor and capital resources. The slope of a line tangent to the PPF (such as the line through point A) represents the quantity of steel that must be given up to produce another unit of clothing. As such, the slope of the PPF is the opportunity cost of producing clothing. Since the slope becomes steeper as more and more clothing is produced (as when moving production from point A to B), we say that there is increasing opportunity cost. This means that more steel must be given up to produce one more unit of clothing at point B than at point A in the figure. In contrast, in the Ricardian model the PPF was a straight line that indicated constant opportunity costs.

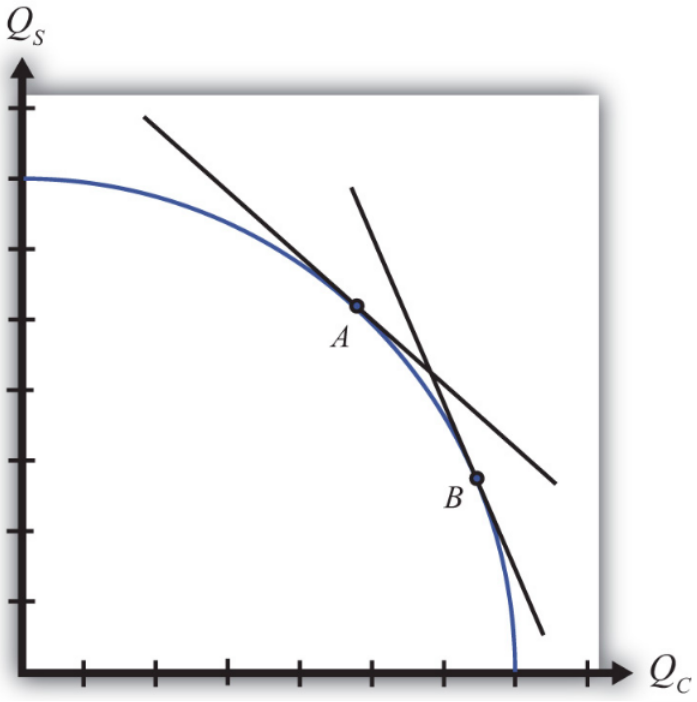


Figure 5.8.1: The PPF in the Variable Proportions H-O Model

The third important distinction of variable proportions is that the magnification effects, derived previously under a fixed proportions assumption, continue to work under variable proportions. To show this requires a fair amount of advanced math, but a student can rest assured that we can apply the magnification effect even in the more complex variable proportions version of the Heckscher-Ohlin (H-O) model.

Key Takeaways

- Variable proportions imply that the capital-labor ratios used in production are varied as wage and rental rates change in the economy.
- Variable proportions imply that the PPF becomes bowed out and continuous, consisting of many output combinations that can be produced with full employment of labor and capital.
- Variable proportions do not invalidate the Rybczynski theorem, the Stolper-Samuelson theorem, or the magnification effects for quantities and prices.

? Exercise 5.8.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. Interpretation given for the slope of the production possibility frontier in the case of variable proportions in the Heckscher-Ohlin model.
   b. In a variable proportion H-O model, the factor proportions in each industry vary with changes in *these two other variables*.
   c. Of *increase*, *decrease*, or *stay the same*, this is the effect on the capital-labor ratio in an industry when wages fall in a variable proportions H-O model.
   d. Of *increase*, *decrease*, or *stay the same*, this is the effect on the amount of capital used per worker in an industry when rental rates increase in a variable proportions H-O model.
   e. Of *increase*, *decrease*, or *stay the same*, this is the effect on the labor-capital ratio in an industry when wages fall in a variable proportions H-O model.
   f. Of *increase*, *decrease*, or *stay the same*, this is the effect on the capital-labor ratio in the cheese industry when wages increase in a variable proportions H-O model, if cheese is a labor-intensive industry.
   g. Of *increase*, *decrease*, or *stay the same*, this is the effect on the capital-labor ratio in the wine industry when wages increase in a variable proportions H-O model, if wine is a capital-intensive industry.

h. Of *increase*, *decrease*, or *stay the same*, this is the effect on the capital-labor ratio in an industry when wages fall in a fixed proportions H-O model.

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5.9: The Heckscher-Ohlin Theorem 5.9: The Heckscher-Ohlin TheoremEdit Update titlecancel

Learning Objectives

1. Learn the Heckscher-Ohlin theorem highlighting the determinants of the pattern of trade.
2. Identify the effects of trade on prices and outputs using a PPF diagram.

The **Heckscher-Ohlin (H-O) theorem** states that a country that is capital abundant will export the capital-intensive good. Likewise, the country that is labor abundant will export the labor-intensive good. Each country exports that good that it produces relatively better than the other country. In this model, a country's advantage in production arises solely from its relative factor abundancy.

The H-O Theorem Graphical Depiction: Variable Proportions

The H-O model assumes that the two countries (United States and France) have identical technologies, meaning they have the same production functions available to produce steel and clothing. The model also assumes that the aggregate preferences are the same across countries. The only difference that exists between the two countries in the model is a difference in resource endowments. We assume that the United States has relatively more capital per worker in the aggregate than does France. This means that the United States is capital abundant compared to France. Similarly, France, by implication, has more workers per unit of capital in the aggregate and thus is labor abundant compared to the United States. We also assume that steel production is capital intensive and clothing production is labor intensive.

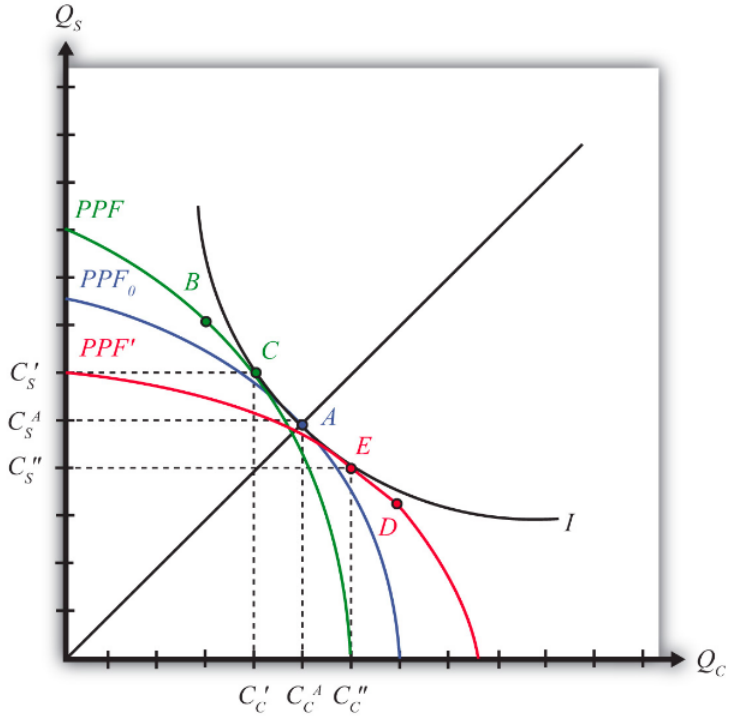


Figure 5.9.1: Endowment Differences and the PPF

The difference in resource endowments is sufficient to generate different PPFs in the two countries such that equilibrium price ratios would differ in autarky. To see why, imagine first that the two countries are identical in every respect. This means they would have the same PPF (depicted as the blue PPF_0 in Figure 5.9.1), the same set of aggregate indifference curves, and the same autarky equilibrium. Given the assumption about aggregate preferences—that is, $U = C_C C_S$—the indifference curve, I, will intersect the countries' PPF at point A, where the absolute value of the slope of the tangent line (not drawn), P_C/P_S, is equal to the slope of the ray from the origin through point A. The slope is given by $\frac{C_S^A}{C_C^A}$. In other words, the autarky price ratio in each country will be given by

$$\left(\frac{P_C}{P_S}\right)^0 = \frac{C_S^A}{C_C^A}$$

$$\left(\frac{P_C}{P_S}\right)_{Aut} = \frac{C_S}{C_C^A}.$$

Next, suppose that labor and capital are shifted between the two countries. Suppose labor is moved from the United States to France, while capital is moved from France to the United States. This will have two effects. First, the United States will now have more capital and less labor, and France will have more labor and less capital than it did initially. This implies that $K/L > K^*/L^*$, or that the United States is capital abundant and France is labor abundant. Second, the two countries' PPFs will shift. To show how, we apply the Rybczynski theorem.

The United States experiences an increase in K and a decrease in L. Both changes will cause an increase in output of the good that uses capital intensively (i.e., steel) and a decrease in output of the other good (clothing). The Rybczynski theorem is derived assuming that output prices remain constant. Thus if prices did remain constant, production would shift from point A to B and the U.S. PPF would shift from the blue PPF_0 to the green *PPF* in Figure 5.9.1.

Using the new PPF, we can deduce what the U.S. production point and price ratio would be in autarky given the increase in the capital stock and the decline in the labor stock. Consumption could not occur at point B because first, the slope of the PPF at B is the same as the slope at A because the Rybczynski theorem was used to identify it, and second, homothetic preferences imply that the indifference curve passing through B must have a steeper slope because it lies along a steeper ray from the origin.

Thus to find the autarky production point, we simply find the indifference curve that is tangent to the U.S. PPF. This occurs at point C on the new U.S. PPF along the original indifference curve, I. (Note that the PPF was conveniently shifted so that the same indifference curve could be used. Such an outcome is not necessary but does make the graph less cluttered.) The negative of the slope of the PPF at C is given by the ratio of quantities C_S'/C_C'. Since $C_S'/C_C' > C_S^A/C_C^A$, it follows that the new U.S. price ratio will exceed the one prevailing before the capital and labor shift, that is, $P_C/P_S > (P_C/P_S)^0$. In other words, the autarky price of clothing is higher in the United States after it experiences the inflow of capital and outflow of labor.

France experiences an increase in L and a decrease in K. These changes will cause an increase in output of the labor-intensive good (i.e., clothing) and a decrease in output of the capital-intensive good (steel). If the price were to remain constant, production would shift from point A to D in Figure 5.9.1, and the French PPF would shift from the blue PPF_0 to the red *PPF'*.

Using the new PPF, we can deduce the French production point and price ratio in autarky given the increase in the capital stock and the decline in the labor stock. Consumption could not occur at point D since homothetic preferences imply that the indifference curve passing through D must have a flatter slope because it lies along a flatter ray from the origin. Thus to find the autarky production point, we simply find the indifference curve that is tangent to the French PPF. This occurs at point E on the red French PPF along the original indifference curve, I. (As before, the PPF was conveniently shifted so that the same indifference curve could be used.) The negative of the slope of the PPF at C is given by the ratio of quantities C_S''/C_C''. Since $C_S''/C_C'' < C_S^A/C_C^A$, it follows that the new French price ratio will be less than the one prevailing before the capital and labor shift—that is, $P_C^*/P_S^* < (P_C/P_S)^0$. This means that the autarky price of clothing is lower in France after it experiences the inflow of labor and outflow of capital.

All of the above implies that as one country becomes labor abundant and the other capital abundant, it causes a deviation in their autarky price ratios. The country with relatively more labor (France) is able to supply relatively more of the labor-intensive good (clothing), which in turn reduces the price of clothing in autarky relative to the price of steel. The United States, with relatively more capital, can now produce more of the capital-intensive good (steel), which lowers its price in autarky relative to clothing. These two effects together imply that

$$\left(\frac{P_C}{P_S}\right)_{Aut}^{US} > \left(\frac{P_C}{P_S}\right)_{Aut}^{FR}.$$

Any difference in autarky prices between the United States and France is sufficient to induce profit-seeking firms to trade. The higher price of clothing in the United States (in terms of steel) will induce firms in France to export clothing to the United States to take advantage of the higher price. The higher price of steel in France (in terms of clothing) will induce U.S. steel firms to export steel to France. Thus the United States, abundant in capital relative to France, exports steel, the capital-intensive good. France, abundant in labor relative to the United States, exports clothing, the labor-intensive good. This is the H-O theorem. Each country exports the good intensive in the country's abundant factor.

Key Takeaways

- The H-O theorem states that a country will export that good that is intensive in the country's abundant factor.

- In the standard case, a country will produce more of its export good and less of its import good but will continue to produce both. In other words, specialization does not occur as it does in the Ricardian model.
- Trade is motivated by price differences. A capital-abundant (labor-abundant) country exports the capital-intensive (labor-intensive) good because that product price is initially higher in the labor-abundant (capital-abundant) country.

Exercise 5.9.1

1. Consider an H-O economy in which there are two countries (United States and France), two goods (wine and cheese), and two factors (capital and labor). Assume the United States is labor abundant and cheese is labor intensive. What is the pattern of trade in free trade? (State what the United States and France import and export.) Which theorem is applied to get this answer? Explain.
2. Suppose two countries, Malaysia and Thailand, can be described by a variable proportions H-O model. Assume they each produce rice and palm oil using labor and capital as inputs. Suppose Malaysia is capital abundant with respect to Thailand and rice production is labor intensive. Suppose the two countries move from autarky to free trade with each other. In the table below, indicate the effect of free trade on the variables listed in the first column in both Malaysia and Thailand. You do not need to show your work. Use the following notation:

   + the variable increases

   − the variable decreases

   0 the variable does not change

   A the variable change is ambiguous (i.e., it may rise, it may fall)

Table 5.9.1: Effects of Free Trade

	In Malaysia	In Thailand
Price Ratio P_{po}/P_r		
Output of Palm Oil		
Output of Rice		
Exports of Palm Oil		
Imports of Rice		
Capital-Labor Ratio in Palm Oil Production		
Capital-Labor Ratio in Rice Production		

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5.10: Depicting a Free Trade Equilibrium in the Heckscher-Ohlin Model 5.10: Depicting a Free Trade Equilibrium in the Heckscher-Ohlin ModelEdit Update titlecancel

Learning Objectives

1. Learn how to depict a free trade equilibrium on a PPF diagram in the Heckscher-Ohlin (H-O) model.

In Figure 5.10.1, we depict free trade equilibria in a Heckscher-Ohlin (H-O) model. The United States is assumed to be capital abundant, which skews its PPF_{US} (in green) in the direction of steel production, the capital-intensive good. France is labor abundant, which skews its PPF_{FR} (in red) in the direction of clothing production, the labor-intensive good. In free trade, each country faces the same price ratio.

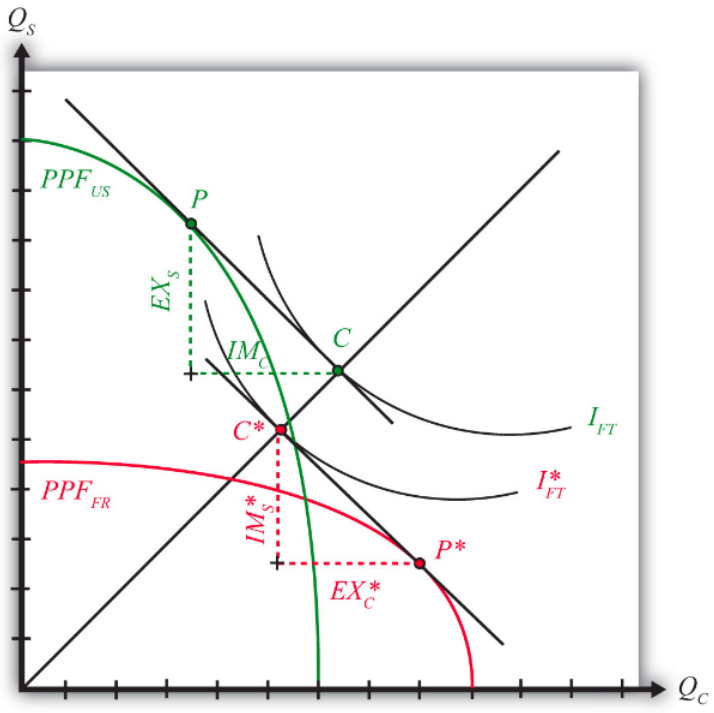


Figure 5.10.1: Free Trade Equilibria in an H-O PPF Diagram

The United States produces at point P. The tangent line at P represents the national income line for the U.S. economy. The equation for the income line is $P_C Q_C + P_S Q_S = NI$, where NI is national income in dollar terms. The slope of the income line is the free trade price ratio $(P_C/P_S)_{FT}$. Consumption in the United States occurs where the aggregate indifference curve I_{FT}, representing preferences, is tangent to the national income line at C. To reach the consumption point, the United States exports EX_S and imports IM_C.

France produces at point P^*. The tangent line at P^* represents the national income line for the French economy. The slope of the income line is also the free trade price ratio $(P_C/P_S)_{FT}$. Consumption in France occurs where the aggregate indifference curve I^*_{FT}, representing preferences, is tangent to the national income line at C^*. Note that since the United States and France are assumed to have the same aggregate *homothetic* preferences and since they face the same price ratio in free trade, consumption for both countries must lie along the same ray from the origin, $0C$. For France to reach its consumption point, it exports EX^*_C and imports IM^*_S. In order for this to be a free trade equilibrium in a two-country model, U.S. exports of steel must equal French imports of steel ($EX_S = IM^*_S$) and French exports of clothing must equal U.S. imports of clothing ($EX^*_C = IM_C$). In other words, the *U.S. trade triangle* formed by EX_S, IM_C, and the U.S. national income line must be equivalent to *France's trade triangle* formed by EX^*_C, IM^*_S, and the French national income line.

Key Takeaways

- The line tangent to the free trade production point on the PPF represents the national income line and has a slope equal to the terms of trade.
- The consumption point in a free trade equilibrium is found as the tangency point of the highest national indifference curve along the national income line tangent to the production point.
- The pattern of trade is shown as the exports and imports needed to move from the production point to the consumption point.

? Exercise 5.10.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The term used to describe the slope of the national income line in a two-good, variable proportions H-O model.
   b. In a two-good, variable proportions H-O model, this occurs where the national income line is tangent to the PPF.
   c. In a two-good, variable proportions H-O model, this occurs where the national income line is tangent to an indifference curve.
   d. In a two-good, variable proportions H-O model, these form the base and height of the triangle between the production and consumption points on the PPF diagram.

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5.11: National Welfare Effects of Free Trade in the Heckscher-Ohlin Model 5.11: National Welfare Effects of Free Trade in the Heckscher-Ohlin ModelEdit Update titlecancel

Learning Objectives

1. Learn how national welfare improvements from free trade can be depicted in a PPF diagram.

Figure 5.11.1 compares autarky and free trade equilibria for the United States and France.

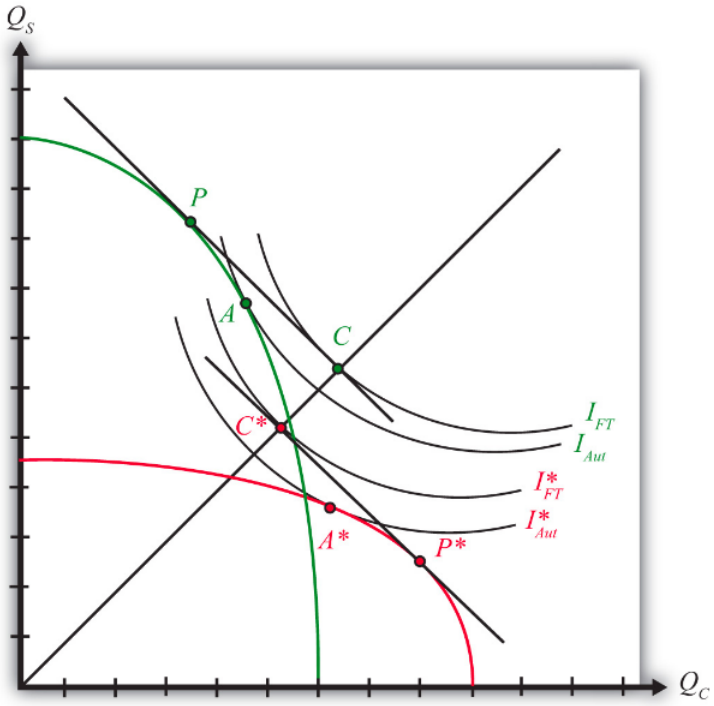


Figure 5.11.1: National Welfare Effects of Free Trade in the H-O Model

The U.S. autarky production and consumption points are determined where the aggregate indifference curve is tangent to the U.S. PPF. This occurs at point A. The United States realizes a level of aggregate utility that corresponds to the indifference curve I_{Aut}.

The U.S. production and consumption points in free trade are P and C, respectively. In free trade, the United States realizes a level of aggregate utility that corresponds to the indifference curve I_{FT}. Since the free trade indifference curve I_{FT} lies to the northeast of the autarky indifference curve I_{Aut}, national welfare rises as the United States moves to free trade.

France's autarky production and consumption points are determined by finding the aggregate indifference curve that is tangent to the French PPF. This occurs at point A^*. France realizes a level of aggregate utility that corresponds to the indifference curve I^*_{Aut}.

French production and consumption points in free trade are P^* and C^*, respectively. In free trade, France realizes a level of aggregate utility that corresponds to the indifference curve I^*_{FT}. Since the free trade indifference curve I^*_{FT} lies to the northeast of the autarky indifference curve I^*_{Aut}, national welfare rises as France moves to free trade.

This means that free trade will raise aggregate welfare for both countries relative to autarky. Both countries are better off with free trade.

However, the use of aggregate indifference curves (or preferences) ignores the issue of income distribution. Although it is correct to conclude from this analysis that both *countries* benefit from free trade, it is not correct to conclude that all individuals in both countries also benefit from free trade. By calculating changes in real income in the Heckscher-Ohlin (H-O) model, it can be shown that some individuals will likely benefit from free trade, while others will suffer losses. An increase in aggregate welfare means *only* that the sum of the gains exceeds the sum of the losses.

Another important issue is also typically ignored when using aggregate or national indifference curves to represent a country's preferences. For these curves to make sense, we must assume that income distribution remains the same when moving from one equilibrium to another. That it does not is shown in Chapter 5: The Heckscher-Ohlin (Factor Proportions) Model, Section 5.12: The Distributive Effects of Free Trade in the Heckscher-Ohlin Model. The one way to resolve the issue is to assume that compensation is provided after the redistribution occurs so as to recreate the same income distribution. Compensation is discussed in Chapter 5: The Heckscher-Ohlin (Factor Proportions) Model, Section 5.13: The Compensation Principle.

key takeaway

- In moving from autarky to free trade in an H-O model, both countries can reach a consumption point on a higher national indifference, thereby representing an increase in national welfare.

Exercise 5.11.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. Of points A, A^*, C, C^*, P, or P^* in Figure 5.11.1, this point provides the highest level of national welfare.
   b. Of points A, A^*, C, C^*, P, or P^* in Figure 5.11.1, this point provides the lowest level of national welfare.
   c. Between indifference curves I_{FT}, I^*_{FT}, I_{Aut}, and I^*_{Aut} in Figure 5.11.1, points on this curve provide the lowest level of national welfare.
   d. Between indifference curves I_{FT}, I^*_{FT}, I_{Aut}, and I^*_{Aut} in Figure 5.11.1, points on this curve provide the highest level of national welfare.
   e. Of *both increase*, *both decrease*, *both stay the same*, or *one increases and the other decreases*, this is the effect on two countries' national welfare levels when they move from autarky to free trade in a variable proportions H-O model.
   f. Of *both increase*, *both decrease*, *both stay the same*, or *one increases and the other decreases*, this is the effect on two countries' national welfare levels when they move from free trade to autarky in a variable proportions H-O model.

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5.12: The Distributive Effects of Free Trade in the Heckscher-Ohlin Model 5.12: The Distributive Effects of Free Trade in the Heckscher-Ohlin ModelEdit Update titlecancel

Learning Objectives

1. Learn how income is redistributed between factors of production when adjusting to free trade.

The term "distributive effects" refers to the distribution of income gains, losses, or both across individuals in the economy. In the Heckscher-Ohlin (H-O) model, there are only two distinct groups of individuals: those who earn their income from labor (workers) and those who earn their income from capital (capitalists). In actuality, many individuals may earn income from both sources. For example, a worker who has deposits in a pension plan that invests in mutual funds has current wage income, but changes in rental rates will affect his or her future capital income. This person's income stream thus depends on both the return to labor and the return to capital.

For the moment, we shall consider the distributive effects on workers who depend solely on labor income and capitalists who depend solely on capital income. Later we shall consider what happens if individuals receive income from both sources.

To measure gains or losses to workers and capitalists, we must evaluate the effects of free trade on their real incomes. Increases in nominal income are not sufficient to know whether an individual is better off since the price of exportable goods will also rise when a country moves to free trade. By assessing the change in real income, we can determine how the purchasing power of workers and capitalists is affected by the move to free trade.

Suppose there are two countries, the United States and France, producing two goods, clothing and steel, using two factors, capital and labor, according to an H-O model. Suppose steel production is capital intensive and the United States is capital abundant. This implies that clothing production is labor intensive and France is labor abundant.

If these two countries move from autarky to free trade, then, according to the H-O theorem, the United States will export steel to France and France will export clothing to the United States. Also, the price of each country's export good will rise relative to each country's import good. Thus in the United States, P_S/P_C rises, while in France P_C/P_S rises.

Next, we apply the magnification effect for prices to each country's price changes.

In the United States, $\left(\frac{P_S}{P_C}\right)\uparrow \Rightarrow \hat{P}_S > \hat{P}_C$—that is, if the ratio of prices rises, it must mean that the percentage change in P_S is greater than the percentage change in P_C. Then applying the magnification effect for prices implies

$$\hat{r} > \hat{P}_S > \hat{P}_C > \hat{w}.$$

This in turn implies that

$$\frac{r}{P_S}\uparrow, \frac{r}{P_C}\uparrow,$$

which means that the real rent in terms of both steel and clothing rises. And

$$\frac{w}{P_S}\downarrow, \frac{w}{P_C}\downarrow,$$

which means that the real wage in terms of both steel and clothing falls.

Thus individuals in the United States who receive income solely from capital are able to purchase more of each good in free trade relative to autarky. Capitalists are made absolutely better off from free trade. Individuals who receive wage income only are able to purchase less of each good in free trade relative to autarky. Workers are made absolutely worse off from free trade.

In France, $\left(\frac{P_C}{P_S}\right)\uparrow \Rightarrow \hat{P}_C > \hat{P}_S$—that is, the percentage change in P_C is greater than the percentage change in P_S. Then, according to the magnification effect for prices,

$$\hat{w} > \hat{P}_C > \hat{P}_S > \hat{r}.$$

This in turn implies that

$$\frac{w}{P_C}\uparrow, \frac{w}{P_S}\uparrow,$$

$$P_C \quad P_S$$

which means that the real wage in terms of both clothing and steel rises. And

$$\frac{r}{P_C} \downarrow, \frac{r}{P_S} \downarrow,$$

which means that the real rent in terms of both clothing and steel falls.

Thus individuals in France who receive wage income only are able to purchase more of each good in free trade relative to autarky. Workers are made absolutely better off from free trade. Individuals in France who receive income solely from capital are able to purchase less of each good in free trade relative to autarky. Capitalists are made absolutely worse off from free trade.

These results imply that both countries will experience a redistribution of income when moving from autarky to free trade. Some individuals will gain from trade, while others will lose. Distinguishing the winners and losers more generally can be done by referring to the fundamental basis for trade in the model. Trade occurs because of differences in endowments between countries. The United States is assumed to be capital abundant, and when free trade occurs, capitalists in the United States benefit. France is assumed to be labor abundant, and when free trade occurs, workers in France benefit. Thus, in the H-O model, a country's relatively abundant factor gains from trade, while a country's relatively scarce factor loses from trade.

It is worth noting that the redistribution of income is between factors of production and not between industries. The H-O model assumes that workers and capital are homogenous and are costlessly mobile between industries. This implies that all workers in the economy receive the same wage and all capital receives the same rent. Thus if workers benefit from trade in the H-O model, it means that all workers in both industries benefit. In contrast to the immobile factor model, one need not be affiliated with the export industry in order to benefit from trade. Similarly, if capital loses from trade, then capitalists suffer losses in both industries. One need not be affiliated with the import industry to suffer losses

Key Takeaways

- In the H-O model, when countries implement free trade, output prices, wages, and rents on capital change.
- If a country is abundant in capital (labor), then a movement to free trade will increase real rents (wages) and decrease real wages (rents). In other words, income is redistributed from workers (capital owners) to capital owners (workers).
- Because labor and capital are assumed to be homogeneous factors, workers (capital owners) in both industries realize identical real income effects.
- The redistribution of income in the H-O model is based on which factor an individual owns, not on which industry an individual works in (as it is in the immobile factor model).

? Exercise 5.12.1

1. Consider an H-O economy in which there are two countries (United States and France), two goods (wine and cheese), and two factors (capital and labor).
   a. Suppose France exports wine, the capital-intensive good. Which factor benefits from free trade in the United States? Explain.
   b. Suppose workers in France benefit when tariffs are increased on cheese imports. Which factor is used intensively in cheese production? What is France's abundant factor? Explain.
2. Suppose two countries, Malaysia and Thailand, can be described by a variable proportions H-O model. Assume they each produce rice and palm oil using labor and capital as inputs. Suppose Malaysia is capital abundant with respect to Thailand and rice production is labor intensive. Suppose the two countries move from autarky to free trade with each other. In the table below, indicate the effect of free trade on the variables listed in the first column in both Malaysia and Thailand. You do not need to show your work. Use the following notation:

   + the variable increases

   − the variable decreases

   0 the variable does not change

   A the variable change is ambiguous (i.e., it may rise, it may fall)

Table 5.12.1: Effects of Free Trade

	In Malaysia	In Thailand

	In Malaysia	In Thailand
Price Ratio P_{po}/P_r		
Real Wage in Terms of Palm Oil		
Real Wage in Terms of Rice		
Real Rental Rate in Terms of Palm Oil		
Real Rental Rate in Terms of Rice		

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5.13: The Compensation Principle 5.13: The Compensation PrincipleEdit Update titlecancel

Learning Objectives

1. Learn how compensation, consisting of a redistribution of income after a new equilibrium is reached, can support an equal distribution of benefits arising from free trade.
2. Learn why economists suggest *lump-sum* redistributions as the most effective way to compensate the losers with gains from the winners.

The Heckscher-Ohlin model generates several important conclusions for a country that moves from autarky to free trade:

- Aggregate national welfare rises—this is displayed as achieving a higher level of utility on a set of national indifference curves.
- Income is redistributed among individuals within the economy—this is shown by applying the magnification effect for prices to the price changes that arise in moving from autarky to free trade. It is shown that the real income of a country's relatively abundant factor rises while the real income of a country's relatively scarce factor falls.

A reasonable question at this juncture, then, is whether the gains to some individuals exceed the losses to others and, if so, whether it is possible to redistribute income to ensure that everyone is absolutely better off with trade than he or she was in autarky. In other words, is it possible for the winners from free trade to *compensate* the losers in such a way that everyone is left better off than he or she was in autarky?

The answer to this is yes in most circumstances. The primary reason is that the move to free trade improves production and consumption efficiency, which can make it possible for the country to consume more of both goods with trade compared to autarky.

Consider Figure 5.13.1. Point A on the PPF represents the autarky production and consumption point for this economy. The shaded region represents the set of consumption points that provides at least as much of one good and more of the other relative to the autarky equilibrium. Suppose that in free trade production moves to $P1$ and consumption moves to $C1$. Since $C1$ lies within the shaded region, the country consumes more clothing and more steel in the aggregate than it had consumed in autarky. However, in moving from autarky to free trade, some factors have experienced increases in income, while others have suffered losses. This means that some individuals consume less of both goods in free trade, while others consume more of both goods.

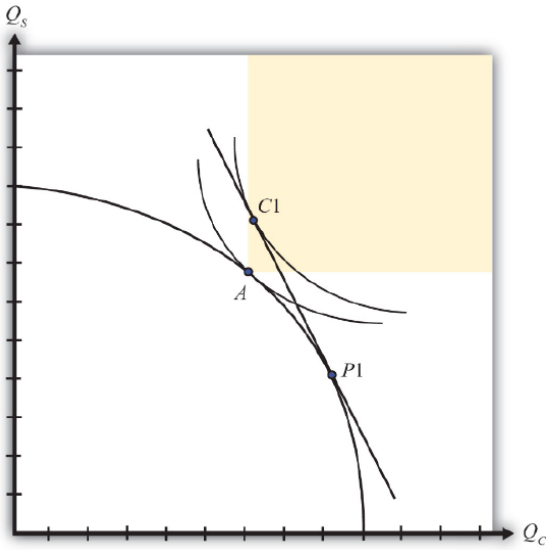


Figure 5.13.1: Compensation in the H-O Model

However, since there are more of both goods in the aggregate, it is conceivable that government intervention, which takes some of the extra goods away from the winners, could sufficiently compensate the losers and leave everyone better off in trade.

The possibility of an effective redistribution depends in some circumstances on the way in which the redistribution is implemented. For example, taxes and subsidies could redistribute income from winners to losers but would simultaneously affect the domestic prices of the goods, which would affect consumption decisions and so on. With the secondary effects of taxes and subsidies, it

becomes uncertain whether a redistribution policy would work. For this reason, economists will often talk about making a *lump-sum* redistribution or transfer. Lump-sum transfers are analogous to the transfers from rich to poor made by the infamous character Robin Hood. Essentially, goods must be stolen away from the winners, after they have made their consumption choices, and given to the losers, also after they have made their consumption choices. Furthermore, the winners and losers must not know or expect that a redistribution will be made, lest that knowledge affect their consumption choices beforehand. Thus a lump-sum redistribution is exactly what Robin Hood achieves. He steals from the wealthy, after they've purchased their goods, and gives to the poor, who were not expecting such a gift.

Although lump-sum compensations make perfect sense in theory, or in principle, it is worth noting how impractical they are. There is no government that has tried to institutionalize this process by creating a Division of Robin Hoodian Transfers. In practice, lump-sum transfers rarely occur.

Compensation may not always be as straightforward as in the previous example, however. Another possible outcome in a free trade equilibrium is for more of one good to be consumed but less of another relative to autarky. In other words, the free trade consumption point may occur at a point like $C2$ in Figure 5.13.2. In this case, it would not be possible to compensate everyone with as much steel as they had in autarky since the economy is consuming less steel in the free trade equilibrium. However, even in this case it is potentially possible to arrange a redistribution scheme. The reason is that the economy could potentially choose a consumption point along the red line segment, as at point $C1$ Since the red segment lies in the range in which more of both goods is available, compensation to make everyone better off with trade remains a possibility.

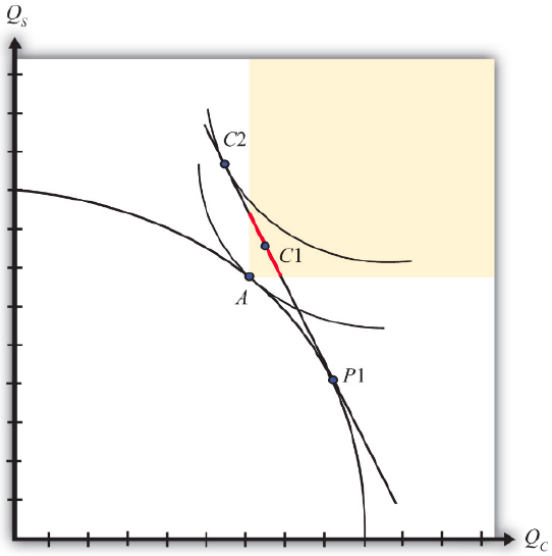


Figure 5.13.2: Compensation Difficulties

Thus it is always possible to find a free trade consumption point and an appropriate lump-sum compensation scheme such that everyone is at least as well off with trade as they had been in autarky.

Key Takeaways

- Because the sum of the benefits accruing to the winners exceeds the sum of the losses to the losers from free trade, it is possible to conceive of an income redistribution, or compensation, scheme that will assure that all individuals gain from trade.
- To avoid upsetting the optimal decisions made by producers and consumers in a free trade equilibrium, the most effective compensation scheme involves lump-sum transfers from winners to losers.
- Lump-sum transfers, although effective in theory, are virtually impossible to implement in practice.

? Exercise 5.13.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The term used to describe a policy response that can alleviate the losses caused to some groups and assure that everyone gains from trade liberalization.
   b. Of points A, $C1$, or $P1$ in Figure 5.13.1, this point provides the highest level of national welfare.

c. Of points A, $C1$, or $P1$ in Figure 5.13.1, this point provides the lowest level of national welfare.
d. A type of compensation reminiscent of Robin Hood.
e. Lump-sum transfers were conceived as a way to avoid the effects of taxes or subsidies on these decisions.

2. When a country moves to free trade, there are several ways to identify an improvement in the nation's welfare. One method requires information about the nation's preferences, especially the trade-offs between consumption of different goods; the other method does not. Explain.

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5.14: Factor-Price Equalization 5.14: Factor-Price EqualizationEdit Update titlecancel

Learning Objectives

1. Understand the relationship between wages and rents across countries in the Heckscher-Ohlin (H-O) model.

The fourth major theorem that arises out of the Heckscher-Ohlin (H-O) model is called the factor-price equalization theorem. Simply stated, the theorem says that when the prices of the output goods are equalized between countries as they move to free trade, then the prices of the factors (capital and labor) will also be equalized between countries. This implies that free trade will equalize the wages of workers and the rents earned on capital throughout the world.

The theorem derives from the assumptions of the model, the most critical of which is the assumption that the two countries share the same production technology and that markets are perfectly competitive.

In a perfectly competitive market, the return to a factor of production depends on the value of its marginal productivity. The marginal productivity of a factor, like labor, in turn depends on the amount of labor being used as well as the amount of capital. As the amount of labor rises in an industry, labor's marginal productivity falls. As the amount of capital rises, labor's marginal productivity rises. Finally, the *value* of productivity depends on the output price commanded by the good in the market.

In autarky, the two countries face different prices for the output goods. The difference in prices alone is sufficient to cause a deviation in wages and rents between countries because it affects the marginal productivity. However, in addition, in a variable proportions model the difference in wages and rents also affects the capital-labor ratios in each industry, which in turn affects the marginal products. All of this means that for various reasons the wage and rental rates will differ between countries in autarky.

Once free trade is allowed in outputs, output prices will become equal in the two countries. Since the two countries share the same marginal productivity relationships, it follows that only one set of wage and rental rates can satisfy these relationships for a given set of output prices. Thus free trade will equalize goods' prices and wage and rental rates.

Since the two countries face the same wage and rental rates, they will also produce each good using the same capital-labor ratio. However, because the countries continue to have different quantities of factor endowments, they will produce different quantities of the two goods.

This result contrasts with the Ricardian model. In that model, production technologies are assumed to be different in the two countries. As a result, when countries move to free trade, real wages remain different from each other; the country with higher productivities will have higher real wages.

In the real world, it is difficult to know whether production technologies are different, similar, or identical. Supporting identical production technology, one could argue that state-of-the-art capital can be moved anywhere in the world. On the other hand, one might counter by saying that just because the equipment is the same doesn't mean the workforces will operate the equipment similarly. There will likely always remain differences in organizational abilities, workforce habits, and motivations.

One way to apply these model results to the real world might be to say that to the extent that countries share identical production capabilities, there will be a tendency for factor prices to converge as freer trade is realized.

Key Takeaways

- The factor-price equalization theorem says that when the product prices are equalized between countries as they move to free trade in the H-O model, then the prices of the factors (capital and labor) will also be equalized between countries.
- Factor-price equalization arises largely because of the assumption that the two countries have the same technology in production.
- Factor-price equalization in the H-O model contrasts with the Ricardian model result in which countries could have different factor prices after opening to free trade.

Exercise 5.14.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"

a. *This key technology assumption* assures that factor-price equalization will occur in free trade in an H-O model.
b. The factor price equalization theorem says these will be equalized between countries if goods prices become equalized because of trade.
c. The factor price equalization theorem says these will be equalized between countries if factor prices become equalized because of factor migration.

2. Suppose there are two countries, Japan and the Philippines, described by a variable proportions H-O model. Suppose they produce two goods, rice and chicken, using two factors, labor and capital. Let rice be capital intensive and the Philippines be labor abundant.
   a. If these are the only two countries and if they do not trade, explain how the price of rice and chicken will differ between the two countries.
   b. If these are the only two countries and if they do not trade, explain how the wages and rental rates on capital will differ between the two countries.
   c. When trade opens between the countries what happens to the price of rice and chicken in the Philippines?
   d. When trade opens between the countries what happens to the wages and rents in the Philippines?
   e. When trade opens between the countries what happens to the wages and rents in Japan?
   f. When trade is free between the two countries, how do the wages and rents compare between the two countries?
3. Suppose there are two countries, Japan and the Philippines, as described in Exercise 2 above. Suppose goods trade is restricted between the countries and that factor mobility between countries suddenly becomes free.
   a. Describe the pattern of factor flows that would occur between the two countries and explain why these flows occur.
   b. Describe the effect of the factor flows on the wages and rents in the two countries.
   c. Apply the magnification effect for quantities to explain how the outputs of rice and chicken will change in Japan and the Philippines.
   d. After factor flows reach a new equilibrium, explain how goods' prices will differ between the two countries.

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5.15: The Specific Factor Model- Overview 5.15: The Specific Factor Model- OverviewEdit Update titlecancel

Learning Objectives

1. Learn the basic assumptions and results of the specific factor (SF) model.

The specific factor (SF) model was originally discussed by Jacob Viner, and it is a variant of the Ricardian model. Hence the model is sometimes referred to as the Ricardo-Viner model. The model was later developed and formalized mathematically by Ronald Jones (1971)See R. W. Jones, "A Three-Factor Model in Theory, Trade and History," in *Trade, Balance of Payments and Growth*, ed. J. N. Bhagwati, R. W. Jones, R. A. Mundell, and J. Vanek (Amsterdam: North-Holland Publishing Co., 1971). and Michael Mussa (1974)Michael Mussa, "Tariffs and the Distribution of Income: The Importance of Factor Specificity, Substitutability, and Intensity in the Short and Long-Run," *Journal of Political Economy*, 82, no. 6 (1974): 1191–1203.. Jones referred to it as the two-good, three-factor model. Mussa developed a simple graphical depiction of the equilibrium that can be used to portray some of the model's results. It is this view that is presented in most textbooks.

The model's name refers to its distinguishing feature—that one factor of production is assumed to be "specific" to a particular industry. A *specific* factor is one that is stuck in an industry or is immobile between industries in response to changes in market conditions. A factor may be immobile between industries for a number of reasons. Some factors may be specifically designed (in the case of capital) or specifically trained (in the case of labor) for use in a particular production process. In these cases, it may be impossible, or at least difficult or costly, to move these factors across industries. See Chapter 4: Factor Mobility and Income Redistribution, Section 4.2: Domestic Factor Mobility and Chapter 4: Factor Mobility and Income Redistribution, Section 4.3: Time and Factor Mobility for more detailed reasons for factor immobility.

The SF model is designed to demonstrate the effects of trade in an economy in which one factor of production is specific to an industry. The most interesting results pertain to the changes in the distribution of income that would arise as a country moves to free trade.

Basic Assumptions

The SF model assumes that an economy produces two goods using two factors of production, capital and labor, in a perfectly competitive market. One of the two factors of production, typically capital, is assumed to be specific to a particular industry—that is, it is completely immobile. The second factor, labor, is assumed to be freely and costlessly mobile between the two industries. Because capital is immobile, one could assume that capital in the two industries is different, or differentiated, and thus is not substitutable in production. Under this interpretation, it makes sense to imagine that there are really three factors of production: labor, specific capital in Industry 1, and specific capital in Industry 2.

These assumptions place the SF model squarely between an immobile factor model and the Heckscher-Ohlin (H-O) model. In an immobile factor model, all the factors of production are specific to an industry and cannot be moved. In an H-O model, both factors are assumed to be freely mobile—that is, neither factor is specific to an industry. Since the mobility of factors in response to any economic change is likely to increase over time, we can interpret the immobile factor model results as short-run effects, the SF model results as medium-run effects, and the H-O model results as long-run effects.

Production of Good 1 requires the input of labor and capital specific to Industry 1. Production of Good 2 requires labor and capital specific to Industry 2. There is a fixed endowment of sector-specific capital in each industry as well as a fixed endowment of labor. Full employment of labor is assumed, which implies that the sum of the labor used in each industry equals the labor endowment. Full employment of sector-specific capital is also assumed; however, in this case the sum of the capital used in all the *firms* within the industry must equal the endowment of sector-specific capital.

The model assumes that firms choose an output level to maximize profit, taking prices and wages as given. The equilibrium condition will have firms choosing an output level, and hence a labor usage level, such that the market-determined wage is equal to the value of the marginal product of the last unit of labor. The **value of the marginal product** is the increment of revenue that a firm will obtain by adding another unit of labor to its production process. It is found as the product of the price of the good in the market and the marginal product of labor. Production is assumed to display diminishing returns because the fixed stock of capital means that each additional worker has less capital to work with in production. This means that each additional unit of labor will

add a smaller increment to output, and since the output price is fixed, the value of the marginal product declines as labor usage rises. When all firms behave in this way, the allocation of labor between the two industries is uniquely determined.

The production possibility frontier (PPF) will exhibit increasing opportunity costs. This is because expansion of one industry is possible by transferring labor out of the other industry, which must therefore contract. Due to the diminishing returns to labor, each additional unit of labor switched will have a smaller effect on the expanding industry and a larger effect on the contracting industry. This means that the graph of the PPF in the SF model will look similar to the PPF in the variable proportion H-O model. However, in relation to a model in which both factors were freely mobile, the SF model PPF will lie everywhere inside the H-O model PPF. This is because the lack of mobility of one factor inhibits firms from taking full advantage of efficiency improvements that would be possible if both factors can be freely reallocated.

Specific Factor Model Results

The SF model is used to demonstrate the effects of economic changes on labor allocation, output levels, and factor returns. Many types of economic changes can be considered, including a movement to free trade, the implementation of a tariff or quota, growth of the labor or capital endowment, or technological changes. This section will focus on effects that result from a change in prices. In an international trade context, prices might change when a country liberalizes trade or when it puts into place additional barriers to trade.

When the model is placed into an international trade context, differences of some sort between countries are needed to induce trade. The standard approach is to assume that countries differ in the amounts of the specific factors used in each industry relative to the total amount of labor. This would be sufficient to cause the PPFs in the two countries to differ and could potentially generate trade. Under this assumption, the SF model is a simple variant of the H-O model. However, the results of the model are not sensitive to this assumption. Trade may arise due to differences in endowments, differences in technology, differences in demands, or some combination. The results derive as long as there is a price change, for whatever reason.

So suppose, in a two-good SF model, that the price of one good rises. If the price change is the result of trade liberalization, then the industry whose price rises is in the export sector. The price increase would set off the following series of adjustments. First, higher export prices would initially raise profits in the export sector since wages and rents may take time to adjust. The value of the marginal product in exports would rise above the current wage, and that would induce the firms to hire more workers and expand output. However, to induce the movement of labor, the export firms would have to raise the wage that they pay. Since all labor is alike (the model assumes labor is homogeneous), the import-competing sector would have to raise its wages in step so as not to lose all of its workers. The higher wages would induce the expansion of output in the export sector (the sector whose price rises) and a reduction in output in the import-competing sector. The adjustment would continue until the wage rises to a level that equalizes the value of the marginal product in both industries.

The return to capital in response to the price change would vary across industries. In the import-competing industry, lower revenues and higher wages would combine to reduce the return to capital in that sector. However, in the export sector, greater output and higher prices would combine to raise the return to capital in that sector.

The real effects of the price change on wages and rents are somewhat more difficult to explain but are decidedly more important. Remember that absolute increases in the wage, or the rental rate on capital, does not guarantee that the recipient of that income is better off, since the price of one of the goods is also rising. Thus the more relevant variables to consider are the real returns to capital (real rents) in each industry and the real return to labor (real wages).

Ronald Jones (1971) derived a magnification effect for prices in the SF model that demonstrated the effects on the real returns to capital and labor in response to changes in output prices. In the case of an increase in the price of an export good and a decrease in the price of an import good, as when a country moves to free trade, the magnification effect predicts the following impacts:

1. The real return to capital in the export industry will rise with respect to purchases of both exports and imports.
2. The real return to capital in the import-competing industry will fall with respect to purchases of both exports and imports.
3. The real wage to workers in both industries will rise with respect to purchases of the import good and will fall with respect to purchases of the export good.

This result means that when a factor of production, like capital, is immobile between industries, a movement to free trade will cause a redistribution of income. Some individuals—owners of capital in the export industry—will benefit from free trade. Other individuals—owners of capital in the import-competing industries—will lose from free trade. Workers, who are freely mobile between industries, may gain or may lose since the real wage in terms of exports rises while the real wage in terms of imports falls.

If workers' preferences vary, then those individuals who have a relatively high demand for the export good will suffer a welfare loss, while those individuals who have a relatively strong demand for imports will experience a welfare gain.

Notice that the clear winners and losers in this model are distinguishable by industry. As in the immobile factor model, the factor specific to the export industry benefits, while the factor specific to the import-competing industry loses.

Key Takeaways

- The specific factor (SF) model is designed to evaluate the real-world phenomenon that some factors of production are more mobile between industries than others. It does that by assuming that one factor (capital) cannot move between industries, while the other factor (labor) can freely move.
- In all other respects, the SF model is like the H-O model.
- The SF model shows that upon opening to free trade, the real rents in the exports industry rise, real rents in the import-competing industry fall, and real wages in both industries may rise or fall.

? Exercise 5.15.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The term used in economic models to describe a factor of production that is so specialized that it can only be used in a single industry.
   b. Of *increase*, *decrease*, *stay the same*, or *ambiguous*, this is the effect of trade on the real return to specific capital in the export industry.
   c. Of *increase*, *decrease*, *stay the same*, or *ambiguous*, this is the effect of trade on the real return to specific capital in the import industry.
   d. Of *increase*, *decrease*, *stay the same*, or *ambiguous*, this is the effect of trade on the real wages when labor is the mobile factor in a specific factor model.
   e. Of *increase*, *decrease*, *stay the same*, or *ambiguous*, this is the effect of trade on the real wage with respect to the imported good when labor is the mobile factor in a specific factor model.
   f. Of *increase*, *decrease*, *stay the same*, or *ambiguous*, this is the effect of trade on the real wage with respect to the exported good when labor is the mobile factor in a specific factor model.

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5.16: The Specific Factor Model 5.16: The Specific Factor ModelEdit Update titlecancel

Learning Objectives

1. Learn the detailed assumptions of the specific factor model.
2. Learn how price changes affect wages, rents, and factor returns using the Mussa diagram.
3. Learn the real wage and real rent effects of free trade in a specific factor model.

Consider an economy with two perfectly competitive industries, textiles and steel. Suppose the output of both products requires labor and capital as factor inputs. However, we'll imagine the capital used in textile production consists of equipment such as looms, while the capital used in steel production requires equipment such as blast furnaces. Since each type of capital is designed for use in a specific production process, we call it "specific capital." We can imagine that if the capital from one industry were shifted to another, its productivity in the new industry would be zero. Simply imagine the usefulness of a blast furnace in textile production and you should see the point! Thus for capital to remain fully employed, it must remain in the same industry—it is immobile, or stuck in its respective industry.

We assume labor, on the other hand, is homogenous and perfectly freely mobile between the two industries. This will imply that a firm's choice problem is reduced to the decision of how much labor to hire and how much to produce to maximize its profits, given that it has a fixed amount of capital available to use. We'll assume for simplicity that the capital stock in each industry is exogenously fixed and there is no investment in new capital.

Single-Firm Equilibrium in the Specific Factor Model

In this context, a firm will maximize it profits when it produces a level of output such that the wage it must pay to workers is equal to the value of the marginal product at the chosen level of output. This is written in equation form for a textile firm as follows:

$$w = P_T MP_T.$$

The left-hand side of the equation represents the hourly wage the firm pays its workers. The right-hand side is the value of the marginal product, which consists of the product of the market price of output (P_T) and the marginal product of production (MP_T). The marginal product, in turn, represents the additional output that can be obtained by increasing the labor input by one unit. For example, if $MP_T = 10$, this means that by adding one more hour of labor, ten additional meters of cloth could be produced. The units of the expression MP_T are meters of cloth per hour of labor (m/hr.). When multiplied by the price, measured as dollars per meter, the product, $P_T MP_T$, yields *the number of dollars that could be earned per hour of additional labor applied in production*. This then is the definition of the value of the marginal product in this context. It is measured in dollars per hour, the same as the wage is measured—a good thing since they must be equal to each other!

To see why this condition will hold when the firm maximizes profit, we will graph these expressions in Figure $5.16.1$, which depicts the value of a marginal product line for a representative textile firm, $VMP_T = P_T MP_T$, and the market wage rate, w_T, with respect to the labor supply.

The wage is assumed to be exogenous to each firm and is independent of the labor supply. Hence it is drawn as a horizontal line at the level of the wage, w_T. Later the wage will be determined endogenously through the interaction of the two industries. Nevertheless, firms in both industries recognize they are too small to influence the market wage and make decisions based on an exogenously given wage.

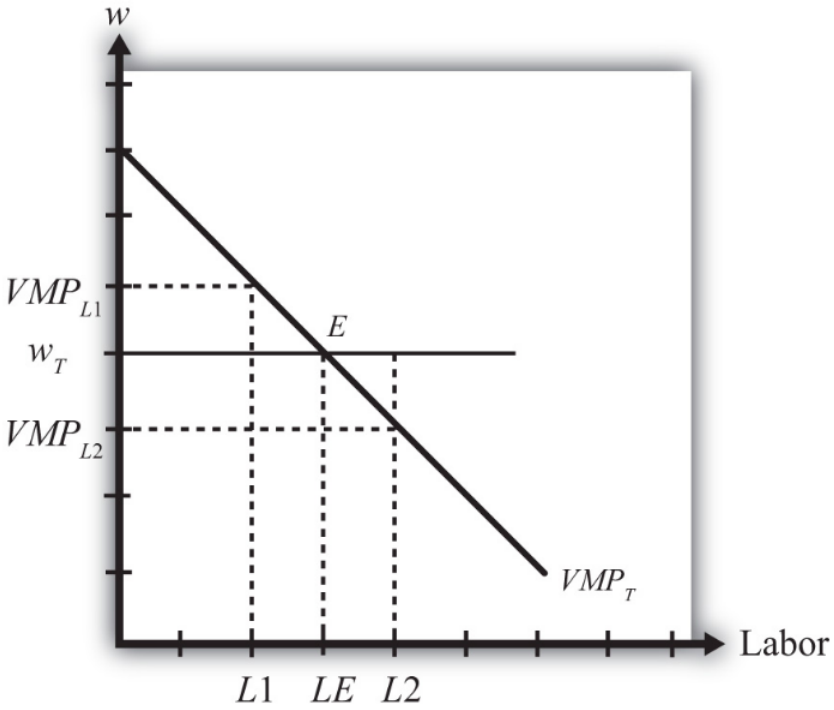


Figure 5.16.1: Specific Factor Model—Single-Firm Equilibrium

The value of the marginal product is a decreasing function of labor. This means that at higher levels of labor usage, each additional unit of labor applied to production adds fewer units of output. The intuition for this is straightforward. Imagine more and more workers being assigned to use the same machine in a production process. Each additional worker may help in the production process and add output (thus $MP > 0$), but as more and more are added, overcrowding will set in and each person will find less and less to do that is helpful. Thus the marginal product will fall. Since we draw the value of the marginal product line under the assumption that there is a fixed amount of specific capital in the industry, the same overcrowding argument applies at the larger industry scale.

The position of the VMP line is dependent on the market price and the amount of specific capital, both assumed to be exogenous. If the price of the product rises (falls), the VMP line shifts upward (downward). The same applies for changes in the amount of specific capital. If the amount of specific capital in the industry were to rise (fall), the VMP line would shift upward (downward).

The profit-maximizing choice of labor input by the industry is determined at level LE on the horizontal axis, where the wage w_T is equal to the value of the marginal product VMP_T at point E. To see why, consider what it would mean if the industry chose a different labor input, say $L1$. At $L1$, $VMP_{L1} > w_T$. This says that the additional revenue earned by expanding labor input by one unit exceeds the additional cost of adding one more unit of labor. Thus adding one more unit of labor must raise profit, which means that $L1$ cannot be the profit-maximizing choice—it must lie to the right of $L1$. Next consider labor input $L2$. At $L2$, $VMP_{L2} < w_T$. This says that the additional revenue earned by expanding labor input by one unit is less than the cost of adding one more unit of labor. Thus adding one more unit of labor must lower profit, which means that $L2$ cannot be the profit-maximizing choice—it must lie to the left of $L2$. Finally, consider labor input LE. At LE, $VMP_{LE} = w_T$. This says that the additional revenue earned by expanding labor input by one unit equals the additional cost of adding one more unit of labor. Thus adding one more unit of labor has no effect on profit, which means that LE must be the profit-maximizing choice.

Factor Payments

In Figure 5.16.2, we consider ways to represent the factor payments made in an equilibrium. Consider a wage rate w_T and an equilibrium labor input given by LE. The product of these two, $w_T LE$, represents the total amount of money that must be paid to workers in the industry and is referred to as the wage bill. It is the charges incurred by the owners (i.e., the bill that must be paid) to hire the workers. It is represented by the green shaded area.

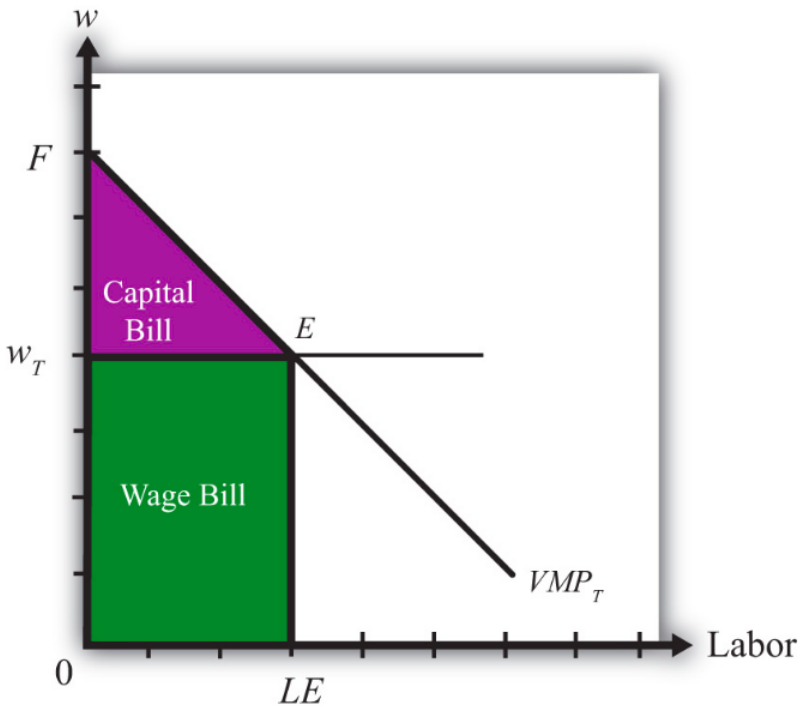


Figure 5.16.2: Specific Factor Model—Factor Payments

The total amount of revenue earned by the firm on the market is given by the total shaded area (green + purple). This corresponds to the area under the VMP_T line between 0 and LE units of labor. Without the use of calculus, it is difficult to describe why this is so. Nonetheless, since the VMP gives the additional revenue earned for each additional unit of labor, one can imagine beginning back at $L = 0$ and increasing labor in small increments. The vertical distance to the VMP line would be added to the total revenue for every increment in labor. Adding each of these vertical lines together between $L = 0$ and $L = LE$ yields total revenue earned by the firm and is given by the total shaded area.

Finally, since there are only two factors of production—labor and specific capital—it must follow that the total revenue equals the sum of the wage bill and the capital bill, where the capital bill represents the total amount of money paid to the capital owners. In equation form we could write

$$total\ revenue = wage\ bill + capital\ bill.$$

Since the total revenue is given by the total shaded area and the wage bill is given by the lower shaded area, the capital bill must be given by the upper purple shaded area. Again, this area represents the total amount of money the firm must pay to the owners of capital used in production. It is not the rental rate, however. The rental rate is given by the rental bill divided by the total quantity of capital units used in production. In other words, the rental rate in textiles, r_T, is given by

$$r_T = rental\ bill/K_T,$$

where K_T is the fixed amount of specific capital available for use in the industry.

Similarly, the wage rate in textiles, w_T, is given by

$$w_T = wage\ bill/LE.$$

Two-Firm Equilibrium in the Specific Factor Model

The economy consists of two industries, textiles and steel, each of which is choosing labor input so as to maximize profit. Thus when both industries operate and both maximize profit,

$$w_T = VMP_T$$

for textiles and

$$w_S = VMP_S$$

for steel, where w_T and w_S are the wage rates paid to workers in textiles and steel, respectively. With homogeneous and perfectly mobile labor, another condition must also hold, namely, the labor constraint:

$$L_T + L_S = L.$$

In other words, the labor used in textile production (L_T) plus the labor used in steel production (L_S) must equal the total labor endowment available in the economy (L). Finally, because labor is homogeneous and perfectly mobile between industries, wages must be equalized in equilibrium between the two industries. Thus

$$w_T = w_S.$$

All four conditions must be satisfied simultaneously in an equilibrium in this model. To represent this equilibrium and to provide a medium to analyze potential changes, we present a diagram developed by Mussa (1974). The diagram (shown in Figure 5.16.3) is unique in that it presents all four conditions together on the same graph. The horizontal axis of the diagram plots the labor supply. The vertical axis plots the wage and the value of the marginal products.

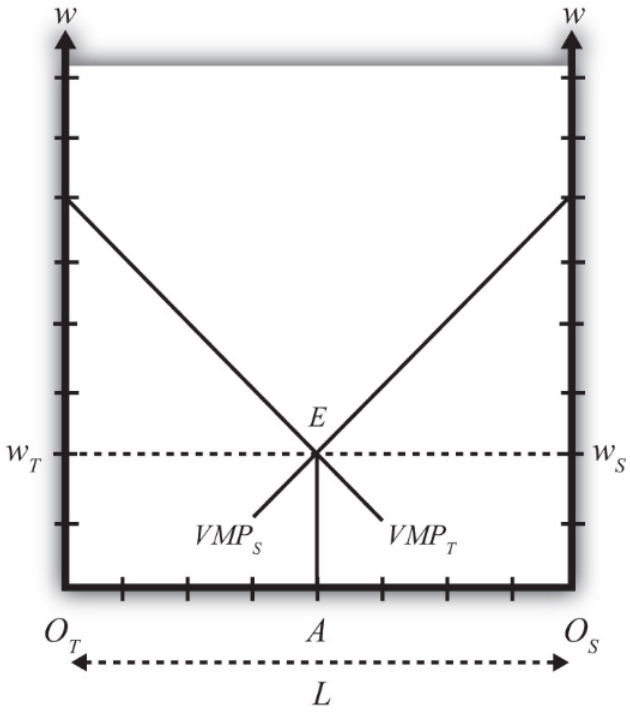


Figure 5.16.3: Specific Factor Model—Mussa Diagram

The horizontal length of Figure 5.16.3, O_TO_S, represents the labor endowment (L), the total amount of labor available for use in the economy. The VMP_T line slopes down from the left as presented before. However, the VMP_S line slopes down from the right. This is because the point O_S corresponds to zero units of labor used in steel production and O_TO_S units of labor used in textiles. As we move to the left from O_S, labor used in steel increases, while labor used in textiles decreases. Thus the VMP_S line is flipped and drawn with respect to its origin at O_S. Every point along the horizontal axis corresponds to an allocation of labor between the two industries satisfying the labor constraint condition. Thus at a point like A, O_TA units of labor are used in textile production (L_T) and O_SA units of labor are used in steel production (L_S). The sum of the two equals O_TO_S, which is the total labor endowment (L).

At point E in Figure 5.16.3, the two VMP lines intersect so that $VMP_T = VMP_S$, determining the unique wage rate $w = w_T = w_S$ using all the available labor, O_TO_S. Thus at point E all four equilibrium conditions listed are satisfied.

Effects of a Price Increase

Prices will change whenever a country moves from autarky to free trade or when a country imposes a trade or domestic policy. At this stage, we will simply consider the effects of a price change within the context of the model without specifying why the change occurred. (In more technical terms, we say the price change is exogenous.) Later, we'll introduce several situations to see how trade or trade policies will affect outcomes in the specific factor (SF) model.

Suppose we begin with a country producing textiles and steel in an initial equilibrium given by point E in Figure 5.16.4. The original value of the marginal product lines is given by VMP_{T1} and VMP_{S1}, respectively. The initial labor allocation is O_TA units to textiles and O_SA units to steel. The initial wage rate in both industries is w_1.

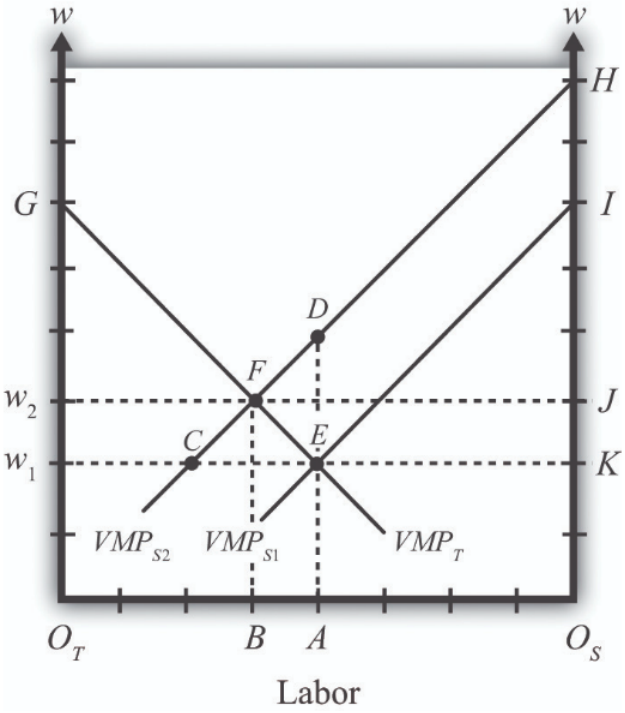


Figure 5.16.4: Effects of a Price Increase

Now suppose the price of steel increases exogenously. The immediate effect will be to raise the value of the marginal product of steel, shifting up VMP_{S1} to VMP_{S2}. The new equilibrium is given at point F. At F, labor allocated to steel production will have risen to O_SB, while labor used in textiles will have fallen to O_TB. The equilibrium wage increases to w_2.

The intuition for these changes follows from the underlying dynamic effects. At first, when the price of steel rises, the wage and rental rates remain fixed. This means steel revenue rises while costs remain the same, stimulating an increase in steel profits. Positive profit, in a perfectly competitive market, induces new entry of firms into steel production, expansion of current firms in the industry, or both. To expand, steel must induce workers to move over from textile production. This requires an increase in the wage since labor demand temporarily exceeds labor supply. To prevent all the labor from shifting to steel, the textile industry must raise the wage to its workers as well. As labor shifts from textiles to steel and as the wage rises, the costs of production in steel and textiles rise. In steel, this erodes the temporary profits it was making. Textiles respond to the higher costs by cutting production and releasing workers. Remember, there is no ability to expand capital inputs in steel since we assume steel's capital stock is fixed exogenously in size, and due to specificity, capital cannot be moved in from the textile industry. In the end, industry profits are driven to zero in both industries once the wage rises sufficiently.

Our prime concern, however, is the effect of the price increase on the factor payments or returns. In other words, how are wages and rental rates on capital affected by the steel price increase? The answer for wages is already shown. We can see that wages rise for workers in both industries. However, we care about not just how the nominal (money) wage changes but, more importantly, how the *real* wage changes. In other words, we need to identify how the purchasing power of wages changes when the price of steel increases. We also want to know how the real rental rates change.

Real Wage Effect

When the price of steel rises from P_{S1} to P_{S2}, the value of the marginal product line shifts up proportionally to the increase in the price. This is because the price of steel enters the value of the marginal product formula multiplicatively—that is, $VMP_S = P_S MP_S$. The percentage change in the steel price $\hat{P}_S$ is derived in Figure 5.16.4 as

$$\hat{P}_S = \frac{DA - EA}{EA} = \frac{DE}{EA}.$$

Here's why. First, the distance DA is the value of the marginal product for labor usage O_SA when the price of steel is P_{S2}. The distance EA is the value of the marginal product for labor usage O_SA when the price of steel is P_{S1}. Thus

$$\frac{DA-EA}{EA}=\frac{P_{S2}MP_S-P_{S1}MP_S}{P_{S1}MP_S}=\frac{P_{S2}-P_{S1}}{P_{S1}}=\hat{P}_S.$$

Note that MP_S cancels out because it is evaluated at the same labor input given by point A.

Similarly, since FB is the equilibrium wage at steel price P_{S2} and CB is the wage at steel price P_{S1}, the percentage change in the equilibrium wage $\hat{w}$ is given by

$$\hat{w}=\frac{FB-CB}{CB}=\frac{FC}{CB}.$$

From Figure 5.16.4, it is obvious that $\hat{P}_S>\hat{w}$, which means that the percentage change in the price of steel exceeds the percentage change in the wage rate.

Since in the exercise the price of textiles remains constant, $\hat{P}_T=0$, we can expand the inequality to

$$\hat{P}_S>\hat{w}>\hat{P}_T.$$

Since $\hat{P}_S>\hat{w}$, this implies that w/P_S, the real wage in terms of steel purchases, decreases. In other words, workers in both industries will be able to buy less steel after the steel price increase than before. However, $\hat{w}>\hat{P}_T$, which implies that w/P_T, the real wage in terms of textile purchases, increases. This means all workers will be able to buy more textiles after the steel price increase than before. In terms of overall well-being, workers will lose in total if they tend to purchase more steel products and fewer textile products. However, if a person's preferences are tilted toward more textiles than steel, then the person may be better off.

Real Rental Effect

When the price of steel rises from P_{S1} to P_{S2}, the rental bill in the steel industry rises from area KEI to area JFH in Figure 5.16.4. Since the amount of capital in steel remains fixed, this must mean that the rental rate on steel capital increases. However, simply by looking at the diagram, it is impossible to tell if that increase exceeds or falls short of the percentage change in the price of steel. We'll discuss this issue further.

The rental bill in the textile industry falls from area w_1EG to area w_2FG in Figure 5.16.4. Since the amount of capital in steel remains fixed, this must mean that the rental rate on textile capital decreases. Furthermore, since the price of steel increases and the price of textiles stays the same, it must follow that r_T/P_S and r_T/P_T decrease. Therefore, the real rental rate on textile capital must fall with respect to purchases of both goods when the price of steel increases.

Magnification Effect

A definitive ordering of the percentage changes in all goods and factor prices in a two-good SF model was derived mathematically by Jones (1971).See R. W. Jones, "A Three-Factor Model in Theory, Trade and History," in *Trade, Balance of Payments and Growth*, ed. J. N. Bhagwati, R. W. Jones, R. A. Mundell, and J. Vanek (Amsterdam: North-Holland Publishing Co., 1971). The magnification effect for the SF model is analogous to the magnification effect for prices demonstrated in the Heckscher-Ohlin (H-O) model. It defines an ordering of percentage changes in factor prices induced by changes in the goods' prices. Thus suppose the price of steel rises by a greater percentage than the price of textiles such that PS∧>PT∧. This may occur if two countries move together in trade or if a trade or domestic policy is changed. Jones showed that the magnification effect in this case would be

$$\hat{r}_S>\hat{P}_S>\hat{w}>\hat{P}_T>\hat{r}_T.$$

Since $\hat{r}_S>\hat{P}_S$ and $\hat{r}_S>\hat{P}_T$, this implies r_S/P_S and r_S/P_T both increase. Thus the real returns to steel capital increase with respect to both goods.

Since $\hat{P}_S>\hat{r}_T$ and $\hat{P}_T>\hat{r}_T$, r_T/P_S and r_T/P_T both decrease. Thus the real returns to textile capital decrease with respect to both goods. Finally, since $\hat{P}_S>\hat{w}$, w/P_S, the real wage in terms of steel purchases, decreases. Thus workers will be able to buy less steel than before. However, $\hat{w}>\hat{P}_T$, which implies that w/P_T, the real wage in terms of textile purchases, increases. This means all workers will be able to buy more textiles than before.

An alternative version of the magnification effect in this model can be written for the case when the price of textiles rises by a greater percentage than the price of steel such that $\hat{P}_T > \hat{P}_S$. The magnification effect in this case becomes

$$\hat{r}_T > \hat{P}_T > \hat{w} > \hat{P}_S > \hat{r}_S.$$

This implies that the real returns to capital in the textile industry increase, and the real returns to capital in the steel industry decrease with respect to purchases of both goods. As before, though, the effect on wages is mixed. Real wages with respect to steel purchases increase, while real wages with respect to textile purchases fall.

Effects of Trade

Since this model is a variation of the H-O model, production technologies are assumed to be identical between countries and trade occurs due to differences in factor proportions. Since there are ostensibly three factors—labor, textile capital, and steel capital—a country will export those goods that use its relatively abundant factor most intensively. Generally, this model is analyzed by assuming a country conforms to the trade pattern described by the H-O model.

Thus if steel production is capital intensive and the country is capital abundant, then in autarky the price of steel will be relatively lower domestically than abroad, while the price of textiles will be relatively higher. Upon opening trade, the price of steel will begin to rise as steel is exported and the price of textiles will fall as textiles are imported. These price changes are all one needs to apply the magnification effect.

If we assume trade leads to $\hat{P}_S > \hat{P}_T$, then $\hat{r}_S > \hat{P}_S > \hat{w} > \hat{P}_T > \hat{r}_T$. This implies that the return to capital in the export industry (steel) rises, while the return to capital in the import-competing industry (textiles) falls. The return to mobile labor rises with respect to imported goods but falls with respect to export goods.

In contrast, if a country experiences the opposite price change such that $\hat{P}_T > \hat{P}_S$, then the country must be exporting textiles and importing steel. This implies $\hat{r}_T > \hat{P}_T > \hat{w} > \hat{P}_S > \hat{r}_S$. Thus the return to capital in the export industry (textiles) rises, while the return to capital in the import-competing industry (steel) falls. The return to mobile labor rises with respect to imported goods but falls with respect to export goods.

Now we can state more formally and generally that if capital is immobile between industries (or specific to an industry) and if labor is homogeneous and freely mobile between industries, then free trade will cause an increase in the real rents earned by capital in the export industry, a decrease in real rents earned by capital in the import-competing industry, an increase in real wages with respect to purchases of the import goods, and a decrease in real wages with respect to purchases of the export goods.

Key takeaways

- The specific factor (SF) model is a variant of the H-O model that assumes capital is specific to an industry, while labor is freely mobile between industries.
- The Mussa diagram shows how the increase in the price of one product raises wages, raises the rental rate on capital specific to that industry, and lowers the rent on capital specific to the other industry.
- The magnification effect in the SF model demonstrates that the real rent rises in the export industry and falls in the import industry.
- The magnification effect in the SF model demonstrates that real wages in both industries rise with respect to purchases of the import good and fall with respect to purchases of the export good.

Exercise 5.16.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The term used to describe the amount of additional dollars earned from one additional unit of labor input applied in production.
   b. The value of the marginal product is found by multiplying the marginal product by this variable.
   c. A condition that is satisfied in the specific factor model at the profit-maximizing level of output.
   d. The term describing the sum of the total wage bill and the total capital bill.
   e. Of *increase*, *decrease*, or *stay the same*, the effect on the value of the marginal product of grapes when there is a decrease in the market price of grapes in a specific factor model.

f. Of *increase*, *decrease*, or *stay the same*, the effect on wage bill in the grape industry when there is an increase in the market price of grapes in a specific factor model.
g. Of *increase*, *decrease*, or *stay the same*, the effect on the equilibrium wage rate when there is a decrease in the market price of one of two goods in a specific factor model.
h. The magnification effect for prices in a two-good specific factor model with specific capital and mobile labor when a country opens to trade and exports milk and imports cookies.
i. The magnification effect for prices in a two-good specific factor model with specific capital and mobile labor when a country that exports wine and imports cheese moves from free trade to autarky.

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5.17: Dynamic Income Redistribution and Trade 5.17: Dynamic Income Redistribution and TradeEdit Update titlecancel

Learning Objectives

1. Integrate the results of income redistribution from three separate models: the immobile factor model, the specific factor (SF) model, and the Heckscher-Ohlin (H-O) model.

A number of trade models demonstrate that movements to free trade will cause a redistribution of income. The immobile factor model concludes that income will be redistributed from workers in the import-competing industry to workers in the export industry. The specific factor (SF) model concludes that owners of capital in the export sector will gain at the expense of capital owners in the import-competing sector and that the effects on workers in both industries are ambiguous. The Heckscher-Ohlin (H-O) model demonstrates that income will be redistributed from owners of a country's scarce factor, who will lose, to owners of a country's abundant factor, who will gain.

One of the key distinctions between these models is the degree of factor mobility. The immobile factor model represents one extreme, in which factors are stuck in one industry and cannot move between sectors. The H-O model represents another extreme, in which factors can move freely and costlessly between sectors. The SF model represents an intermediate special case in which one factor is completely immobile and the other is completely mobile.

As was discussed in detail in Chapter 4: Factor Mobility and Income Redistribution, Section 4.2: Domestic Factor Mobility, different factors of production will likely have different degrees of mobility. Some factors are easily adaptable to other industries. For example, accountants are needed in all businesses, and trucks can be used to transport tomatoes or software. Other factors are so specialized that they cannot be easily adapted for use in other industries. Machinery is often carefully designed for a particular production process and cannot be applied elsewhere.

However, the adaptability of any productive factor is likely to change over time, with mobility rising the longer the amount of time that elapses (see Chapter 4: Factor Mobility and Income Redistribution, Section 4.3: Time and Factor Mobility). Thus, if a country were to suddenly liberalize trade, in the very short run—perhaps up to a few weeks—most of the productive factors would not adjust to the change in prices. This is the situation reflected in the immobile factor model. After a few months or more, the most adaptable factors of production would begin to move from the import-competing sectors to the export sectors, while the least adaptable factors would remain stuck in their respective industries. This situation is characterized by the SF model, in which one factor is freely mobile but the other is immobile. Finally, in the very long run—perhaps after several years or more—we might expect all factors to have adapted to the changed economic conditions, either by moving to another industry or by moving out of productive activity, as with retired workers and capital equipment. This situation is depicted in the H-O model.

Thus, by piecing together the results of these models, we can evaluate how income redistribution is likely to change dynamically over time in response to any shock to the system, such as a movement toward trade liberalization or free trade.

Scenario Setup/Assumptions

Consider a country that produces two goods, which we simply label the import good and the export good, respectively. Production of these two goods requires two factors of production, capital and labor. Assume that the country in question is capital abundant vis-à-vis its trading partner and that the export good is capital intensive relative to the import good. In general, we maintain all the assumptions of the H-O model, with one exception: we will assume that in the short run, capital and labor are completely immobile between industries; in the medium run, labor is freely mobile but capital remains immobile; and in the long run, both labor and capital are freely and costlessly mobile between industries.

We will consider the effects of trade liberalization, although any change that affects the relative prices of the goods can be expected to stimulate similar dynamic effects. Trade liberalization, which in the extreme would be a movement from autarky to free trade, would raise the price of the country's export good and lower the price of its import good. The change in prices sets off the following effects.

Short-Run Effects: Immobile Factor Model

The immobile factor model, beginning in Chapter 4: Factor Mobility and Income Redistribution, Section 4.4: Immobile Factor Model Overview and Assumptions, was based on a variation of the Ricardian model. As such, the model assumed only one factor

of production and different production technologies across countries. The results from that model do carry over into this two-factor, identical technology context, however.

First, consider the transition to the change in output prices. When the price of the export good rises, firms in the export industry will begin to collect more revenue from sales of their product. Initially, firm profit will begin to rise since the wage rate and rental rate on capital remains fixed. The increase in profit will stimulate the desire to expand production, but production cannot expand by drawing factors from the other industry due to the immobility of factors. Instead, profit-seeking firms within the industry will begin to compete for the capital and labor already in the industry. (Immobility of factors across industries does not mean that factors cannot move between firms within the industry. Recall also that the assumption of perfect competition implies that there are many, many firms operating within an industry.)

Each export firm now has the incentive to lure workers and capital away from other export firms so that it can expand its own production and raise its share of the industry profit. However, the only way to entice factor mobility within the industry is to offer a higher wage and a higher rent. Some factors may now move to other firms, while others may simply negotiate a higher payment from their present employer to induce them to stay. This bidding war will raise both the wage rate and the rental rate to factors employed within the export industry. The bidding war will end once the total factor cost to each firm is equal to revenue and the profit is driven to zero.

In the import industry, firms now face a lower price and hence a lower revenue. Profits will become negative for all firms in the industry. The firms' only options to cut their losses are to contract by laying off workers or to lower the payments to the workers and capital owners. We will assume, for simplicity, that full employment prevails. However, we could easily imagine the bargaining strategy of the firm managers with the workers: "Either we lower your wages or we eliminate your job." Given that factors are assumed to be immobile across industries, there is no hope, at least in the short run, of finding another job. If you are laid off, you could find alternative employment in another firm, but it would only hire you at a lower wage. The assumption of full employment, then, really just means that the price system in the market responds to the excess supply of workers and capital in this industry by lowering factor prices until all the factors are fully employed. Therefore, wages and rents will fall in the import-competing industry until profit in the industry rises to zero and losses are eliminated.

Although it is more difficult to explain intuitively, the real returns to factors in the export industry will rise, while the real returns to factors in the import-competing industry will fall. This means that workers and capital owners in the export industry will have greater purchasing power after trade liberalization, while workers and capitalists in the import-competing industry will be able to buy less.

The final short-run effects are summarized in Figure 5.17.1. Both workers and capitalists affiliated with the export industry will benefit from trade liberalization, while workers and capitalists affiliated with the import-competing sector will lose from free trade. Note that income redistribution, at least initially, is based on industry affiliation. What determines who wins and who loses is the industry from which you receive your income.

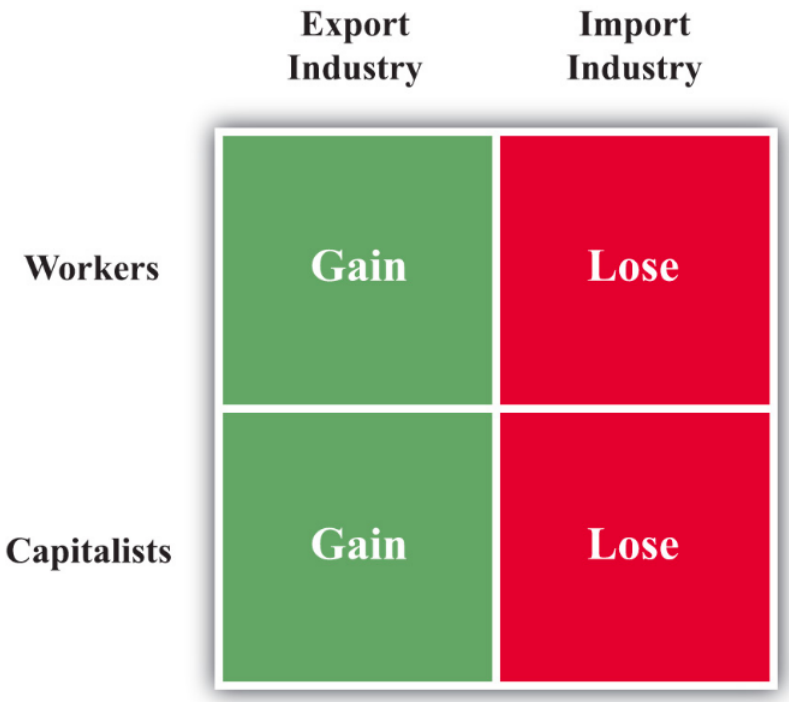


Figure 5.17.1: Short-Run Factor Income Effects of Trade Liberalization

Medium-Run Effects: The Specific Factor Model

The SF model is based on a variation of the H-O model. It assumes that one factor, labor, is freely mobile between the two industries, while the second factor, capital, is completely immobile between industries. Although it is unlikely that one factor would move completely before another begins to adjust, the SF model nonetheless is an easily representable intermediate position between the short-run and long-run effects.

First, consider the transition to equilibrium in the SF model. After the final adjustment depicted in the immobile factor model, the wage rate paid to workers in the export industry is higher than the wage paid in the import-competing industry. In the next step of the transition, workers (assumed to be the more readily mobile factor) in the import-competing industry begin to seek ways to obtain a higher wage. This might require additional education or training, or it may require workers to move to another geographical area. In any case, the transition takes time. As workers begin to move across sectors, the supply of labor to the export industry will rise. Profit-seeking firms in that sector will realize that they can temporarily raise their profits by lowering their wage and hiring workers moving in from the other sector. Competition among export firms will eventually lower the wage of all workers in the export industry. Competition within the industry for the specific immobile capital will bid up the rental rate even further than in the short run.

At the same time, the workers fleeing the import-competing sector will reduce the supply of labor there. Import firms will bid among themselves for the remaining workers to maintain output and profit, which will raise the wage paid to workers in this sector. With declining output, the demand for capital will fall, causing an even further drop in the rental rate paid to capital owners.

When the final adjustment of labor across sectors is complete, the wage paid to workers in both industries will be equal. Capital remains in its original sector, but changing prices and outputs affect its sectoral demand. The rental rate paid to capital owners in the export industry will remain higher than that obtained before trade liberalization and will increase relative to the short run. The rental rate for capital owners in the import-competing sector will remain lower than that obtained before trade liberalization.

The magnification effect for prices in this model can be used to assess the real return to factors in the medium-run equilibrium relative to the returns prior to trade liberalization. It shows that the real return to capital owners in the export industry will rise with respect to purchases of both goods, while the real return to capital in the import industry will fall with respect to purchases of both goods. Thus, as shown in Figure 5.17.2, capitalists in the export industry gain and capitalists in the import industry lose.

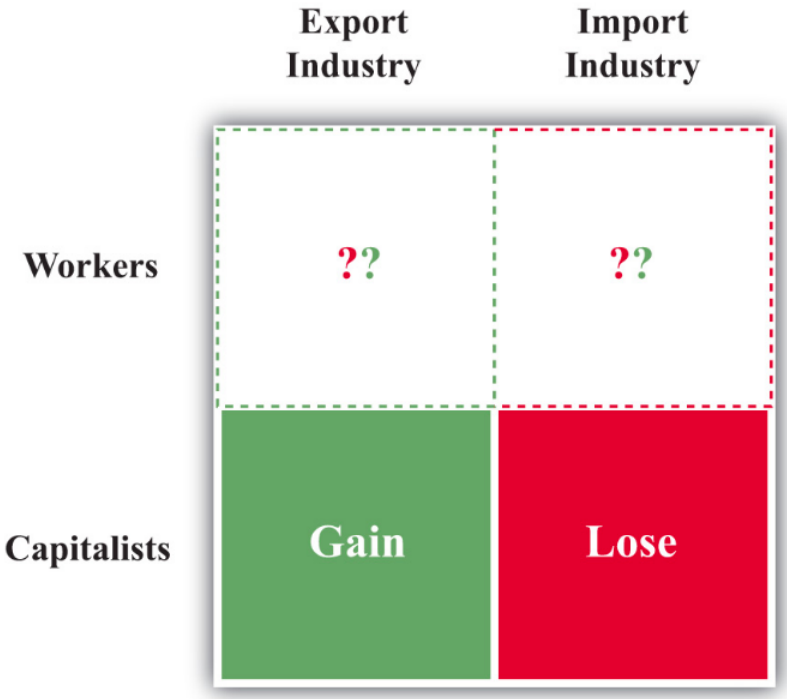


Figure 5.17.2: Medium-Run Factor Income Effects of Trade Liberalization

The effect on workers is, in general, ambiguous. The real wage of workers in terms of purchases of the import good rises, while the real wage in terms of the export good falls. For this reason, we place a question mark in Figure 5.17.2 to note the ambiguity. Whether a worker benefits or loses depends, in part, on the worker's preferences. If a worker has a high demand for the import good for which the real wage rises, then the worker may benefit. If, however, a worker has a relatively high demand for the export good, then the worker would lose.

Long-Run Effects: The Heckscher-Ohlin Model

The H-O model assumes that both factors, labor and capital, are freely mobile between the two industries. As such, this corresponds to a long-run outcome after factors fully adjust to the changes in prices.

After the final adjustment depicted in the SF model, the wage rate paid to workers is the same in both industries, but the rental rate on capital in the export industry is higher than the rental rate paid in the import-competing industry. In the next step of the transition, capital owners (assumed to adjust in the final stage) in the import-competing industry begin to seek ways to obtain higher rents. This might require adapting the capital equipment for use in the export sector or waiting for the capital to fully depreciate and then reinvesting in capital that is usable in the export sector. In any case, the transition takes time. As capital begins to move across sectors, the supply of capital in the export industry will rise. Profit-seeking firms in that sector will realize that they can temporarily raise their profits by lowering their rental and hiring capital moving in from the other sector. Capital owners already in the export sector will have to begin accepting a lower rental payment to avoid being laid off. After all, firm owners can argue that there is no need to keep paying the higher rental rates when there is now a flood of accessible capital streaming in from the import sector.

In the import-competing sector, the loss of capital to the export sector makes capital relatively scarcer in the import sector. This leads to competition among firms for the capital that remains and forces up the price of capital in the import industry. Capital will cease to move between the two industries when the price of capital is equal in both sectors.

As the capital adjusts between industries, outputs and wage rates also adjust. Because the expanding export industry is capital intensive, its demand of capital per worker is greater than the amount of capital per worker that the labor-intensive import industry is able to give up. This implies that the relative demand for capital is higher in the transition to the long-run equilibrium, which results in an increase in the equilibrium rental rate. However, the relative demand for workers in the transition is lower, and this causes a reduction in the equilibrium wage rate.See J. P. Neary, "Short-Run Capital Specificity and the Pure Theory of International Trade," *Economic Journal* 88, no. 351 (1978): 488–510, for an excellent description of the transition between the medium-run effects in the SF model and the long-run effects in the H-O model.

The magnification effect for prices in the H-O model reveals the real returns to the factors relative to those obtained prior to trade liberalization. The effect shows that the equilibrium rental rate rises by a greater percentage than the percentage changes in the two goods' prices, indicating an absolute increase in the real rental rate for all capital owners. The effect also shows that the percentage change in the wage rate is less than the changes in both output prices, indicating an absolute reduction in the purchasing power of all workers' wages. Since capital is the country's relatively abundant factor vis-à-vis the rest of the world and labor is its relatively scarce factor, the general conclusion is that a country's abundant factor gains from trade liberalization, while a country's scarce factor loses. This result is indicated in Figure 5.17.3. Note that capital owners are shown to gain regardless of whether their capital is used in the expanding export sector or the declining import sector. Similarly, all workers lose, even those working in the expanding export sector.

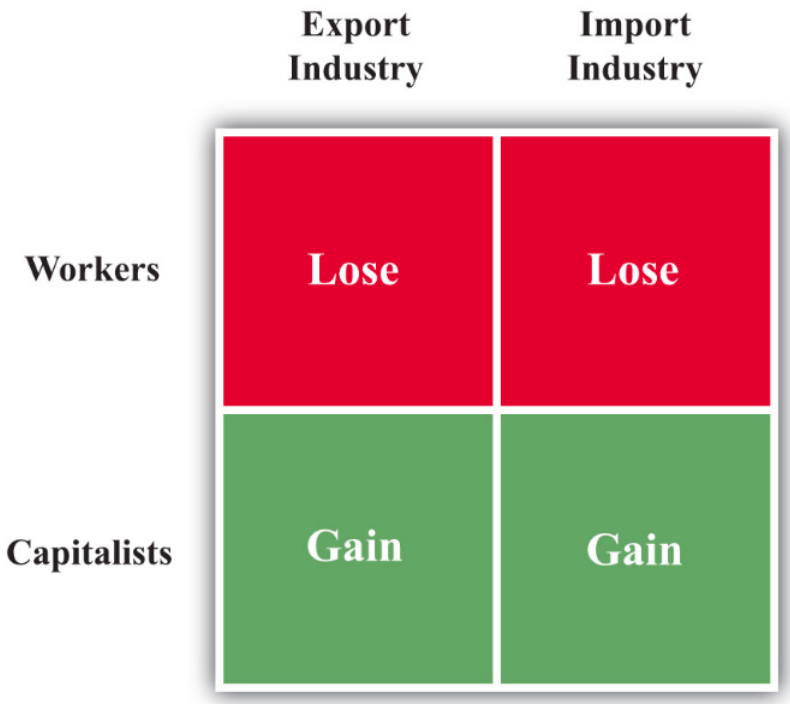


Figure 5.17.3: Long-Run Income Effects of Trade Liberalization

Factor Rewards over Time

Now let's consider the dynamic impact of trade liberalization on factor returns. Figure 5.17.4, Figure 5.17.5, Figure 5.17.6, and Figure 5.17.7 depict the changes in real income that might arise over time as a result of trade liberalization. We look at the following four factors in turn: (1) capital owners initially in the export industry, (2) capital owners initially in the import industry, (3) workers originally in the export industry, and (4) workers originally in the import industry. On the horizontal axis in Figure 5.17.4, we plot time, with the initial time labeled TL to indicate when trade liberalization occurs. The equilibria that arise in the short run, medium run, and long run are depicted by the vertical blue dotted lines. On the vertical axis, we plot the change in real income, with zero representing the initial preliberalization level. When the graph is above zero, it indicates an increase in real income; when the graph is below zero, it represents a decrease in real income.

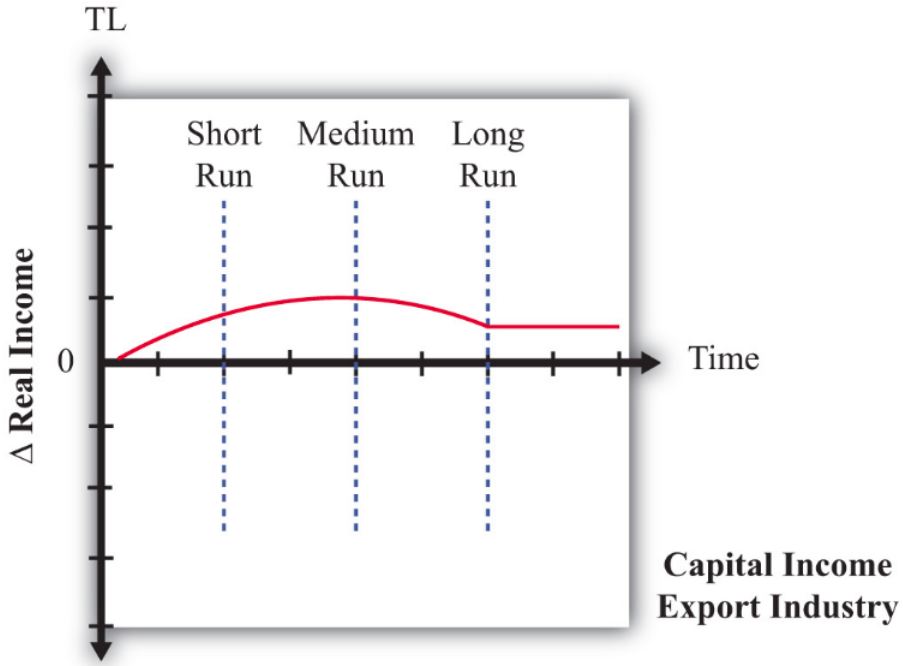


Figure 5.17.4: Dynamic Export-Capital Income Effects of Trade Liberalization

First, consider the owners of capital in the export industry before trade liberalization occurs. The series of models suggests that they will gain in the short run, gain in the medium run, and gain in the long run. However, the transition stories suggest that initial short-run gains would be followed by an increase in these gains in the medium run, but owners would suffer a reduction in their gains in the long term. The dynamic path might look like the red line depicted in Figure 5.17.4. Note that although the factor gains throughout the transition, the magnitude of its gains varies.

The models suggest that owners of capital initially in the import industry lose in the short run, will lose further in the medium run, but will ultimately gain in the long run. Its dynamic path might look like the red line in Figure 5.17.5. Since this factor experiences both gains and losses, one way to evaluate whether these factor owners are indeed better off would be to calculate the present discounted value of this stream of costs and benefits. If the period of losses is sufficiently large or lasts long enough or if the discount rate is high and the person is myopic, the present value may be negative. Otherwise, the discounted value will be positive.

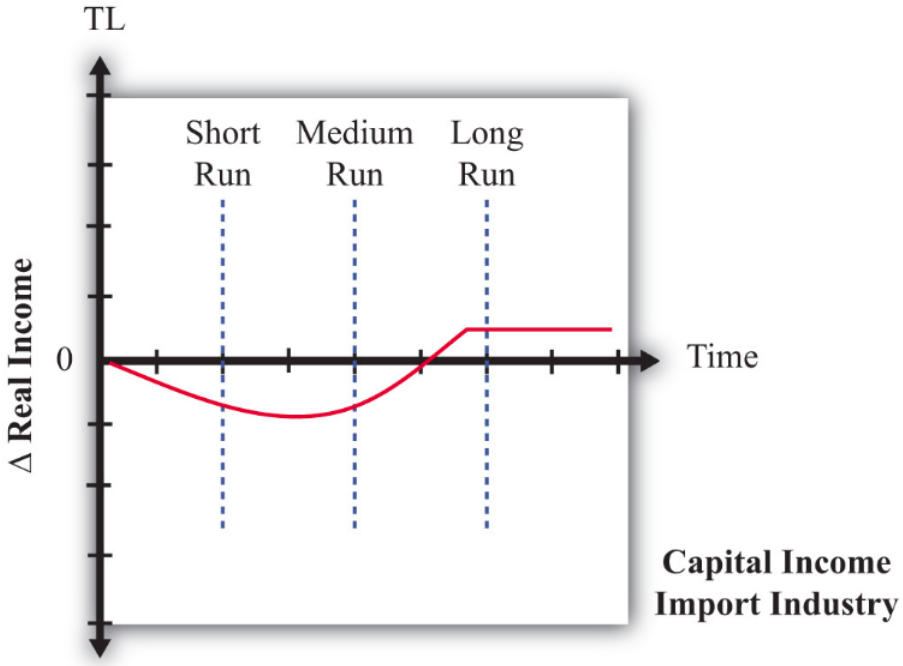


Figure 5.17.5: Dynamic Import-Capital Income Effects of Trade Liberalization

The models suggest that workers who initially work in the export industry will experience gains in real income in the short run, followed by ambiguous effects in the medium run, followed by losses in the long run. The dynamic path might look like the red line shown in Figure 5.17.6. The path is drawn such that the medium-run effect is zero, but the path could be either positive or negative at that point. The present value of this stream of benefits and costs could be positive or negative. If the short-run benefits are sufficiently large or last long enough or if the discount rate is high, then the present value would be positive. Otherwise, the present value is negative.

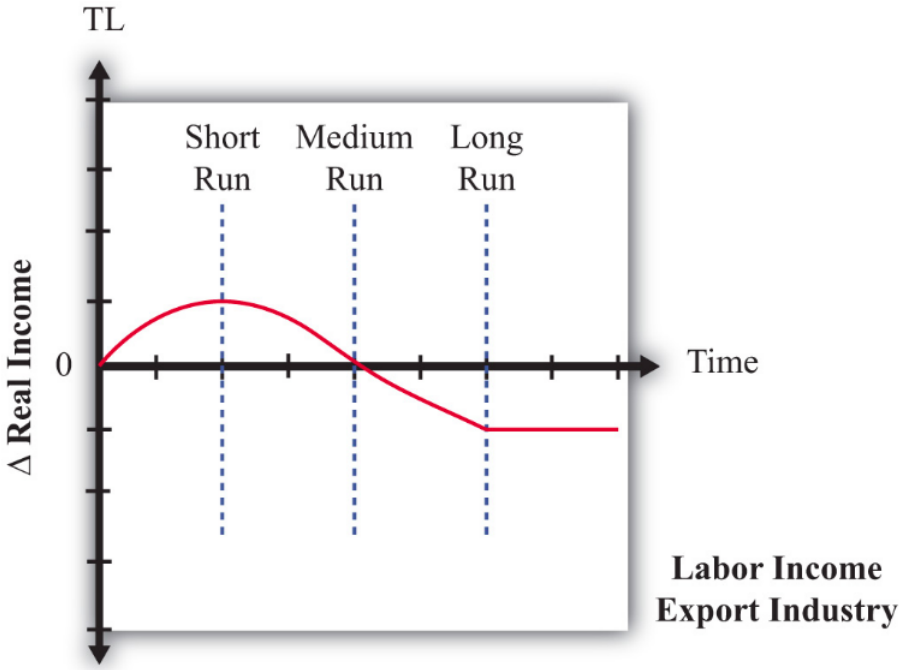


Figure 5.17.6: Dynamic Export-Labor Income Effects of Trade Liberalization

Finally, the models suggest that workers initially in the import sector will lose in the short run, experience ambiguous effects in the medium run, and ultimately lose in the long run. Its dynamic time path may look like the red line in Figure 5.17.7. We have set the medium-run effects to zero, but they conceivably could be positive or negative. The present value of this path is likely to be negative even if the factor experiences some medium-run gains.

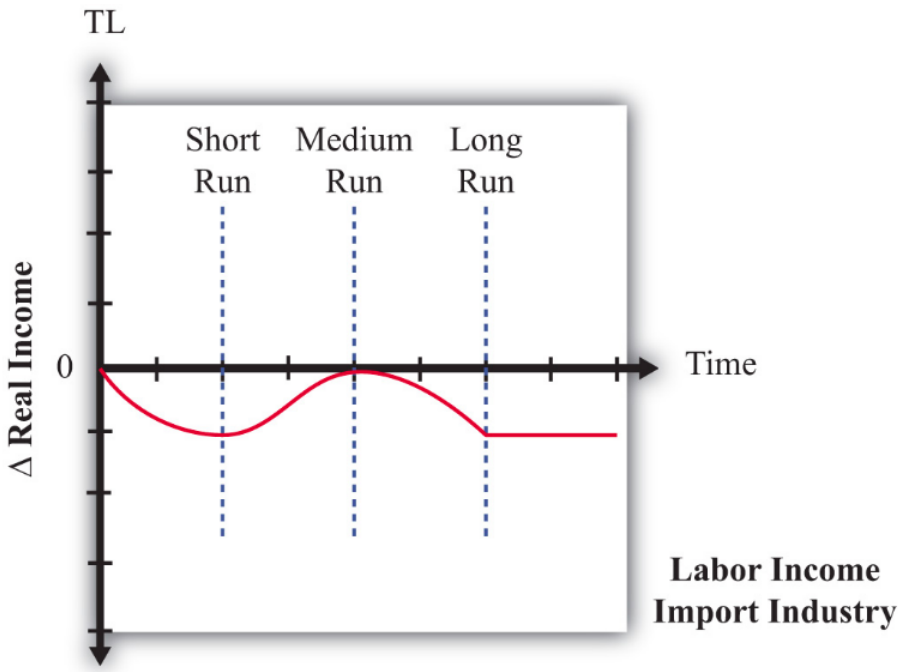


Figure 5.17.7: Dynamic Import-Labor Income Effects of Trade Liberalization

In summary, the models suggest that the effects of trade liberalization on factor income are rather complex. Some factors will benefit in the short, medium, and long run. Some will lose in all periods. However, some factors will benefit in the short run and lose in the long run, while others will lose in the short run and gain in the long run. The determinants of these paths are whether income is from a relatively abundant factor or from a relatively scarce factor and which industry the factor is employed in before the liberalization occurs.

Key Takeaways

- Three models of trade can be interpreted as representing three time frames of factor adjustment to a new equilibrium.
- The immobile factor model represents a very short-run perspective. The specific factor model represents a medium-run perspective. The H-O model represents a long-run perspective.
- By piecing together the results of the models in a dynamic adjustment story, one can demonstrate greater complexity in the effects on factor incomes as time passes after an adjustment to free trade. Most factors will experience changing real income effects as the degree of factor mobility rises over time.

? Exercise 5.17.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. Of *increase*, *decrease*, *stay the same*, or *ambiguous*, this is the effect of trade liberalization on the real income of nationally scarce workers in the import-competing industry in the long run in a dynamic model in which both factors are immobile between industries in the short run, capital is immobile in the medium run, and both factors are mobile in the long run.
   b. Of *increase*, *decrease*, *stay the same*, or *ambiguous*, this is the effect of trade liberalization on the real income of nationally abundant capital in the import-competing industry in the short run in a dynamic model in which both factors are immobile between industries in the short run, capital is immobile in the medium run, and both factors are mobile in the long run.
   c. Of *increase*, *decrease*, *stay the same*, or *ambiguous*, this is the effect of trade liberalization on the real income of nationally abundant capital in the export industry in the medium run in a dynamic model in which both factors are immobile between industries in the short run, capital is immobile in the medium run, and both factors are mobile in the long run.

d. Of *increase*, *decrease*, *stay the same*, or *ambiguous*, this is the effect of trade liberalization on the real income of nationally scarce capital in the export industry in the long run in a dynamic model in which both factors are immobile between industries in the short run, capital is immobile in the medium run, and both factors are mobile in the long run.
e. Of *increase*, *decrease*, *stay the same*, or *ambiguous*, this is the effect of trade liberalization on the real income of nationally scarce capital in the export industry in the short run in a dynamic model in which both factors are immobile between industries in the short run, capital is immobile in the medium run, and both factors are mobile in the long run.
f. Of *increase*, *decrease*, *stay the same*, or *ambiguous*, this is the effect of trade liberalization on the real income of nationally abundant labor in the export industry in the medium run in a dynamic model in which both factors are immobile between industries in the short run, capital is immobile in the medium run, and both factors are mobile in the long run.

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CHAPTER OVERVIEW

6: Economies of Scale and International Trade

One important motivation for international trade is the efficiency improvements that can arise because of the presence of economies of scale in production. Although economists wrote about these effects long ago, models of trade developed after the 1980s introduced economies of scale in creative new ways and became known as the “New Trade Theory.”

In this chapter, the barest essentials of economies of scale models are developed to explain the rationale for trade with this production feature. The chapter also presents the monopolistic competition model of trade that incorporates an obvious feature of the real world—namely, the presence of heterogeneous goods.

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6.3: Gains from Trade with Economies of Scale- A Simple Explanation
6.4: Monopolistic Competition
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6.6: The Effects of Trade in a Monopolistically Competitive Industry
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6.1: Chapter Overview 6.1: Chapter OverviewEdit Update titlecancel

Learning Objectives

1. Learn the basic rationale for economies-of-scale models with international trade.

Another major reason that international trade may take place is the existence of economies of scale (also called increasing returns to scale) in production. **Economies of scale** means that production at a larger scale (more output) can be achieved at a lower cost (i.e., with economies or savings). When production within an industry has this characteristic, specialization and trade can result in improvements in world productive efficiency and welfare benefits that accrue to all trading countries.

Trade between countries need not depend on country differences under the assumption of economies of scale. Indeed, it is conceivable that countries could be identical in all respects and yet find it advantageous to trade. For this reason, economies-of-scale models are often used to explain trade among countries like the United States, Japan, and the European Union. For the most part, these countries, and other developed countries, have similar technologies, similar endowments, and to some extent similar preferences. Using classical models of trade (e.g., Ricardian, Heckscher-Ohlin), these countries would have little reason to engage in trade. Yet trade between the developed countries makes up a significant share of world trade. Economies of scale can provide an answer for this type of trade.

Another feature of international trade that remains unexplained with classical models is the phenomenon of intraindustry trade. A quick look at the aggregate trade data reveals that many countries export and import similar products. For example, the United States imports and exports automobiles, imports and exports machine tools, imports and exports steel, and so on. To some extent, intraindustry trade arises because many different types of products are aggregated into one category. For example, many different types of steel are produced, from flat-rolled to specialty steels. It may be that production of some types of steel requires certain resources or technologies in which one country has a comparative advantage. Another country may have the comparative advantage in another type of steel. However, since all these types are generally aggregated into one export or import category, it could appear as if the countries are exporting and importing "identical" products when in actuality they are exporting one type of steel and importing another type.

Nevertheless, it is possible to explain intraindustry trade in a model that includes economies of scale and differentiated products even when there are no differences in resources or technologies across countries. This model is called the monopolistic competition model. Its focus is on consumer demand for a variety of characteristics embodied in the goods sold in a product category. In this model, advantageous trade in differentiated products can occur even when countries are very similar in their productive capacities.

Key Takeaways

- The presence of economies of scale in production represents another reason countries may trade with each other.
- Economies-of-scale models are used to explain intraindustry trade—that is, trade between countries with similar characteristics, like the United States and Canada.

Exercise 6.1.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The term used to describe when both exports and imports of a good occur in the same industry.
   b. The term used to describe production in which the unit cost falls as the size of the industry becomes larger.
   c. Models incorporating this assumption about production are used to explain trade between countries with similar characteristics.

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6.2: Economies of Scale and Returns to Scale 6.2: Economies of Scale and Returns to ScaleEdit Update titlecancel

Learning Objectives

1. Distinguish economies of scale from increasing returns to scale.

Economies of scale in production means that production at a larger scale (more output) can be achieved at a lower cost (i.e., with economies or savings). A simple way to formalize this is to assume that the unit labor requirement in the production of a good is a function of the level of output produced. In Figure 6.2.1, we present a graph of the unit labor requirement in steel production as a function of the scale (level of output) of production. At production level Q_S^1, the unit labor requirement is given by a_{LS}^1. If production were to rise to Q_S^2, then the unit labor requirement would fall to a_{LS}^2. This means that at the higher level of output, it requires less labor (i.e., fewer resources or a lower cost) per unit of output than it required at the smaller scale.

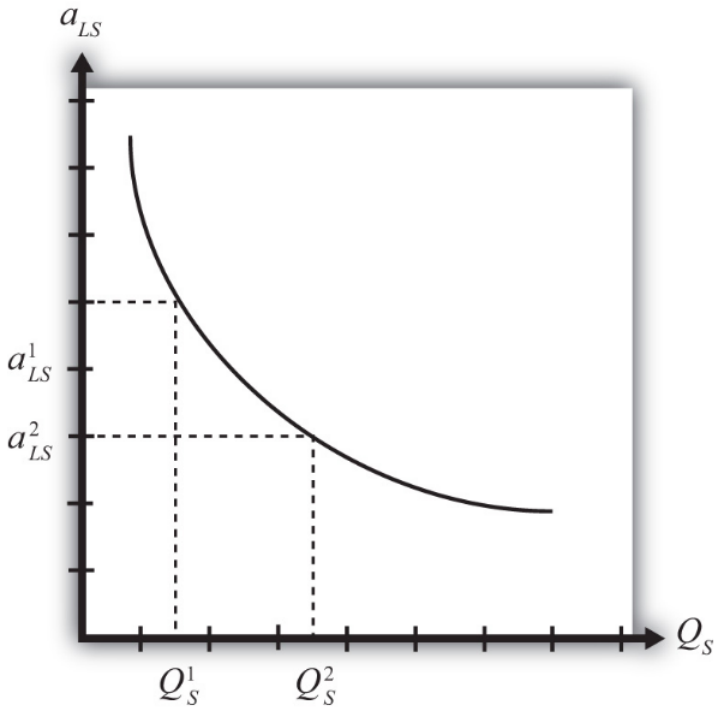


Figure 6.2.1: Unit-Labor Requirement with Economies of Scale

A secondary assumption is that the additional savings (or economies) fall as the scale increases. Graphically, this means that the slope of the curve in Figure 6.2.1 becomes less negative as the scale of production (output) rises. Economists sometimes refer to this feature by saying the function is concave to the origin; that is, it is bowed inward. The reason this assumption is made is because it seems to correspond to what is observed in the world. We expect that the degree of cost savings will be largest in the earliest stages of production, when labor division is likely to be the easiest and most effective. This assumption, although a realistic feature, is not necessary to explain trade, however.

With a simple adjustment, it is possible to show that **increasing returns to scale** in production means that an increase in resource usage by, say, *x* percent results in an increase in output by more than *x* percent. In Figure 6.2.2, we plot labor productivity in steel production when production exhibits increasing returns to scale. This curve is derived by plotting the reciprocal of the unit labor requirement (i.e., $1/a_{LS}$) for each output level in Figure 6.2.2.

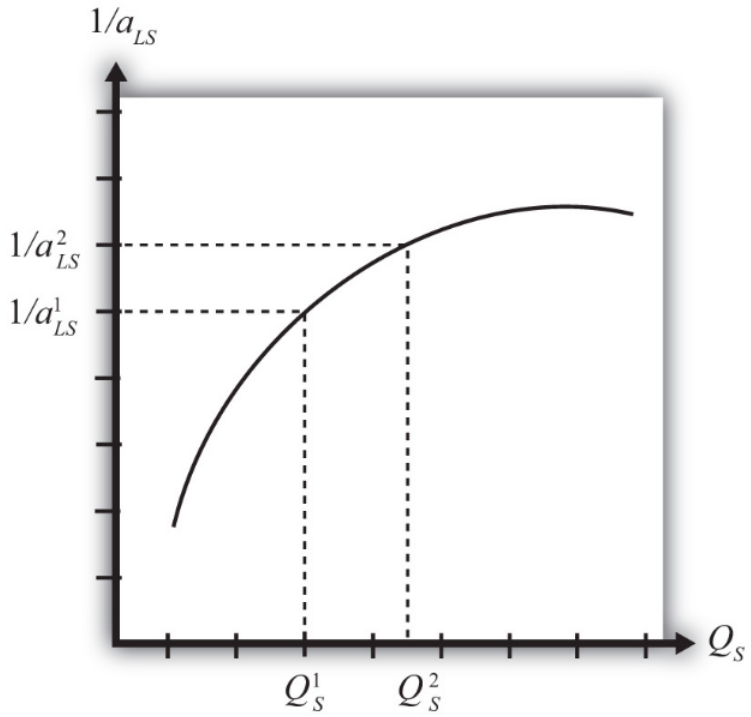


Figure 6.2.2: Productivity with Increasing Returns to Scale

Note that as output (scale) increases from Q^1_S to Q^2_S, labor productivity (given by the reciprocal of the unit labor requirement) also rises. In other words, output per unit of labor input increases as the scale of production rises, hence increasing returns to scale.

Another way to characterize economies of scale is with a decreasing average cost curve. Average costs, AC, are calculated as the total costs to produce output Q, $TC(Q)$, divided by total output. Thus $AC(Q) = TC(Q)/Q$. When average costs decline as output increases, it means that it becomes cheaper to produce the average unit as the scale of production rises, hence resulting in economies of scale.

Economies of scale are most likely to be found in industries with large fixed costs in production. Fixed costs are those costs that must be incurred even if production were to drop to zero. For example, fixed costs arise when large amounts of capital equipment must be put into place even if only one unit is to be produced and if the costs of this equipment must still be paid even with zero output. In this case, the larger the output, the more the costs of this equipment can be spread out among more units of the good. Large fixed costs and hence economies of scale are prevalent in highly capital-intensive industries such as chemicals, petroleum, steel, automobiles, and so on.

Economies of Scale and Perfect Competition

It is worth noting that the assumption of economies of scale in production can represent a deviation from the assumption of perfectly competitive markets. In most perfectly competitive models, it is assumed that production takes place with constant returns to scale (i.e., no economies). This means that the unit cost of production remains constant as the scale of production increases. When that assumption is changed, it can open up the possibility of positive profits and strategic behavior among firms. Because there are numerous ways to conceive of strategic interactions between firms, there are also numerous models and results that could be obtained. To avoid some of these problems, a number of models have been developed that retain some of the key features of perfect competition while allowing for the presence of economies of scale as well.

Key Takeaways

- Economies of scale refers to the feature of many production processes in which the per-unit cost of producing a product falls as the scale of production rises.
- Increasing returns to scale refers to the feature of many production processes in which productivity per unit of labor rises as the scale of production rises.

- The introduction of economies of scale in production in a model is a deviation from perfect competition when positive economic profits are allowed to prevail.

? Exercise 6.2.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The term used to describe rising productivity in an industry as the scale of production increases.
   b. The assumption about scale economies normally made in perfect competition.
   c. The term used to describe total production costs per unit of output.
   d. The assumption made about scale economies if a 10 percent increase in factor inputs causes a 10 percent increase in output.
   e. The assumption made about scale economies if a 10 percent increase in factor inputs causes a 20 percent increase in output.

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6.3: Gains from Trade with Economies of Scale- A Simple Explanation 6.3: Gains from Trade with Economies of Scale- A Simple ExplanationEdit Update titlecancel

Learning Objectives

1. Learn how a simple model can show the gains from trade when production involves economies of scale.

The main reason the presence of economies of scale can generate trade gains is because the reallocation of resources can raise world productive efficiency. To see how, we present a simple example using a model similar to the Ricardian model.

Basic Assumptions

Suppose there are two countries, the United States and France, producing two goods, clothing and steel, using one factor of production, labor. Assume the production technology is identical in both countries and can be described with the production functions in Table 6.3.1.

Table 6.3.1: Production of Clothing

United States	France
$Q_C = \frac{L_C\,[hrs]}{a_{LC}\,\left[\frac{hrs}{rack}\right]}$	$Q_C^* = \frac{L_C^*}{a_{LC}}$

where

- Q_C = quantity of clothing produced in the United States
- L_C = amount of labor applied to clothing production in the United States
- a_{LC} = unit labor requirement in clothing production in the United States and France (hours of labor necessary to produce one rack of clothing)
- * All starred variables are defined in the same way but refer to the production process in France.

Note that since production technology is assumed to be the same in both countries, we use the same unit labor requirement in the U.S. and French production functions.

Production of steel. The production of steel is assumed to exhibit economies of scale in production (see Table 6.3.2).

Table 6.3.2: Production of Steel

United States	France
$Q_S = \frac{L_S\,[hrs]}{a_{LS}(Q_S)\,\left[\frac{hrs}{ton}\right]}$	$Q_S^* = \frac{L_S^*}{a_{LS}(Q_S^*)}$

where

- Q_S = quantity of steel produced in the United States
- L_S = amount of labor applied to steel production in the United States
- $a_{LS}(Q_S)$ = unit labor requirement in steel production in the United States (hours of labor necessary to produce one ton of steel)
- * All starred variables are defined in the same way but refer to the production process in France.

Note that it is assumed that the unit labor requirement is a function of the level of steel output in the domestic industry. More specifically, we will assume that the unit labor requirement falls as industry output rises.

Resource constraint. The production decision is how to allocate labor between the two industries. We assume that labor is homogeneous and freely mobile between industries. The labor constraints are given in Table 6.3.3.

Table 6.3.3: Labor Constraints

United States	France
$L_C + L_W = L$	$L_C^* + L_W^* = L^*$

where L = labor endowment

When the resource constraint holds with equality, it implies that the resource is fully employed.

Demand. We will assume that the United States and France have identical demands for the two products.

A Numerical Example

We proceed much as David Ricardo did in presenting the argument of the gains from specialization in one's comparative advantage good. First, we will construct an autarky equilibrium in this model assuming that the two countries are identical in every respect. Then we will show how an improvement in world productive efficiency can arise if one of the two countries produces all the steel that is demanded in the world.

Suppose the exogenous variables in the two countries take the values in Table 6.3.4.

Table 6.3.4: Initial Exogenous Variable Values

United States	$a_{LC} = 1$	$L = 100$
France	$a^*_{LC} = 1$	$L^* = 100$

Let the unit labor requirement for steel vary as shown in Figure 6.3.1. The graph shows that when fifty tons of steel are produced by the economy, the unit labor requirement is one hour of labor per ton of steel. However, when 120 tons of steel are produced, the unit labor requirement falls to half an hour of labor per ton of steel.

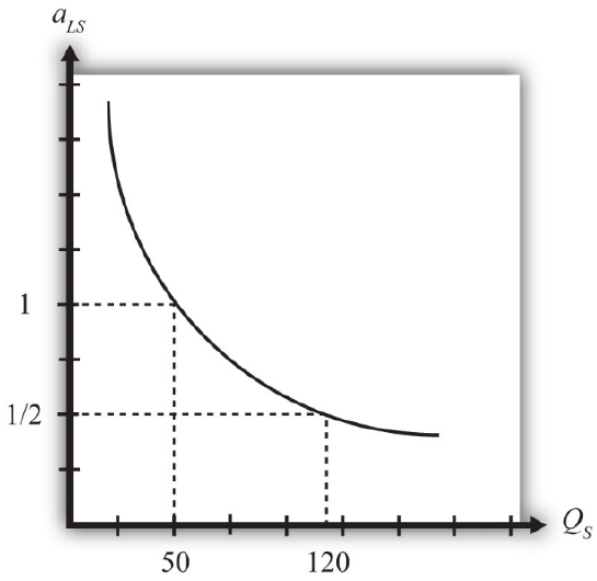


Figure 6.3.1: Economies of Scale- Numerical Example

An Autarky Equilibrium

The United States and France, assumed to be identical in all respects, will share identical autarky equilibria. Suppose the equilibria are such that production of steel in each country is fifty tons. Since at fifty tons of output, the unit labor requirement is one, it means that the total amount of labor used in steel production is fifty hours. That leaves fifty hours of labor to be allocated to the production of clothing. The production of clothing has a unit labor requirement of one also, meaning that the total output of clothing is fifty racks. The autarky production and consumption levels are summarized in Table 6.3.5.

Table 6.3.5: Autarky Production/Consumption

	Clothing (Racks)	Steel (Tons)
United States	50	50
France	50	50
World Total	100	100

The problem with these initial autarky equilibria is that because demands and supplies are identical in the two countries, the prices of the goods would also be identical. With identical prices, there would be no incentive to trade if trade suddenly became free between the two countries.

Gains from Specialization

Despite the lack of incentive to trade in the original autarky equilibria, we can show, nevertheless, that trade could be advantageous for both countries. All that is necessary is for one of the two countries to produce its good with economies of scale and let the other country specialize in the other good.

For example, suppose we let France produce 120 tons of steel. This is greater than the 100 tons of world output of steel in the autarky equilibria. Since the unit labor requirement of steel is one-half when 120 tons of steel are produced by one country, the total labor can be found by plugging these numbers into the production function. That is, since $Q_S^* = L_S^*/a_{LS}^*$, $Q_S^* = 120$ and $a_{LS}^* = 1/2$, it must be that $L_S^* = 60$. In autarky, it took 100 hours of labor for two countries to produce 100 tons of steel. Now it would take France 60 hours to produce 120 tons. That means more output with less labor.

If France allocates its remaining forty hours of labor to clothing production and if the United States specializes in clothing production, then production levels in each country and world totals after the reallocation of labor would be as shown in Table 6.3.6.

Table 6.3.6: Reallocated Production

	Clothing (Racks)	Steel (Tons)
United States	100	0
France	40	120
World Total	140	120

The important result here is that it is possible to find a reallocation of labor across industries and countries such that world output of both goods rises. Or in other words, there is an increase in world productive efficiency.

If output of both goods rises, then surely it must be possible to find a terms of trade such that both countries would gain from trade. For example, if France were to export sixty tons of steel and import thirty racks of clothing, then each country would consume seventy units of clothing (twenty more than in autarky) and sixty tons of steel (ten more than in autarky).

The final conclusion of this numerical example is that when there are economies of scale in production, then free trade, after an appropriate reallocation of labor, can improve national welfare for both countries relative to autarky. The welfare improvement arises because concentrating production in the economies-of-scale industry in one country allows one to take advantage of the productive efficiency improvements.

Some Noteworthy Features

Some features of the economies-of-scale model make it very different from the other models of trade, such as the Ricardian or Heckscher-Ohlin models. For example, it is possible to show that countries that are identical in every respect might nevertheless find it advantageous to trade. Thus it is not always differences between countries that stimulate trade. In this case, it is a feature of the production process (i.e., economies of scale) that makes trade gains possible.

Second, this economies-of-scale model cannot predict which country would export which good. It doesn't matter which country produces all the economies-of-scale good. As long as one country does so and trades it with the rest of the world, trade gains are possible. Also, it may not matter whether your country ends up producing the economies-of-scale good or not because both countries will realize the benefits as long as an appropriate terms of trade arises.

Despite these differences with other models, the main similarity is that gains from trade arise because of an improvement in productive efficiency. By reallocating resources between industries within countries, it is possible to produce more output with the same amount of resources. This remains the prime motivation in support of free trade.

Key Takeaways

- By shifting production in one country to production of the good that exhibits economies of scale and shifting production toward the other good in the other country, it is possible to raise total output in the world with the same total resources.

- Countries that are identical in every respect can benefit from trade in the presence of economies of scale.
- Countries that are identical would have no natural incentive to trade because there would be no price differences between countries.
- A simple economies-of-scale model does not predict which country would export which good.

? Exercise 6.3.1

1. Suppose there are two countries with the same production technologies. Let labor productivity in butter production be ten pounds per hour at all levels of output and productivity in gun production be one-half of a gun per hour when gun production is less than ten and two-thirds of a gun per hour when production is ten or more. Suppose each country has fifty hours of labor and in autarky produces eight guns.

a. Calculate how many pounds of butter each country produces in autarky.
b. What is the total world output of guns and butter in autarky?

Next, suppose Country A produces all the guns in the world while Country B specializes in butter production.

c. Calculate the quantity of butter produced by Country A and Country B.
d. What is total world output of guns and butter now?
e. Identify a terms of trade (guns for butter) that will assure that each country is at least as well off after trade as before.

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6.4: Monopolistic Competition 6.4: Monopolistic CompetitionEdit Update titlecancel

Learning Objectives

1. Identify the basic features of a monopolistic competition model.

Monopolistic competition refers to a market structure that is a cross between the two extremes of perfect competition and monopoly. The model allows for the presence of increasing returns to scale in production and for differentiated (rather than homogeneous or identical) products. However, the model retains many features of perfect competition, such as the presence of many, many firms in the industry and the idea that free entry and exit of firms in response to profit would eliminate economic profit among the firms. As a result, the model offers a somewhat more realistic depiction of many common economic markets. The model best describes markets in which numerous firms supply products that are each slightly different from that supplied by its competitors. Examples include automobiles, toothpaste, furnaces, restaurant meals, motion pictures, romance novels, wine, beer, cheese, shaving cream, and much more.

The model is especially useful in explaining the motivation for **intraindustry trade**—that is, trade between countries that occurs within an industry rather than across industries. In other words, the model can explain why some countries export *and* import automobiles simultaneously. This type of trade, although frequently measured, is not readily explained in the context of the Ricardian or Heckscher-Ohlin models of trade. In those models, a country might export wine and import cheese, but it would never export and import wine at the same time.

The model demonstrates not only that intraindustry trade may arise but also that national welfare can be improved as a result of international trade. One reason for the improvement in welfare is that individual firms produce larger quantities, which, because of economies of scale in production, leads to a reduction in unit production costs. This means there is an improvement in productive efficiency. The second reason welfare improves is that consumers are able to choose from a greater variety of available products with trade as opposed to autarky.

Key Takeaways

- A monopolistic competition market represents a cross between a monopoly market and a perfectly competitive market.
- Intraindustry trade refers to trade within a particular industry. An example is a country that both exports and imports cars.
- A monopolistic competition model can explain why intraindustry trade may occur between countries.

Exercise 6.4.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The type of market structure that mixes assumptions from perfect competition with assumptions from monopoly models.
   b. The term used to describe two-way trade in identical or similar products.
   c. The term used to describe nonhomogeneous goods produced by different firms within the same industry.

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6.5: Model Assumptions: Monopolistic Competition 6.5: Model Assumptions: Monopolistic CompetitionEdit Update titlecancel

Learning Objectives

1. Compare the assumptions of a monopolistic competition model with monopoly and perfect competition assumptions.

A monopolistically competitive market has features that represent a cross between a perfectly competitive market and a monopolistic market (hence the name). The following are some of the main assumptions of the model:

1. Many, many firms produce in a monopolistically competitive industry. This assumption is similar to that found in a model of perfect competition.
2. Each firm produces a product that is differentiated (i.e., different in character) from all other products produced by the other firms in the industry. Thus one firm might produce a red toothpaste with a spearmint taste, and another might produce a white toothpaste with a wintergreen taste. This assumption is similar to a monopoly market that produces a unique (or highly differentiated) product.
3. The differentiated products are imperfectly substitutable in consumption. This means that if the price of one good were to rise, some consumers would switch their purchases to another product within the industry. From the perspective of a firm in the industry, it would face a downward-sloping demand curve for its product, but the position of the demand curve would depend on the characteristics and prices of the other substitutable products produced by other firms. This assumption is intermediate between the perfectly competitive assumption in which goods are perfectly substitutable and the assumption in a monopoly market in which no substitution is possible.

   Consumer demand for differentiated products is sometimes described using two distinct approaches: the love-of-variety approach and the ideal variety approach. The love-of-variety approach assumes that each consumer has a demand for multiple varieties of a product over time. A good example of this would be restaurant meals. Most consumers who eat out frequently will also switch between restaurants, one day eating at a Chinese restaurant, another day at a Mexican restaurant, and so on. If all consumers share the same love of variety, then the aggregate market will sustain demand for many varieties of goods simultaneously. If a utility function is specified that incorporates a love of variety, then the well-being of any consumer is greater the larger the number of varieties of goods available. Thus the consumers would prefer to have twenty varieties to choose from rather than ten.

   The ideal variety approach assumes that each product consists of a collection of different characteristics. For example, each automobile has a different color, interior and exterior design, engine features, and so on. Each consumer is assumed to have different preferences over these characteristics. Since the final product consists of a composite of these characteristics, the consumer chooses a product closest to his or her ideal variety subject to the price of the good. In the aggregate, as long as consumers have different ideal varieties, the market will sustain multiple firms selling similar products. Therefore, depending on the type of consumer demand for the market, one can describe the monopolistic competition model as having consumers with heterogeneous demand (ideal variety) or homogeneous demand (love of variety).

4. There is free entry and exit of firms in response to profits in the industry. Thus firms making positive economic profits act as a signal to others to open up similar firms producing similar products. If firms are losing money (making negative economic profits), then, one by one, firms will drop out of the industry. Entry or exit affects the aggregate supply of the product in the market and forces economic profit to zero for each firm in the industry in the long run. (Note that the long run is defined as the period of time necessary to drive the economic profit to zero.) This assumption is identical to the free entry and exit assumption in a perfectly competitive market.
5. There are economies of scale in production (internal to the firm). This is incorporated as a downward-sloping average cost curve. If average costs fall when firm output increases, it means that the per-unit cost falls with an increase in the scale of production. Since monopoly markets can arise when there are large fixed costs in production and since fixed costs result in declining average costs, the assumption of economies of scale is similar to a monopoly market.

These main assumptions of the monopolistically competitive market show that the market is intermediate between a purely competitive market and a purely monopolistic market. The analysis of trade proceeds using a standard depiction of equilibrium in a monopoly market. However, the results are reinterpreted in light of these assumptions. Also, it is worth mentioning that this model

is a partial equilibrium model since there is only one industry described and there is no interaction across markets based on an aggregate resource constraint.

Key Takeaways

- The monopolistic competition assumptions of many firms, free entry and exit, and imperfect substitutability between products are most similar to a perfectly competitive market.
- The monopolistic competition assumptions of differentiated products, economies of scale, and imperfect substitutability between products are most similar to a monopoly market.

Exercise 6.5.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The demand assumption in which each consumer has a demand for multiple varieties of a product over time.
   b. The demand assumption in which each consumer has a demand for different sets of characteristics of a particular product type.
   c. This is a standard perfect competition assumption indicating what new firms do in response to positive profit in an industry.
   d. This is a standard perfect competition assumption indicating what existing firms do in response to negative profit in an industry.
   e. The production feature that is present when a firm's average cost curve is downward sloping.
   f. Of *many* or *few*, this is the assumption made about the number of firms in a monopolistically competitive industry.
   g. The long-run value of firm profit in a monopolistically competitive industry.

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6.6: The Effects of Trade in a Monopolistically Competitive Industry 6.6: The Effects of Trade in a Monopolistically Competitive IndustryEdit Update titlecancel

Learning Objectives

1. Use a monopoly diagram for a representative monopolistically competitive firm to depict a long-run equilibrium.
2. Understand how the market equilibrium changes upon opening to free trade.

Assume that there are two countries, each with a monopolistically competitive industry producing a differentiated product. Suppose initially that the two countries are in autarky. For convenience, we will assume that the firms in the industry are symmetric relative to the other firms in the industry. Symmetry implies that each firm has the same average and marginal cost functions and that the demand curves for every firm's product are identical, although we still imagine that each firm produces a product that is differentiated from all others. (Note that the assumptions about symmetry are made merely for tractability. It is much simpler to conceive of the model results when we assume that all firms are the same in their essential characteristics. However, it seems likely that these results would still be obtained even if firms were asymmetric.)

In Figure 6.6.1, we depict a market equilibrium for a representative firm in the domestic industry. The firm faces a downward-sloping demand curve (D_1) for its product and maximizes profit by choosing that quantity of output such that marginal revenue (MR_1) is equal to marginal cost (MC). This occurs at output level Q_1 for the representative firm. The firm chooses the price for its product, P_1, that will clear the market. Notice that the average cost curve (AC) is just tangent to the demand curve at output Q_1. This means that the unit cost at Q_1 is equal to the price per unit—that is, $P_1 = AC(Q_1)$, which implies that profit is zero. Thus the firm is in a long-run equilibrium since entry or exit has driven profits to zero.

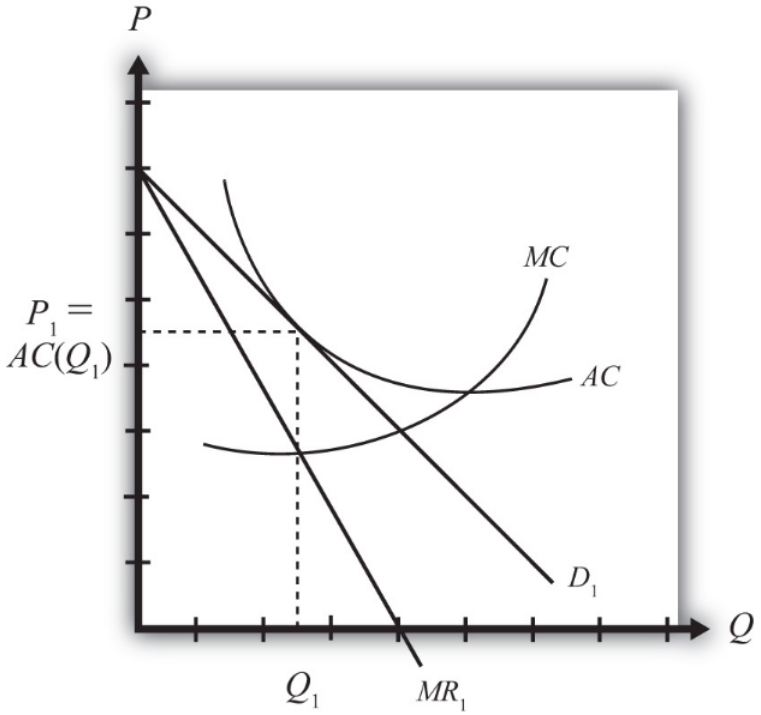


Figure 6.6.1: Firm Equilibrium in Monopolistic Competition

Keep in mind that this is the equilibrium for just one of many similar firms producing in the industry. Also imagine that the foreign market (which is also closed to trade) has a collection of firms that are also in a long-run equilibrium initially.

Next, suppose whatever barriers to trade that had previously existed are suddenly and immediately removed—that is, suppose the countries move from autarky to free trade. The changes that ultimately arise will be initiated by the behavior of consumers in the market. Recall that market demand can be described using a love-of-variety approach or an ideal variety approach.

In the love-of-variety approach, the removal of trade barriers will increase the number of varieties consumers have to choose from. Since consumer welfare rises as the number of varieties increases, domestic consumers will shift some of their demand toward foreign varieties, while foreign consumers will shift some of their demand toward domestic varieties.

In the ideal variety approach, some domestic consumers will likely discover a more ideal variety produced by a foreign firm. Similarly, some foreign consumers will find a more ideal variety produced by a domestic firm.

In either case, domestic demand by domestic consumers will fall, while domestic demand by foreign consumers will rise. Similarly, foreign demand by foreign consumers will fall, while foreign demand by domestic consumers will rise. Note that this is true even if all the prices of all the goods in both countries are initially identical. In terms of Figure 6.6.1, trade will cause the demand curve of a representative firm to shift out because of the increase in foreign demand but will cause the demand curve to shift back in because of the reduction in domestic demand. Since these two effects push the demand curve in opposite directions, the final effect will depend on the relative sizes of these effects.

Regardless of the size of these effects, the removal of trade barriers would cause intraindustry trade to arise. Each country would become an exporter and an importer of differentiated products that would be classified in the same industry. Thus the country would export and import automobiles, toothpaste, clothing, and so on. The main cause of this result is the assumption that consumers, in the aggregate at least, have a demand for variety.

However, two effects can be used to isolate the final equilibrium after trade is opened. First, the increase in the number of varieties available to consumers implies that each firm's demand curve will become more elastic (or flatter). The reason is that consumers become more price sensitive. Since there are more varieties to choose from, a $1 increase in price of one variety will now lead more consumers to switch to an alternative brand (since there are more close substitutes available), and this will result in a larger decrease in demand for the original product. Second, free entry and exit of firms in response to profits will lead to a zero-profit equilibrium for all remaining firms in the industry.

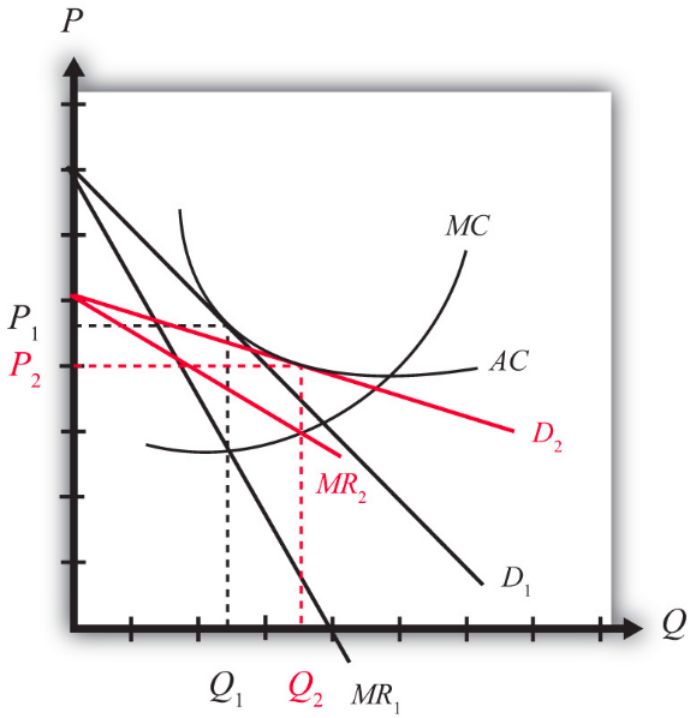


Figure 6.6.2: Firm Equilibrium Before and After Trade

The final equilibrium for the representative firm is shown in Figure 6.6.2. Keep in mind that these same effects are occurring for every other firm in the industry, both domestically and in the foreign country. The demand curve shifts from D_1 to D_2 and the marginal revenue from MR_1 to MR_2 as a result of trade. The firm's cost curves remain the same. Entry or exit of firms causes the final demand curve to be tangent to the firm's average cost curve, but since the demand curve is more elastic (or flatter), the tangency occurs down and to the right of the autarky intersection. In the end, firm output rises from Q_1 to Q_2 and the price charged in the market falls from P_1 to P_2. Although individual firm output rises for each firm, we cannot tell in this model setup whether

industry output has risen. In the adjustment to the long-run zero-profit equilibrium, entry (or more likely exit) of firms would occur. If some firms exit, then it remains uncertain whether fewer firms, each producing more output, would raise or lower industry output.

Key Takeaways

- A market equilibrium for a representative firm in a monopolistically competitive (MC) market displays an output level such that $MR = MC$ and establishes a price such that $P = AC$.
- When trade opens up between two countries that have MC markets, the consumer demand for variety inspires trade.
- Trade in an MC market increases the total number of varieties available to each consumer and causes market demand for each product to become more elastic.
- The free trade equilibrium in an MC market results in a higher quantity produced for each firm and a lower market price than before trade.

? Exercise 6.6.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The type of cost derived by dividing total cost by total output.
   b. The type of market demand (elastic or inelastic) that would arise if demand were very responsive to changes in the price.
   c. This is the relationship between the demand curve and the average cost curve in equilibrium in a monopolistically competitive market.
   d. The position along the average cost curve where the marginal cost curve intersects in a monopolistically competitive market.
   e. This is the relationship between the market price and the average cost in equilibrium in a monopolistically competitive market.
   f. The profit-maximizing condition in a monopolistically competitive market.
   g. Of *increase*, *decrease*, or *stay the same*, this is the effect of international trade on the output of a representative firm in a monopolistically competitive industry.
   h. Of *increase*, *decrease*, or *stay the same*, this is the effect of international trade on the output price of a representative firm in a monopolistically competitive industry.

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6.7: The Costs and Benefits of Free Trade Under Monopolistic Competition 6.7: The Costs and Benefits of Free Trade Under Monopolistic CompetitionEdit Update titlecancel

Learning Objectives

1. Identify the reasons why consumers gain from trade in a monopolistically competitive market.
2. Understand that the movement to free trade in a monopolistically competitive market may cause losses to some individuals under more realistic assumptions.

The Benefits of Free Trade

Welfare of individual consumers who purchase the representative product will be enhanced for three main reasons. First, trade increases the number of varieties of products for consumers to choose from. Second, free trade reduces the price of every variety sold in the market. Third, free trade may increase the supply of products in other markets and result in lower prices for those products.

1. If the product is such that an individual consumer seeks to purchase a product closest to her ideal variety, then presumably with more varieties available, more consumers will be able to purchase more products closer to their ideal. For these consumers welfare will be improved. Other consumers, however, may not be affected by the increase in varieties. If, for example, the new varieties that become available are all more distant from one's ideal than the product purchased in autarky, then one would continue to purchase the same product in free trade. In this case, the increase in variety does not benefit the consumer.

   If the product is one in which consumers purchase many different varieties over time (love of variety), then because trade will increase the number of varieties available to each consumer, trade will improve every consumer's welfare. Of course, this is based on the assumption that every consumer prefers more varieties to less. Thus regardless of whether the product is characterized by the ideal variety or the love-of-variety approach, free trade, by increasing the number of varieties, will increase aggregate consumer welfare.

2. The second effect of trade for consumers is that the price of all varieties of the product will fall. The prices fall because trade allows a firm to produce further down its average cost curve, which means that it lowers its per-unit cost of production. This implies that each product is being produced more efficiently. Competition in the industry, in turn, forces profit to zero for each firm, which implies that the efficiency improvements are passed along to consumers in the form of lower prices.
3. Finally, the improvement in productive efficiency for each firm may lead to a reduction in the use of resources in the industry. This effect would occur if industry output falls or if output does not rise too much. Although the use of resources per unit produced falls, total output by each firm rises. Thus it is uncertain whether an individual firm would have to lay off workers and capital or whether it would need to hire more. However, even if it hired more, the possibility that some firms would drop out of business in the adjustment to the long-run equilibrium might mean that industry resource usage falls. If resource usage does fall and capital and labor are laid off, then in a general equilibrium system (which has not been explicitly modeled here), these resources would be moved into other industries. Production in those industries would rise, leading to a reduction in the prices of those products. Thus free trade in the monopolistically competitive industry can lead to a reduction in prices of completely unrelated industries.

The Costs of Free Trade

There are two potential costs of free trade in this model. The first involves the potential costs of adjustment in the industry. The second involves the possibility that more varieties will increase transaction costs. Each cost requires modification of the basic assumptions of the model in a way that conforms more closely with the real world. However, since these assumption changes are not formally included in the model, the results are subject to interpretation.

1. The movement to free trade requires adjustment in the industry in both countries. Although firm output rises, productive efficiency rises as well. Thus it is possible that each firm will need to lay off resources—labor and capital—in moving to free trade. Even if each firm did not reduce resources, it is possible (indeed likely) that some firms will be pushed out of business in moving to the long-run free trade equilibrium. It is impossible to identify which country's firms would close; however, it is likely to be those firms that lose more domestic customers than they gain in foreign customers or firms that are unable or

unwilling to adjust the characteristics of their product to serve the international market rather than the domestic market alone. For firms that close, all the capital and labor employed will likely suffer through an adjustment process. The costs would involve the opportunity cost of lost production, unemployment compensation costs, search costs associated with finding new jobs, emotional costs of being unemployed, costs of moving, and so on. Eventually, these resources are likely to be reemployed in other industries. The standard model assumption is that this transition occurs immediately and without costs. In reality, however, the adjustment process is likely to be harmful to some groups of individuals.

2. A second potential cost of free trade arises if one questions the assumption that more variety is always preferred by consumers. Consider for a moment a product in which consumers seek their ideal variety. A standard (implicit) assumption in this model is that consumers have perfect information about the prices and characteristics of the products they consider buying. In reality, however, consumers must spend time and money to learn about the products available in a market. For example, when a consumer considers the purchase of an automobile, part of the process involves a search for information. One might visit dealerships and test-drive selected cars, purchase magazines that offer evaluations, or talk to friends about their experiences with different automobiles. All these activities involve expending resources—time and money—and thus represent what we could call a "transactions cost" to the consumer.

Before we argued that because trade increases the number of varieties available to each consumer, each consumer is more likely to find a product that is closer to his or her ideal variety. In this way, more varieties may increase aggregate welfare. However, the increase in the number of varieties also increases the cost of searching for one's ideal variety. More time will now be needed to make a careful evaluation. One could reduce these transaction costs by choosing to evaluate only a sample of the available products. However, in this case, a psychological cost might also arise because of the inherent uncertainty about whether the best possible choice was indeed made. Thus, welfare would be diminished among consumers to the extent that there are increased transaction costs because of the increase in the number of varieties to evaluate.

The Net Welfare Effects of Trade

The welfare effects under the basic assumptions of the model are entirely positive. Improvements in productive efficiency arise as firms produce further down along their average cost curves in free trade. Consumption efficiency is raised because consumers are able to buy the products at lower prices and have a greater variety to choose from.

Potential costs arise in the model only if we introduce the additional assumptions of adjustment costs or transactions costs. The net welfare effect in the presence of adjustment and transactions costs will still be positive if the production and consumption efficiency effects are larger.

Key Takeaways

- Consumers benefit from trade in a monopolistically competitive (MC) market because they can consume a greater variety of goods at a lower price.
- Free trade in an MC market may also lower the prices of products in other markets if reduced resource usage results in a shift to other industries causing an increase in supply and thereby a lower price.
- Because some firms may close when an MC market moves to free trade, some of those resources may suffer costs of adjustment.
- Consumer transaction costs to identify the most ideal variety may rise with an increase in the number of varieties available in free trade.

? Exercise 6.7.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. Of *increase*, *decrease*, or *stay the same*, this is the effect of international trade on the number of varieties of a good available to consumers in a monopolistically competitive market.
   b. Of *increase*, *decrease*, or *stay the same*, this is the effect of international trade on the price of a good available to consumers in a monopolistically competitive market.
   c. Of *increase*, *decrease*, or *stay the same*, this is the effect of international trade on productive efficiency of firms remaining in business in a monopolistically competitive market.
   d. The two costs associated with adjustment to a trading equilibrium in a monopolistically competitive market.

e. Of *positive*, *negative*, or *the same*, this is the net welfare effect of international trade in a monopolistically competitive market under the standard assumptions.

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CHAPTER OVERVIEW

7: Trade Policy Effects with Perfectly Competitive Markets

Governments have long intervened in international trade by collecting taxes, or tariffs, on imported goods. Tariffs have a long history since they are one of the easiest ways for governments to collect revenue. However, tariffs have a number of other effects besides generating government revenue; they also affect the success of business and the well-being of consumers. And because tariffs affect the volume of trade between countries, they also affect businesses and consumers abroad.

This chapter examines, in detail, the effects of a tariff. However, it also examines the impacts of the many other types of trade policies that governments have applied historically, including import quotas, export quotas, export taxes, and export subsidies.

The effects are considered under one set of standard assumptions—namely, in the case when markets are perfectly competitive.

7.1: Basic Assumptions of the Partial Equilibrium Model
7.2: Depicting a Free Trade Equilibrium- Large and Small Country Cases
7.3: The Welfare Effects of Trade Policies- Partial Equilibrium
7.4: Import Tariffs - Large Country Price Effects
7.5: Import Tariffs- Large Country Welfare Effects
7.6: The Optimal Tariff
7.7: Import Tariffs- Small Country Price Effects
7.8: Import Tariffs- Small Country Welfare Effects
7.9: Retaliation and Trade Wars
7.10: Import Quotas- Large Country Price Effects
7.11: Administration of an Import Quota
7.12: Import Quota- Large Country Welfare Effects
7.13: Import Quota- Small Country Price Effects
7.14: Import Quota- Small Country Welfare Effects
7.15: The Choice between Import Tariffs and Quotas
7.16: Export Subsidies: Large Country Price Effects
7.17: Export Subsidies: Large Country Welfare Effects
7.18: Countervailing Duties
7.19: Voluntary Export Restraints (VERs): Large Country Price Effects
7.20: Administration of a Voluntary Export Restraint
7.21: Voluntary Export Restraints: Large Country Welfare Effects
7.22: Export Taxes- Large Country Price Effects
7.23: Export Taxes- Large Country Welfare Effects

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7.1: Basic Assumptions of the Partial Equilibrium Model 7.1: Basic Assumptions of the Partial Equilibrium ModelEdit Update titlecancel

Learning Objectives

1. Identify the basic assumptions of a simple partial equilibrium trade model.

This section analyzes the price and welfare effects of trade policies using a partial equilibrium model under the assumption that markets are perfectly competitive.

1. Assume there are two countries, the United States and Mexico. The analysis can be generalized by assuming one of the countries is the rest of the world.
2. Each country has producers and consumers of a tradable good, wheat. The analysis can be generalized by considering broad classes of products, like manufactured goods, or services.
3. Wheat is a homogeneous good. All wheat from Mexico and the United States is perfectly substitutable in consumption.
4. The markets are perfectly competitive.
5. We assume that the two countries are initially trading freely. One country implements a trade policy and there is no response or retaliation by the other country.

The Meaning of Partial Equilibrium

In **partial equilibrium** analysis, the effects of policy actions are examined only in the markets that are directly affected. Supply and demand curves are used to depict the price effects of policies. Producer and consumer surplus is used to measure the welfare effects on participants in the market. A partial equilibrium analysis either ignores effects on other industries in the economy or assumes that the sector in question is very, very small and therefore has little if any impact on other sectors of the economy.

In contrast, a general equilibrium analysis incorporates the interaction of import and export sectors and then considers the effects of policies on multiple sectors in the economy. It uses offer curves to depict equilibria and measures welfare with aggregate welfare functions or trade indifference curves.

The Large versus Small Country Assumption

Two cases are considered regarding the size of the policy-setting country in international markets. The effects of policies vary significantly depending on the size of a country in international markets.

If the country is a "**large country**" in international markets, then the country's imports or exports are a significant share in the world market for the product. Whenever a country is large in an international market, domestic trade policies can affect the world price of the good. This occurs if the domestic trade policy affects supply or demand on the world market sufficiently to change the world price of the product.

If the country is a "**small country**" in international markets, then the policy-setting country has a very small share in the world market for the product—so small that domestic policies are unable to affect the world price of the good. The small country assumption is analogous to the assumption of perfect competition in a domestic goods market. Domestic firms and consumers must take international prices as given because they are too small for their actions to affect the price.

Key Takeaways

- Partial equilibrium analysis uses supply and demand curves in a particular market and ignores effects that occur beyond these markets.
- Large countries are those whose trade volume is significant enough such that large changes in trade flows can affect the world price of the good.
- Small countries are those whose trade volume is *not* significant enough such that any changes in its trade flows will not affect the world price of the good.

Exercise 7.1.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The term used to describe a country in which domestic policy changes can influence prices in international markets.
   b. The term used to describe a country in which domestic policy changes cannot influence prices in international markets.
   c. The term used to describe the substitutability of a good that is homogeneous.
   d. This type of economic analysis focuses on policy effects within a single market and does not address effects external to the market.

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7.2: Depicting a Free Trade Equilibrium- Large and Small Country Cases 7.2: Depicting a Free Trade Equilibrium- Large and Small Country CasesEdit Update titlecancel

Learning Objectives

1. Use supply and demand to derive import demand curves and export supply curves.
2. Combine import demand and export supply curves to depict a free trade equilibrium under the assumption that the countries are large.
3. Use an import demand and export supply diagram to depict a free trade equilibrium under the assumption that the import country is small.

Figure 7.2.1 depicts the supply and demand for wheat in the U.S. market. The supply curve represents the quantity of wheat that U.S. producers would be willing to supply at every potential price for wheat in the U.S. market. The demand curve represents demand by U.S. consumers at every potential price for wheat in the U.S. market. The intersection of demand and supply corresponds to the equilibrium autarky price and quantity in the United States. The price, P^{US}_{Aut}, is the only price that will balance domestic supply with domestic demand for wheat.

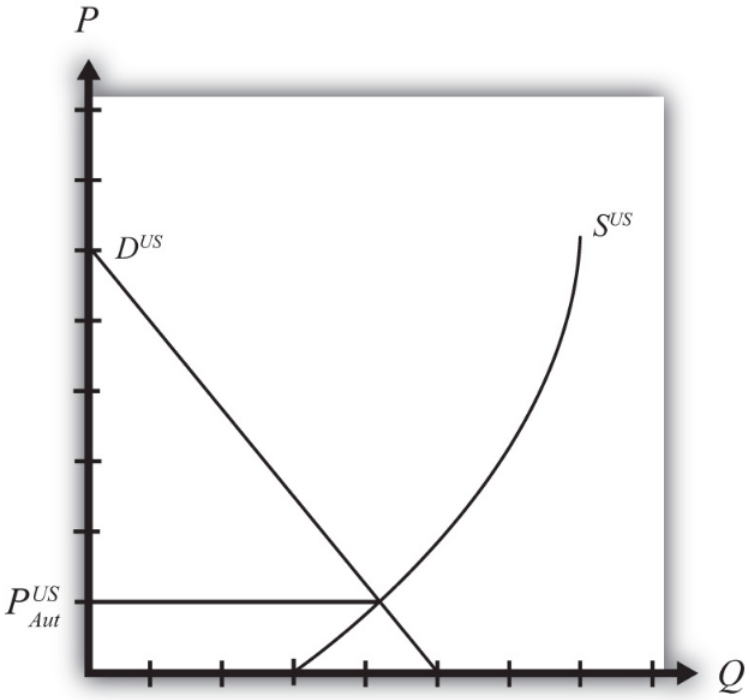
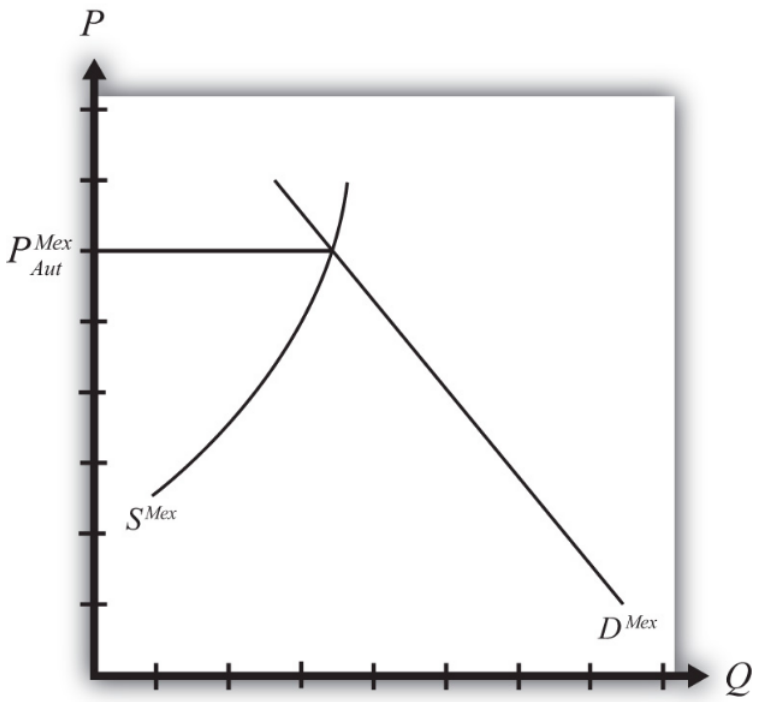


Figure 7.2.1: U.S. Wheat Market- Autarky Equilibrium

Figure 7.2.2 shows the supply and demand for wheat in the Mexican market. The supply curve represents the quantity of wheat that Mexican producers would be willing to supply at every potential price in the Mexican market. The demand curve represents demand by Mexican consumers at every potential price for wheat in the Mexican market. The intersection of demand and supply corresponds to the equilibrium autarky price and quantity in Mexico. The price, P^{Mex}_{Aut}, is the only price that will balance Mexican supply with demand for wheat.



7.2.2: Mexican Wheat Market- Autarky Equilibrium

The curves are drawn such that the U.S. autarky price is lower than the Mexican autarky price. This implies that if these two countries were to move from autarky to free trade, the United States would export wheat to Mexico. Once trade is opened, the higher Mexican price will induce profit-seeking U.S. firms to sell their wheat in Mexico, where it commands a higher price initially. As wheat flows into Mexico, the total supply of wheat rises, which will cause the price to fall. In the U.S. market, wheat supply falls because of U.S. exports. The reduced supply raises the equilibrium price in the United States. These prices move together as U.S. exports rise until the prices are equalized between the two markets. The free trade price of wheat, P_{FT}, is shared by both countries.

To derive the free trade price and the quantity traded, we can construct an export supply curve for the United States and an import demand curve for Mexico. Notice that at prices above the autarky price in the United States, there is excess supply of wheat—that is, supply exceeds demand. If we consider prices either at or above the autarky price, we can derive an export supply curve for the United States. The equation for export supply is given by

$$XS^{US}(P^{US}) = S^{US}(P^{US}) - D^{US}(P^{US}),$$

where $XS^{US}(.)$ is the export supply function, $S^{US}(.)$ is the supply function for wheat in the United States, and $D^{US}(.)$ is the demand function for wheat in the United States. Each function is dependent on the U.S. price of wheat, P^{US}.

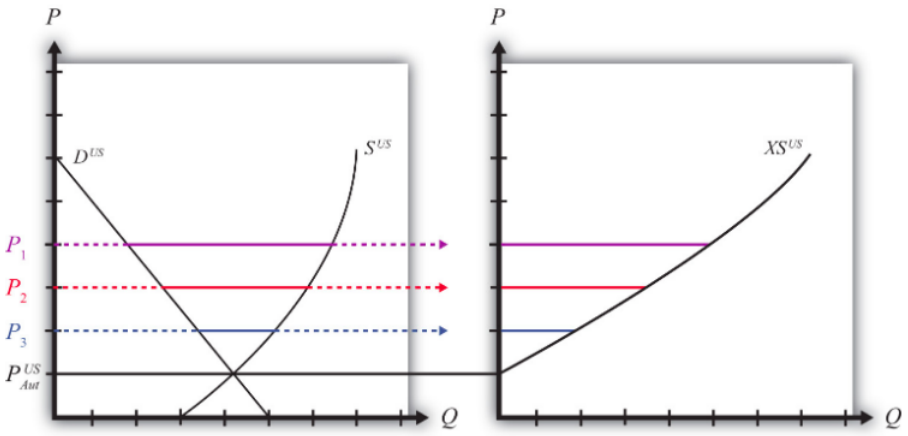


Figure 7.2.3: Deriving the U.S. Export Supply Curve

Graphically, **export supply** is the horizontal difference between the supply and demand curve at every price at and above the autarky price, as shown in Figure 7.2.3. At the autarky price, P^{US}_{Aut}, export supply is zero. At prices P_1, P_2, and P_3, export supply is given by the length of the like-colored line segment. To plot the export supply curve XS^{US}, we transfer each line segment to a separate graph and connect the points, as shown on the right in Figure 7.2.3. The export supply curve gives the quantities the United States would be willing to export if it faced prices above its autarky price.

In Mexico, at prices below its autarky price there is excess demand for wheat since demand exceeds supply. If we consider prices either at or below the autarky price, we can derive an import demand curve for Mexico. The equation for import demand is given by

$$MD^{Mex}(P^{Mex}) = D^{Mex}(P^{Mex}) - S^{Mex}(P^{Mex}),$$

where $MD^{Mex}(.)$ is the import demand function, $D^{Mex}(.)$ is the demand function for wheat in Mexico, and $S^{Mex}(.)$ is the supply function for wheat in Mexico. Each function is dependent on the Mexican price of wheat, P^{Mex}. Graphically, **import demand** is the horizontal difference between the demand and supply curve at every price at and below the autarky price, as shown in Figure 7.2.4. At the autarky price, P^{Mex}_{Aut}, import demand is zero. At prices P_1, P_2, and P_3, import demand is given by the length of the like-colored line segment. To plot the import demand curve MD^{Mex}, we transfer each line segment to a separate graph and connect the points, as shown on the right in Figure 7.2.4. The import demand curve gives the quantities Mexico would be willing to import if it faced prices below its autarky price.

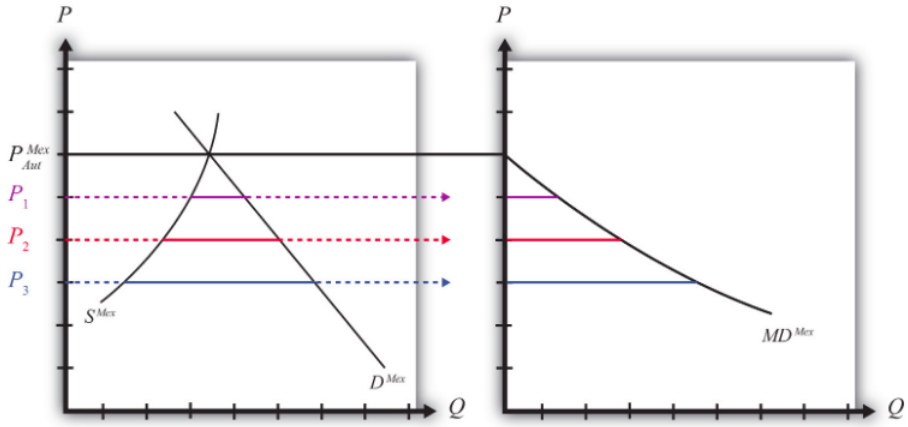


Figure 7.2.4: Deriving the Mexican Import Demand Curve

Free Trade Equilibrium: Large Country Case

The intersection of the U.S. export supply with Mexican import demand determines the equilibrium free trade price, P_{FT}, and the quantity traded, Q_{FT}, where $Q_{FT} = XS^{US}(P_{FT}) = MD^{Mex}(P_{FT})$. See Figure 7.2.5. The free trade price, P_{FT}, must be the price that equalizes the U.S. export supply with Mexican import demand. Algebraically, the free trade price is the price that solves

$$XS^{US}(P_{FT}) = MD^{Mex}(P_{FT}).$$

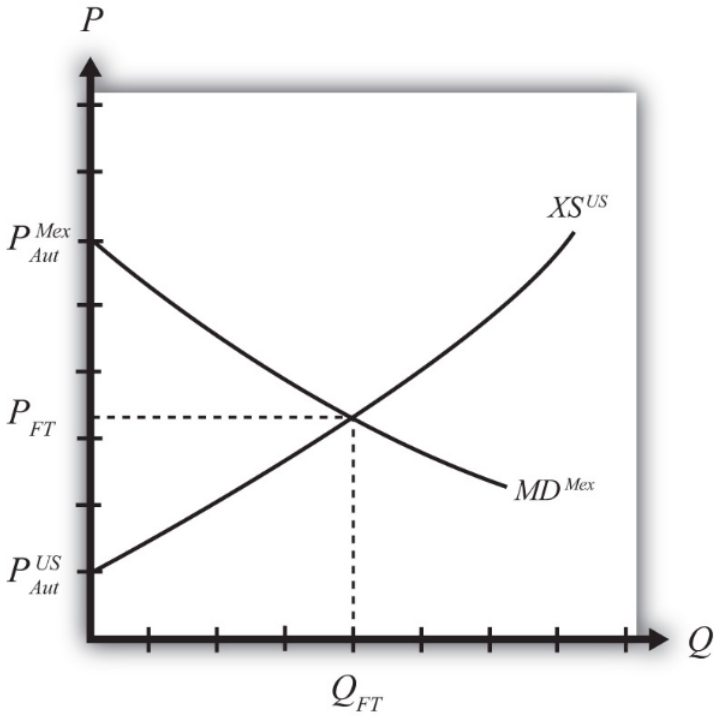


Figure 7.2.5: Depicting a Free Trade Equilibrium

This implies also that world supply is equal to world demand since

$$S^{US}(P_{FT}) - D^{US}(P_{FT}) = D^{Mex}(P_{FT}) - S^{Mex}(P_{FT})$$

and

$$S^{US}(P_{FT}) + S^{Mex}(P_{FT}) = D^{US}(P_{FT}) + D^{Mex}(P_{FT}).$$

Free Trade Equilibrium: Small Country Case

The small country assumption means that the country's imports are a very small share of the world market—so small that even a complete elimination of imports would have an imperceptible effect on world demand for the product and thus would not affect the world price.

To depict a free trade equilibrium using an export supply and import demand diagram, we must redraw the export supply curve in light of the small country assumption. The assumption implies that the export supply curve is horizontal at the level of the world price. In this case, we call the importing country small. From the perspective of the small importing country, it takes the world price as exogenous since it can have no effect on it. From the exporter's perspective, it is willing to supply as much of the product as the importer wants at the given world price.

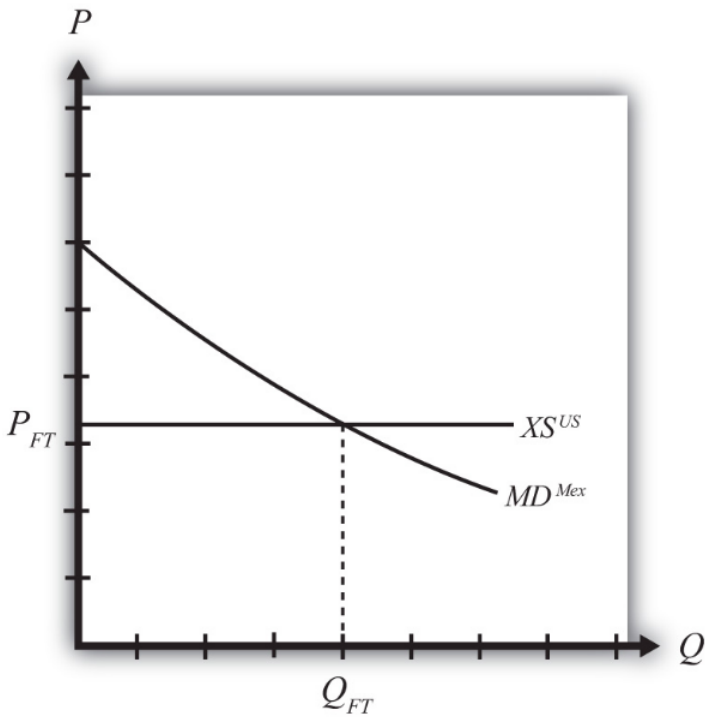


Figure 7.2.6: Free Trade Equilibrium- Small Country Case

The free trade price, P_{FT}, is the price that prevails in the export, or world, market. The quantity imported into the small country is found as the intersection between the downward-sloping import demand curve and the horizontal export supply curve.

Key Takeaways

- Import demand is the excess demand that a country would wish to import from another country if the market price were below the price that equalizes its own supply and demand (i.e., its autarky price).
- Export supply is the excess supply that a country would wish to export to another country if the market price were above the price that equalizes its own supply and demand (i.e., its autarky price).
- When there are only two countries, the free trade price is the one that equalizes one country's import demand with the other's export supply.
- When export supply is equal to import demand, world supply of the product is equal to world demand at the shared free trade price.
- A large importing country faces a downward-sloping export supply curve.
- A small importing country is one that faces a perfectly elastic export supply function.

? Exercise 7.2.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The price that equalizes one country's import demand with the other's export supply.
   b. Of *higher than*, *lower than*, or *equal to* the autarky price in a market, this is the range of prices that would generate positive import demand.
   c. Of *higher than*, *lower than*, or *equal to* the autarky price in a market, this is the range of prices that would generate positive export supply.
   d. The value of imports of wine in free trade in Country A if Country A's autarky wine price is equal to the autarky wine price in the rest of the world.
   e. The term used to describe the horizontal distance between supply and demand at each price below a market autarky price.
   f. The term used to describe the horizontal distance between supply and demand at each price above a market autarky price.

g. The shape of the export supply function faced by a small importing country.

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7.3: The Welfare Effects of Trade Policies- Partial Equilibrium 7.3: The Welfare Effects of Trade Policies- Partial EquilibriumEdit Update titlecancel

Learning Objectives

1. Measure welfare magnitudes accruing to producers and consumers in a partial equilibrium model.

A partial equilibrium analysis distinguishes between the welfare of consumers who purchase a product and the producers who produce it. Consumer welfare is measured using consumer surplus, while producer welfare is measured using producer surplus. Revenue collected by the government is assumed to be redistributed to others. Government revenue is either spent on public goods or is redistributed to someone in the economy, thus raising someone's welfare.

Consumer Surplus

Consumer surplus is used to measure the welfare of a group of consumers who purchase a particular product at a particular price. **Consumer surplus** is defined as the difference between what consumers are willing to pay for a unit of the good and the amount consumers actually do pay for the product. Willingness to pay can be read from a market demand curve for a product. The market demand curve shows the quantity of the good that would be demanded by all consumers at each and every price that might prevail. Read the other way, the demand curve tells us the maximum price that consumers would be willing to pay for any quantity supplied to the market.

A graphical representation of consumer surplus can be derived by considering the following exercise. Suppose that only one unit of a good is available in a market. As shown in Figure 7.3.1, that first unit could be sold at the price P_1. In other words, there is a consumer in the market who would be willing to pay P_1. Presumably that person either has a relatively high desire or need for the product or the person has a relatively high income. To sell two units of the good, the price would have to be lowered to P_2. (This assumes that the firm cannot perfectly price discriminate and charge two separate prices to two customers.) A slightly lower price might induce another customer to purchase the product or might induce the first customer to buy two units. Three units of the good could be sold if the price is lowered to P_3, and so on.

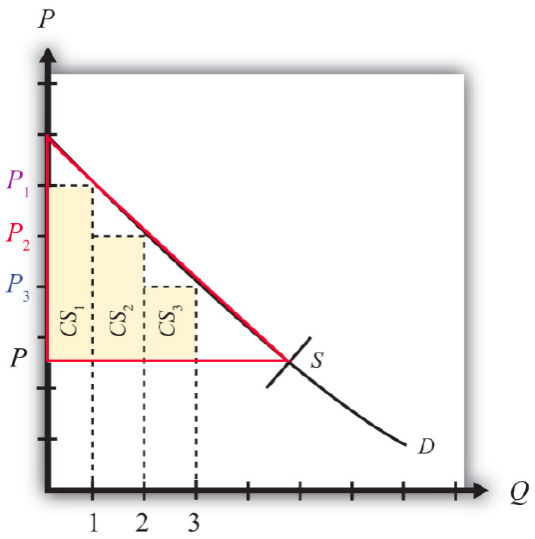


Figure 7.3.1: Calculating Consumer Surplus

The price that ultimately prevails in a free market is that price that equalizes market supply with market demand. That price will be P in Figure 7.3.1 as long as the firms do not price discriminate. Now let's go back to the first unit that could have been sold. The person who would have been willing to pay P_1 for a unit of the good ultimately pays only P for the unit. The difference between the two prices represents the amount of consumer surplus that accrues to that person. For the second unit of the good, someone would have been willing to pay P_2 but ultimately pays P. The second unit generates a smaller amount of surplus than the first unit.

We can continue this procedure until the market supply at the price P is reached. The total consumer surplus in the market is given by the sum of the areas of the rectangles. If many units of the product are sold, then a one-unit width would be much smaller than

shown in Figure 7.3.1. Thus total consumer surplus can reasonably be measured as the area between the demand curve and the horizontal line drawn at the equilibrium market price. This is shown as the red triangle in the diagram. The area representing consumer surplus is measured in dollars.

Changes in Consumer Surplus

Suppose the supply of a good rises, represented by a rightward shift in the supply curve from S to S' in Figure 7.3.2. At the original price, P_1, consumer surplus is given by the blue area in the diagram (the triangular area between the P_1 price line and the demand curve). The increase in supply lowers the market price to P_2. The new level of consumer surplus is now given by the sum of the blue and yellow areas in Figure 7.3.2 (the triangular area between the P_2 price line and the demand curve). The change in consumer surplus, CS, is given by the yellow area in Figure 7.3.2 (the area denoted by a and b). Note that the change in consumer surplus is determined as the area between the price that prevails before, the price that prevails after, and the demand curve. In this case, consumer surplus rises because the price falls. Two groups of consumers are affected. Consumers who would have purchased the product even at the higher price, P_1, now receive more surplus ($P_1 - P_2$) for each unit they purchase. These extra benefits are represented by the rectangular area a in the diagram. Also, there are additional consumers who were unwilling to purchase the product at price P_1 but are now willing to purchase at the price P_2. Their consumer surplus is given by the triangular area b in the diagram.

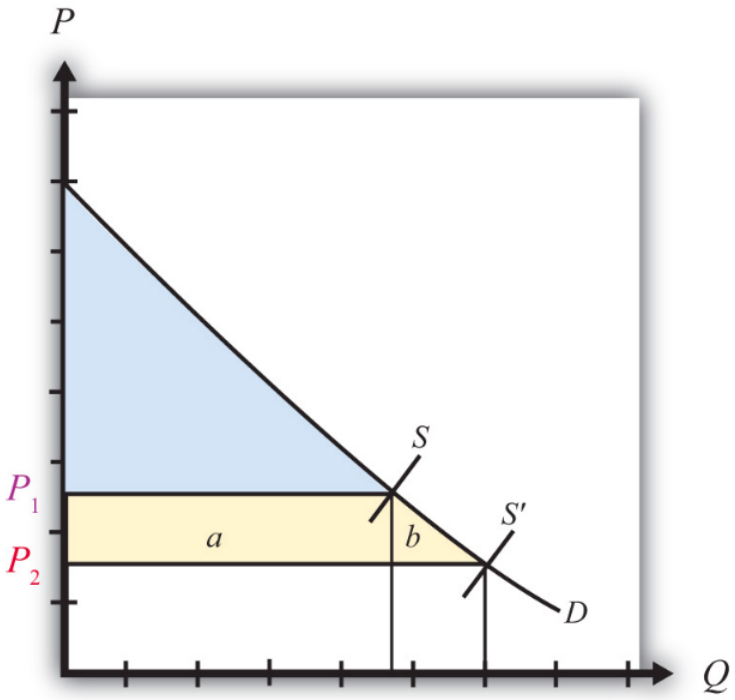


Figure 7.3.2: Depicting a Change in Consumer Surplus

Producer Surplus

Producer surplus is used to measure the welfare of a group of firms that sell a particular product at a particular price. **Producer surplus** is defined as the difference between what producers actually receive when selling a product and the amount they would be willing to accept for a unit of the good. Firms' willingness to accept payments can be read from a market supply curve for a product. The market supply curve shows the quantity of the good that firms would supply at each and every price that might prevail. Read the other way, the supply curve tells us the minimum price that producers would be willing to accept for any quantity demanded by the market.

A graphical representation of producer surplus can be derived by considering the following exercise. Suppose that only one unit of a good is demanded in a market. As shown in Figure 7.3.3, some firm would be willing to accept the price P_1 if only one unit is produced. If two units of the good were demanded in the market, then the minimum price to induce two units to be supplied is P_2. A slightly higher price would induce another firm to supply an additional unit of the good. Three units of the good would be made available if the price were raised to P_3, and so on.

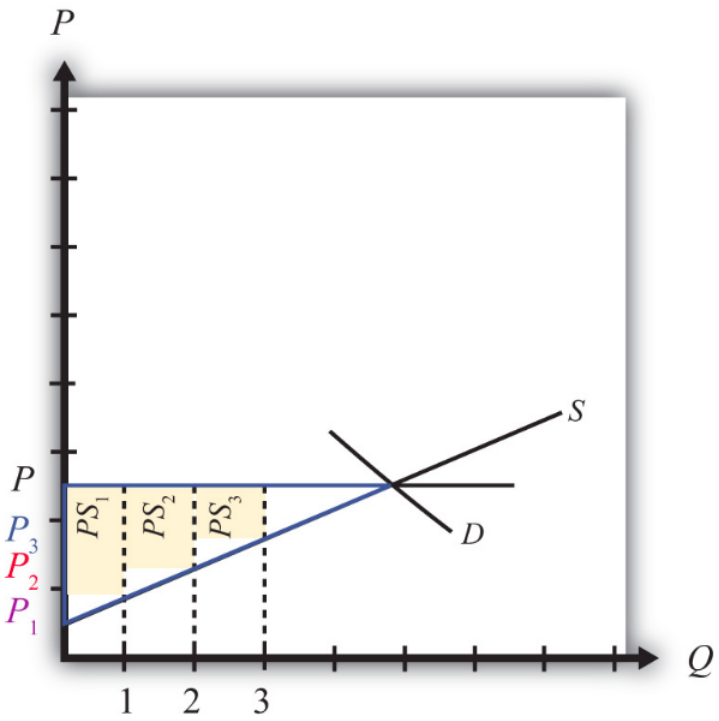


Figure 7.3.3: Calculating Producer Surplus

The price that ultimately prevails in a free market is the price that equalizes market supply with market demand. That price will be P in Figure 7.3.3. Now let's go back to the first unit demanded. Some firm would have been willing to supply one unit at the price P_1 but ultimately receives P for the unit. The difference between the two prices represents the amount of producer surplus that accrues to the firm. For the second unit of the good, some firm would have been willing to supply the unit at the price P_2 but ultimately receives P. The second unit generates a smaller amount of surplus than the first unit.

We can continue this procedure until the market demand at the price P is reached. The total producer surplus in the market is given by the sum of the areas of the rectangles. If many units of the product are sold, then the one-unit width would be much smaller than shown in Figure 7.3.3. Thus total producer surplus can reasonably be measured as the area between the supply curve and the horizontal line drawn at the equilibrium market price. This is shown as the yellow triangle in the diagram. The area representing producer surplus is measured in dollars.

Producer surplus can be interpreted as the amount of revenue allocated to fixed costs and profit in the industry. This is because the market supply curve corresponds to industry marginal costs. Recall that firms choose output in a perfectly competitive market by setting the price equal to the marginal cost. Thus the marginal cost is equal to the price P in Figure 7.3.4 at an industry output equal to Q. The marginal cost represents the addition to cost for each additional unit of output. As such, it represents an additional variable cost for each additional unit of output. This implies that the area under the supply curve at an output level such as Q represents the total variable cost (TVC) to the industry, shown as the blue area in Figure 7.3.4.

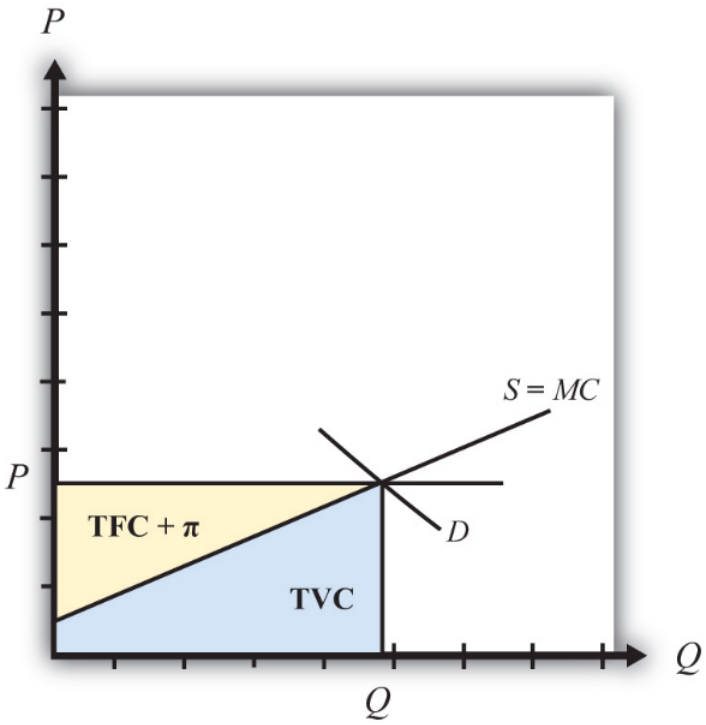


Figure 7.3.4: Interpreting Producer Surplus

On the other hand, the market price multiplied by the quantity produced ($P \times Q$) represents the total revenue received by firms in the industry. This is represented by the sum of the blue and yellow areas in the diagram. The difference between the total revenue and the total variable cost, in turn, represents payments made to fixed factors of production, or total fixed cost (TFC), and any short-run profits (π) accruing to firms in the industry (the yellow area in the figure—that is, the area between the price line and the supply curve). This area is the same as the producer surplus.

Since fixed factors of production represent capital equipment that must be installed by the owners of the firms before any output can be produced, it is reasonable to use producer surplus to measure the well-being of the owners of the firms in the industry.

Changes in Producer Surplus

Suppose the demand for a good rises, represented by a rightward shift in the demand curve from D to D' in Figure 7.3.5. At the original price, P_1, producer surplus is given by the yellow area in Figure 7.3.5 (the triangular area between the P_1 price and the supply curve). The increase in demand raises the market price to P_2. The new level of producer surplus is now given by the sum of the blue and yellow areas in the figure (the triangular area between the price P_2 and the supply curve). The change in producer surplus, PS, is given by the blue area in the figure (the area between the two prices and the supply curve). Note that the change in producer surplus is determined as the area between the price that prevails before, the price that prevails after, and the supply curve. In this case, producer surplus rises because the price increases and output rises. The increase in price and output raises the return to fixed costs and the profitability of firms in the industry. The increase in output also requires an increase in variable factors of production such as labor. Thus one additional benefit to firms not measured by the increase in producer surplus is an increase in industry employment.

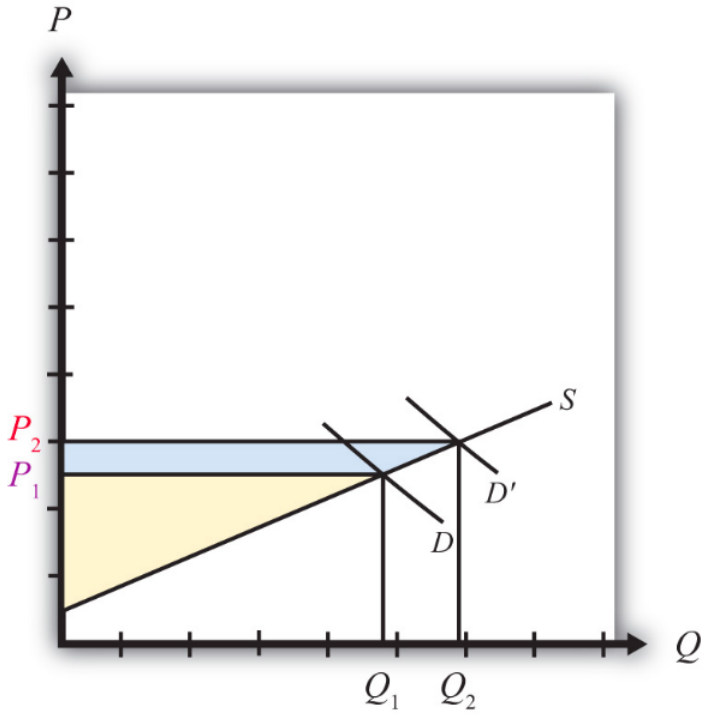


Figure 7.3.5: Depicting a Change in Producer Surplus

Key Takeaways

- Consumer surplus and producer surplus are methods used to identify the magnitude of the welfare effects on consumers of a product and producers of a product.
- Consumer surplus measures the extra amount of money consumers would be willing to pay for a product over what they actually did pay.
- Consumer surplus is measured as the area between the demand curve, the horizontal line at the equilibrium price, and the vertical axis.
- Producer surplus is the extra amount of money producers receive when selling a product above what they would be willing to accept for it.
- Producer surplus is measured as the area between the supply curve, the horizontal line at the equilibrium price, and the vertical axis.

? Exercise 7.3.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The term used to describe a measure of consumer welfare in a partial equilibrium analysis.
   b. The term used to describe a measure of producer welfare in a partial equilibrium analysis.
   c. Of *increase*, *decrease*, or *stay the same*, this is the effect of a price decrease on consumer surplus.
   d. Of *increase*, *decrease*, or *stay the same*, this is the effect of a price increase on producer surplus.
   e. Of *increase*, *decrease*, or *stay the same*, this is the effect of a demand increase on producer surplus.
   f. Of *increase*, *decrease*, or *stay the same*, this is the effect of a supply increase on consumer surplus.
2. Suppose the demand for baseballs is given by $D = 1,000–20P$.
   a. Calculate consumer surplus at a market price of $20.
   b. Calculate the change in consumer surplus if the price increases by $5.
3. Suppose the supply of baseballs is given by $S = 30P$.
   a. Calculate producer surplus at a market price of $20.
   b. Calculate the change in producer surplus if the price decreases by $5.

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7.4: Import Tariffs - Large Country Price Effects 7.4: Import Tariffs - Large Country Price EffectsEdit Update titlecancel

Learning Objectives

1. Identify the effects of a specific tariff on prices in both countries and the quantity traded.
2. Know the equilibrium conditions that must prevail in a tariff equilibrium.

Suppose Mexico, the importing country in free trade, imposes a specific tariff on imports of wheat. As a tax on imports, the tariff will inhibit the flow of wheat across the border. It will now cost more to move the product from the United States into Mexico.

As a result, the supply of wheat to the Mexican market will fall, inducing an increase in the price of wheat. Since wheat is homogeneous and the market is perfectly competitive, the price of all wheat sold in Mexico, both Mexican wheat and U.S. imports, will rise in price. The higher price will reduce Mexico's import demand.

The reduced wheat supply to Mexico will shift back supply to the U.S. market. Since Mexico is assumed to be a large importer, the supply shifted back to the U.S. market will be enough to induce a reduction in the U.S. price. The lower price will reduce the U.S. export supply.

For this reason, a country that is a large importer is said to have **monopsony power in trade**. A monopsony arises whenever there is a single buyer of a product. A monopsony can gain an advantage for itself by reducing its demand for a product in order to induce a reduction in the price. In a similar way, a country with monopsony power can reduce its demand for imports (by setting a tariff) to lower the price it pays for the imported product. Note that these price effects are identical in direction to the price effects of an import quota, a voluntary export restraint, and an export tax.

A new tariff-ridden equilibrium will be reached when the following two conditions are satisfied:

$$P_T^{Mex} = P_T^{US} + T$$

and

$$XS^{US}(P_T^{US}) = MD^{Mex}(P_T^{Mex}),$$

where T is the tariff, P_T^{Mex} is the price in Mexico after the tariff, and P_T^{US} is the price in the United States after the tariff.

The first condition represents a price wedge between the final U.S. price and the Mexican price equal to the amount of the tariff. The prices must differ by the tariff because U.S. suppliers of wheat must receive the same price for their product regardless of whether the product is sold in the United States or Mexico, and all wheat sold in Mexico must be sold at the same price. Since a tax is collected at the border, the only way for these price equalities within countries to arise is if the price differs across countries by the amount of the tax.

The second condition states that the amount the United States wants to export at its new lower price must be equal to the amount Mexico wants to import at its new higher price. This condition guarantees that world supply of wheat equals world demand for wheat.

The tariff equilibrium is depicted graphically in Figure 7.4.1. The Mexican price of wheat rises from P_{FT} to P_T^{Mex}, which reduces its import demand from Q_{FT} to Q_T. The U.S. price of wheat falls from P_{FT} to P_T^{US}, which also reduces its export supply from Q_{FT} to Q_T. The difference in the prices between the two markets is equal to the specific tariff rate, T.

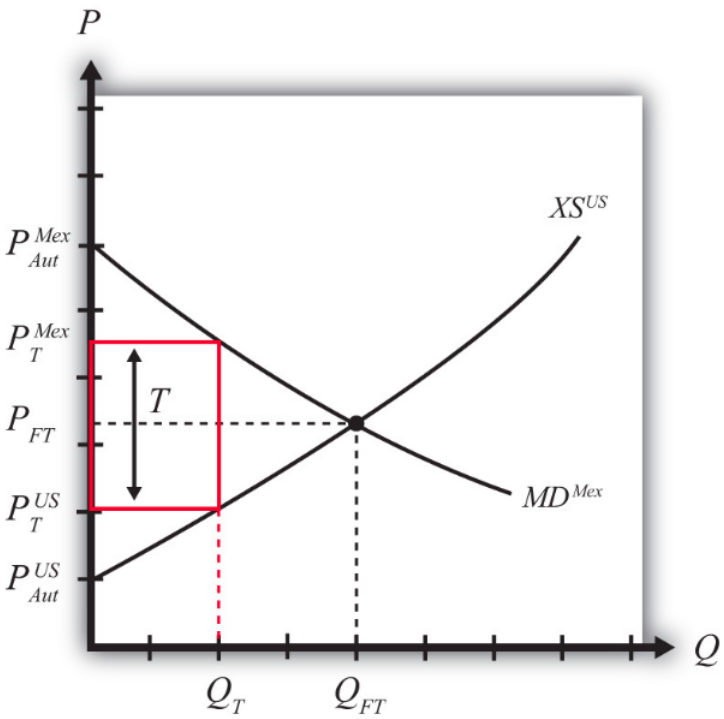


Figure 7.4.1: Depicting a Tariff Equilibrium- Large Country Case

Notice that there is a unique set of prices that satisfies the equilibrium conditions for every potential tariff that is set. If the tariff were set higher than T, the price wedge would rise, causing a further increase in the Mexican price, a further decrease in the U.S. price, and a further reduction in the quantity traded.

At the extreme, if the tariff were set equal to the difference in autarky prices (i.e., $T = P^{Mex}_{Aut} - P^{US}_{Aut}$), then the quantity traded would fall to zero. In other words, the tariff would prohibit trade. Indeed, any tariff set greater than or equal to the difference in autarky prices would eliminate trade and cause the countries to revert to autarky in that market. Thus we define a prohibitive tariff as any tariff, T_{pro}, such that

$$T_{pro} \geq P^{Mex}_{Aut} - P^{US}_{Aut}.$$

The Price Effects of a Tariff: A Simple Dynamic Story

For an intuitive explanation about why these price changes would likely occur in a real-world setting, read the following story about the likely dynamic adjustment process. Technically, this story is *not* a part of the partial equilibrium model, which is a static model that does not contain adjustment dynamics. However, it is worthwhile to think about how a real market adjusts to the equilibria described in these simple models.

Suppose the United States and Mexico are initially in a free trade equilibrium. Mexico imports wheat at the free trade price of $10 per bushel. Imagine that the market for unprocessed wheat in both the United States and Mexico is located in a warehouse in each country. Each morning, wheat arrives from the suppliers and is placed in the warehouse for sale. During the day, consumers of unprocessed wheat arrive to buy the supply. For simplicity, assume there is no service charge collected by the intermediary that runs the warehouses. Thus, for each bushel sold, $10 passes from the consumer directly to the producer.

Each day, the wheat market clears in the United States and Mexico at the price of $10. This means that the quantity of wheat supplied at the beginning of the day is equal to the quantity purchased by consumers during the day. Supply equals demand in each market at the free trade price of $10.

Now suppose that Mexico places a $2 specific tariff on imports of wheat. Let's assume that the agents in the model react slowly and rather naively to the change. Let's also suppose that the $2 tariff is a complete surprise.

Each day, prior to the tariff, trucks carrying U.S. wheat would cross the Mexican border in the wee hours, unencumbered, en route to the Mexican wheat market. On the day the tariff is imposed, the trucks are stopped and inspected. The drivers are

informed that they must pay $2 for each bushel that crosses into Mexico.

Suppose the U.S. exporters of wheat naively pay the tax and ship the same number of bushels to the Mexican market that day. However, to recoup their losses, they raise the price by the full $2. The wheat for sale in Mexico now is separated into two groups. The imported U.S. wheat now has a price tag of $12, while the Mexican-supplied wheat retains the $10 price. Mexican consumers now face a choice. However, since Mexican and U.S. wheat are homogeneous, the choice is simple. Every Mexican consumer will want to purchase the Mexican wheat at $10. No one will want the U.S. wheat. Of course, sometime during the day, Mexican wheat will run out and consumers will either have to buy the more expensive wheat or wait till the next day. Thus some $12 U.S. wheat will sell, but not the full amount supplied. At the end of the day, a surplus will remain. This means that there will be an excess demand for Mexican wheat and an excess supply of U.S. wheat in the Mexican market.

Mexican producers of wheat will quickly realize that they can supply more to the market and raise their price. A higher price is possible because the competition is now charging $12. The higher supply and higher price will raise the profitability of the domestic wheat producers. (Note that the supply of wheat may not rise quickly since it is grown over an annual cycle. However, the supply of a different type of good could be raised rapidly. The length of this adjustment will depend on the nature of the product.) U.S. exporters will quickly realize that no one wants to buy their wheat at a price of $12. Their response will be to reduce export supply and lower their price in the Mexican market.

As time passes, in the Mexican market, the price of Mexican-supplied wheat will rise from $10 and the price of U.S. supplied wheat will fall from $12 until the two prices meet somewhere in between. The homogeneity of the goods requires that if both goods are to be sold in the Mexican market, then they must sell at the same price in equilibrium.

As these changes take place in the Mexican market, other changes occur in the U.S. market. When U.S. exporters of wheat begin to sell less in Mexico, that excess supply is shifted back to the U.S. market. The warehouse in the United States begins to fill up with more wheat than U.S. consumers are willing to buy at the initial price of $10. Thus at the end of each day, wheat supplies remain unsold. An inventory begins to pile up. Producers realize that the only way to unload the excess wheat is to cut the price. Thus the price falls in the U.S. market. At lower prices, though, U.S. producers are willing to supply less, thus production is cut back as well.

In the end, the U.S. price falls and the Mexican price rises until the two prices differ by $2, the amount of the tariff. A Mexican price of $11.50 and a U.S. price of $9.50 is one possibility. A Mexican price of $11 and a U.S. price of $9 is another. U.S. producers now receive the same lower price for wheat whether they sell in the United States or Mexico. The exported wheat is sold at the higher Mexican price, but $2 per bushel is paid to the Mexican government as tariff revenue. Thus U.S. exporters receive the U.S. price for the wheat sold in Mexico.

The higher price in Mexico raises domestic supply and reduces domestic demand, thus reducing their demand for imports. The lower price in the United States reduces U.S. supply, raises U.S. demand, and thus lowers U.S. export supply to Mexico. In a two-country world, the $2 price differential that arises must be such that U.S. export supply equals Mexican import demand.

Noteworthy Price Effects of a Tariff

Two of the effects of a tariff are worthy of emphasis. First, although a tariff represents a tax placed solely on imported goods, the domestic price of both imported and domestically produced goods will rise. In other words, a tariff will cause local producers of the product to raise their prices. Why?

In the model, it is assumed that domestic goods are perfectly substitutable for imported goods (i.e., the goods are homogeneous). When the price of imported goods rises due to the tariff, consumers will shift their demand from foreign to domestic suppliers. The extra demand will allow domestic producers an opportunity to raise output and prices to clear the market. In so doing, they will also raise their profit. Thus as long as domestic goods are substitutable for imports and as long as the domestic firms are profit seekers, the price of the domestically produced goods will rise along with the import price.

The average consumer may not recognize this rather obvious point. For example, suppose the United States places a tariff on imported automobiles. Consumers of U.S.-made automobiles may fail to realize that they are likely to be affected. After all, they might reason, the tax is placed only on imported automobiles. Surely this would raise the imports' prices and hurt consumers of foreign cars, but why would that affect the price of U.S. cars? The reason, of course, is that the import car market and the domestic car market are interconnected. Indeed, the only way U.S.-made car prices would not be affected by the tariff is if consumers were completely unwilling to substitute U.S. cars for imported cars *or* if U.S. automakers were unwilling to take advantage of a profit-raising possibility. These conditions are probably unlikely in most markets around the world.

The second interesting price effect arises because the importing country is large. When a large importing country places a tariff on an imported product, it will cause *the foreign price to fall*. The reason? The tariff will reduce imports into the domestic country, and since its imports represent a sizeable proportion of the world market, world demand for the product will fall. The reduction in demand will force profit-seeking firms in the rest of the world to lower output and price in order to clear the market.

The effect on the foreign price is sometimes called the terms of trade effect. The terms of trade is sometimes defined as the price of a country's *export goods* divided by the price of its *import goods*. Here, since the importing country's import good will fall in price, the country's terms of trade will rise. Thus a tariff implemented by a large country will cause an improvement in the country's terms of trade.

Key Takeaways

- An import tariff will raise the domestic price and, in the case of a large country, lower the foreign price.
- An import tariff will reduce the quantity of imports.
- An import tariff will raise the price of the "untaxed" domestic import-competing good.
- The tariff will drive a price wedge, equal to the tariff value, between the foreign price and the domestic price of the product.
- With the tariff in place in a two-country model, export supply at the lower foreign price will equal import demand at the higher domestic price.

? Exercise 7.4.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The kind of power a country is said to have when its imports make up a significant share of the world market.
   b. The direction of change of the domestic price after an import tariff is implemented by a domestic country.
   c. The direction of change of the foreign price after an import tariff is implemented by a large domestic country.
   d. The term used to describe a tariff that eliminates trade.
   e. Of *increase*, *decrease*, or *stay the same*, this is the effect on the price of U.S.-made automobiles if the United States places a tax on imported foreign automobiles.
   f. The price of tea in the exporting country if the importer sets a tariff of $1.50 per pound and if the importer country price is $5.50 inclusive of the tariff.
   g. Of *increase*, *decrease*, or *stay the same*, this is the effect on imports of wheat if a wheat tariff is implemented.
   h. Of *increase*, *decrease*, or *stay the same*, this is the effect on foreign exports of wheat if a wheat tariff is implemented by an importing country.
2. Complete the following descriptions of the equilibrium conditions with a tariff in place.
   a. _____ is equal to the price in the exporting market with the foreign tariff *plus* the tariff.
   b. Import demand, at the price that prevails in the importing country after the tariff, *is equal to* _____ at the price that prevails _____.

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7.5: Import Tariffs- Large Country Welfare Effects 7.5: Import Tariffs- Large Country Welfare EffectsEdit Update titlecancel

Learning Objectives

1. Use a partial equilibrium diagram to identify the welfare effects of an import tariff on producer and consumer groups and the government in the importing and exporting countries.
2. Calculate the national and world welfare effects of an import tariff.

Suppose that there are only two trading countries: one importing country and one exporting country. The supply and demand curves for the two countries are shown in Figure 7.5.1. P_{FT} is the free trade equilibrium price. At that price, the excess demand by the importing country equals excess supply by the exporter.

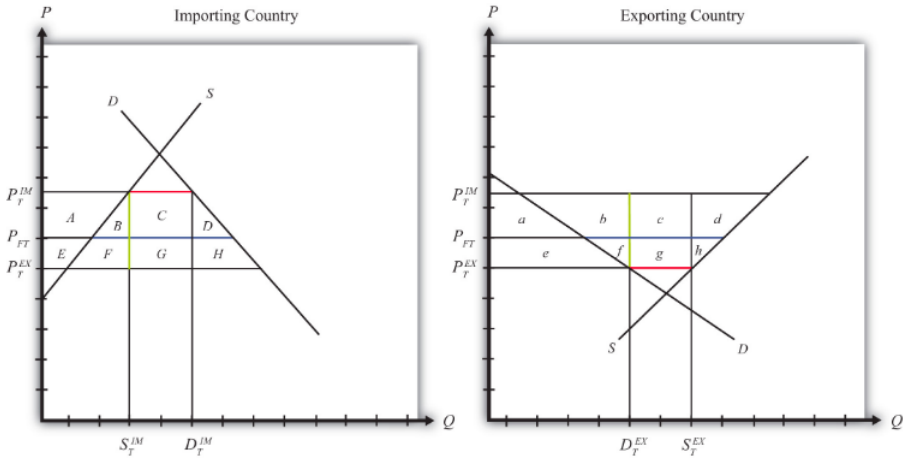


Figure 7.5.1: Welfare Effects of a Tariff- Large Country Case

The quantity of imports and exports is shown as the blue line segment on each country's graph. (That's the horizontal distance between the supply and demand curves at the free trade price.) When a large importing country implements a tariff it will cause an increase in the price of the good on the domestic market and a decrease in the price in the rest of the world (RoW). Suppose after the tariff the price in the importing country rises to P_T^{IM} and the price in the exporting country falls to P_T^{EX}. If the tariff is a specific tax, then the tariff rate would be , equal to the length of the green line segment in the diagram. If the tariff were an ad valorem tax, then the tariff rate would be given by $T = \frac{P_T^{IM}}{P_T^{EX}} - 1$.

Table 7.5.1: Welfare Effects of an Import Tariff provides a summary of the direction and magnitude of the welfare effects to producers, consumers, and the governments in the importing and exporting countries. The aggregate national welfare effects and the world welfare effects are also shown.

Table 7.5.1: Welfare of an Import Tariff

	Importing Country	Exporting Country
Consumer Surplus	$-(A+B+C+D)$	$+e$
Producer Surplus	$+A$	$-(e+f+g+h)$
Govt. Revenue	$+(C+G)$	0
National Welfare	$+G-(B+D)$	$-(f+g+h)$
World Welfare	$-(B+D)-(f+h)$	

Refer to Table 7.5.1: Welfare Effects of an Import *Tariff* and Figure 7.5.1 to see how the magnitudes of the changes are represented.

Tariff effects on the importing country's consumers. Consumers of the product in the importing country suffer a reduction in well-being as a result of the tariff. The increase in the domestic price of both imported goods and the domestic substitutes reduces the

amount of consumer surplus in the market.

Tariff effects on the importing country's producers. Producers in the importing country experience an increase in well-being as a result of the tariff. The increase in the price of their product on the domestic market increases producer surplus in the industry. The price increases also induce an increase in the output of existing firms (and perhaps the addition of new firms); an increase in employment; and an increase in profit, payments, or both to fixed costs.

Tariff effects on the importing country's government. The government receives tariff revenue as a result of the tariff. Who benefits from the revenue depends on how the government spends it. Typically, the revenue is simply included as part of the general funds collected by the government from various sources. In this case, it is impossible to identify precisely who benefits. However, these funds help support many government spending programs, which presumably help either most people in the country, as is the case with public goods, or certain worthy groups. Thus someone within the country is the likely recipient of these benefits.

Tariff effects on the importing country. The aggregate welfare effect for the country is found by summing the gains and losses to consumers, producers, and the government. The net effect consists of three components: a positive terms of trade effect (G), a negative production distortion (B), and a negative consumption distortion (D).

Because there are both positive and negative elements, the net national welfare effect can be either positive or negative. The interesting result, however, is that it can be *positive*. This means that a tariff implemented by a large importing country *may* raise national welfare.

Generally speaking, the following are true:

1. Whenever a large country implements a small tariff, it will raise national welfare.
2. If the tariff is set too high, national welfare will fall.
3. There will be a positive optimal tariff that will maximize national welfare.

However, it is also important to note that not everyone's welfare rises when there is an increase in national welfare. Instead, there is a redistribution of income. Producers of the product and recipients of government spending will benefit, but consumers will lose. A national welfare increase, then, means that the sum of the gains exceeds the sum of the losses across all individuals in the economy. Economists generally argue that, in this case, compensation from winners to losers can potentially alleviate the redistribution problem.

Tariff effects on the exporting country's consumers. Consumers of the product in the exporting country experience an increase in well-being as a result of the tariff. The decrease in their domestic price raises the amount of consumer surplus in the market.

Tariff effects on the exporting country's producers. Producers in the exporting country experience a decrease in well-being as a result of the tariff. The decrease in the price of their product in their own market decreases producer surplus in the industry. The price decline also induces a decrease in output, a decrease in employment, and a decrease in profit, payments, or both to fixed costs.

Tariff effects on the exporting country's government. There is no effect on the exporting country's government revenue as a result of the importer's tariff.

Tariff effects on the exporting country. The aggregate welfare effect for the country is found by summing the gains and losses to consumers and producers. The net effect consists of three components: a negative terms of trade effect (g), a negative consumption distortion (f), and a negative production distortion (h).

Since all three components are negative, the importer's tariff must result in a reduction in national welfare for the exporting country. However, it is important to note that a redistribution of income occurs—that is, some groups gain while others lose. In this case, the sum of the losses exceeds the sum of the gains.

Tariff effects on world welfare. The effect on world welfare is found by summing the national welfare effects on the importing and exporting countries. By noting that the terms of trade gain to the importer is equal to the terms of trade loss to the exporter, the world welfare effect reduces to four components: the importer's negative production distortion (B), the importer's negative consumption distortion (D), the exporter's negative consumption distortion (f), and the exporter's negative production distortion (h). Since each of these is negative, the world welfare effect of the import tariff is negative. The sum of the losses in the world exceeds the sum of the gains. In other words, we can say that an import tariff results in a reduction in world production and consumption efficiency.

Key Takeaways

- An import tariff lowers consumer surplus in the import market and raises it in the export country market.
- An import tariff raises producer surplus in the import market and lowers it in the export country market.
- The national welfare effect of an import tariff is evaluated as the sum of the producer and consumer surplus and government revenue effects.
- National welfare may rise or fall when a large country implements an import tariff.
- National welfare in the exporting country falls when an importing country implements an import tariff.
- An import tariff of any size will reduce world production and consumption efficiency and thus cause world welfare to fall.

? Exercise 7.5.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The product of the specific tariff rate and the quantity of imports.
   b. Of *increase*, *decrease*, or *stay the same*, this is the effect of a tariff on the welfare of consumers of the product in the large importing country.
   c. Of *increase*, *decrease*, or *stay the same*, this is the effect of a tariff on the welfare of producers of the product in the large importing country.
   d. Of *increase*, *decrease*, or *stay the same*, this is the effect of a tariff on the welfare of the recipients of government benefits in the large importing country.
   e. Of *increase*, *decrease*, or *stay the same*, this is the effect of a tariff on the welfare of consumers of the product in the large exporting country.
   f. Of *increase*, *decrease*, or *stay the same*, this is the effect of a tariff on the welfare of producers of the product in the exporting country.
   g. Of *increase*, *decrease*, or *stay the same*, this is the effect of a tariff on the world welfare.
   h. Of *larger*, *smaller*, or *the same*, this is how the magnitude of the consumer losses compares with the magnitude of the producer gains in an importing country implementing a tariff.
   i. Of *larger*, *smaller*, or *the same*, this is how the magnitude of the consumer gains compares with the magnitude of the producer losses in an exporting country affected by a foreign tariff.
2. Consider the following trade policy actions (each applied by the domestic country) listed along the top row of the table below. In the empty boxes, use the following notation to indicate the effect of each policy on the variables listed in the first column. Use a partial equilibrium model to determine the answers and assume that the shapes of the supply and demand curves are "normal." Assume that none of the policies begin with or result in prohibitive trade policies. Also assume that none of the policies correct for market imperfections or distortions. Use the following notation:

   + the variable increases

   − the variable decreases

   0 the variable does not change

   A the variable change is ambiguous (i.e., it may rise, it may fall)

   For example, an import tariff applied by a large country will cause an increase in the domestic price of the import good; therefore, a + is placed in the first box of the table.

Table 7.5.2: Trade Policy Effects

	I	II
	Import Tariff by a Large Country—Initial Tariff Is Zero	Import Tariff Reduction by a Large Country
Domestic Market Price	+	
Domestic Industry Employment		
Domestic Consumer Welfare		

	I	II
	Import Tariff by a Large Country—Initial Tariff Is Zero	Import Tariff Reduction by a Large Country
Domestic Producer Welfare		
Domestic Government Revenue		
Domestic National Welfare		
Foreign Price		
Foreign Consumer Welfare		
Foreign Producer Welfare		
Foreign National Welfare		

3. Consider the following partial equilibrium diagram depicting two countries, China and the United States, trading a product with each other. Suppose P_{FT} is the free trade price, P^{US} is the price in the United States when a tariff is in place, and P_C is the price in China when a tariff is in place. Answer the following questions by referring to the figure below. Assume the letters, A, B, C, D, E, F, G, H, I, and J refer to areas on the graph. The letters v, w, x, y, and z refer to lengths.

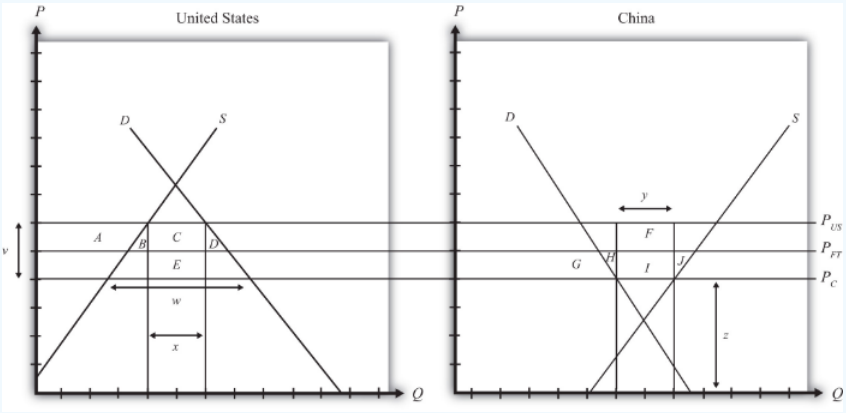


Figure \(\PageIndex{2}\): Two Large Trading Countries

a. Which country is the exporter of the product?
b. Where on the graph is the level of imports depicted with the tariff in place?
c. Which areas on the graph represent the change in consumer surplus for the importing country if the tariff is removed? (Include the sign.)
d. Which areas represent the tariff revenue lost by the importing government?
e. Which areas represent the net national welfare effect of the tariff elimination by the importing country?
f. Which areas represent the net national welfare effect of the tariff elimination in the exporting country?
g. Which areas represent the world welfare effects of the tariff elimination?

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7.6: The Optimal Tariff 7.6: The Optimal TariffEdit Update titlecancel

Learning Objectives

1. Plot the impact of an import tariff in a large country on consumer surplus, producer surplus, government revenue, and national welfare as the tariff is raised from zero.
2. Describe how tariff changes will affect national welfare in different circumstances.

The possibility that a tariff could improve national welfare for a large country in international markets was first noted by Robert Torrens. Since the welfare improvement occurs only if the terms of trade gain exceeds the total deadweight losses, the argument is commonly known as the *terms of trade argument* for protection.

Economists have studied the conditions under which a tariff will improve welfare in a variety of perfectly competitive models. This section describes the general results that come from that analysis.

Consider Figure 7.6.1, which plots the levels of consumer surplus (CS), producer surplus (PS), and tariff revenue (TR) at different tariff rates. The origin corresponds to a zero tariff rate, or free trade. As the tariff is increased from zero, consumer surplus falls since the domestic price rises. This is shown by the solid declining (green) CS line. When the tariff becomes prohibitive at t_p, the price settles at the autarky price, and any further increases in the tariff have no effect on consumer surplus. Hence the CS line becomes flat above t_p.

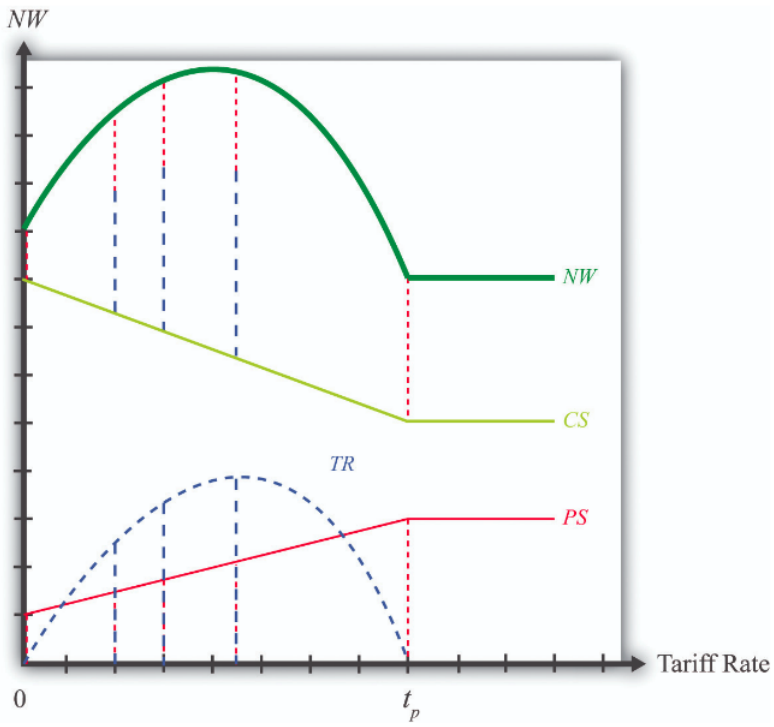


Figure 7.6.1: Derivation of the Optimal Tariff- Large Country

Producer surplus (PS), the red dotted line, rises as the tariff is increased from zero; however, it rises at a lower rate than consumer surplus falls. This occurs because, for an importing country, producer surplus increases are less than the change in consumer surplus for any increase in the tariff. When the prohibitive tariff is reached, again the price settles at the autarky price, and any further increases in the tariff rate have no effect on producer surplus.

Tariff revenue (TR), the blue dashed line, first increases with the increase in the tariff and then decreases for higher tariff rates. This occurs because tariff revenue equals the tariff rate multiplied by imports. As the tariff is increased from zero, imports fall at a slower rate than the increase in the tariff rate, hence revenue rises. Eventually, imports begin to fall faster than the tariff rate rises, and tariff revenue declines. The tariff rate that generates the highest tariff revenue is called the **maximum revenue tariff**.

Another way to see that tariff revenue must rise and then fall with increasing tariffs is to note that when the tariff rate is zero, tariff revenue has to be zero for any level of imports. Also, when the tariff rate is at or above t_p, the prohibitive tariff, imports are zero, thus whatever the tariff rate, tariff revenue again must be zero. Somewhere between a zero tariff and the prohibitive tariff, tariff revenue has to be positive. Thus tariff revenue must rise from zero and then fall back to zero when it reaches t_p.

The national welfare level at each tariff rate is defined as the sum of consumer surplus, producer surplus, and tariff revenue. The vertical summation of these three curves generates the national welfare (NW) curve given by the thick, solid blue-green line. In Figure 7.6.1, the vertical summation is displayed for five different levels of the tariff rate.

The basic shape of the national welfare line is redrawn in Figure 7.6.2. Note that national welfare first rises and then falls as the tariff is increased from zero. For one tariff rate (t_{opt}), the country can realize the highest level of national welfare (NW_{opt}), one that is higher than that achievable in free trade. We call that tariff rate the "optimal tariff." One regularity that results is that the optimal tariff is always less than the maximum revenue tariff.

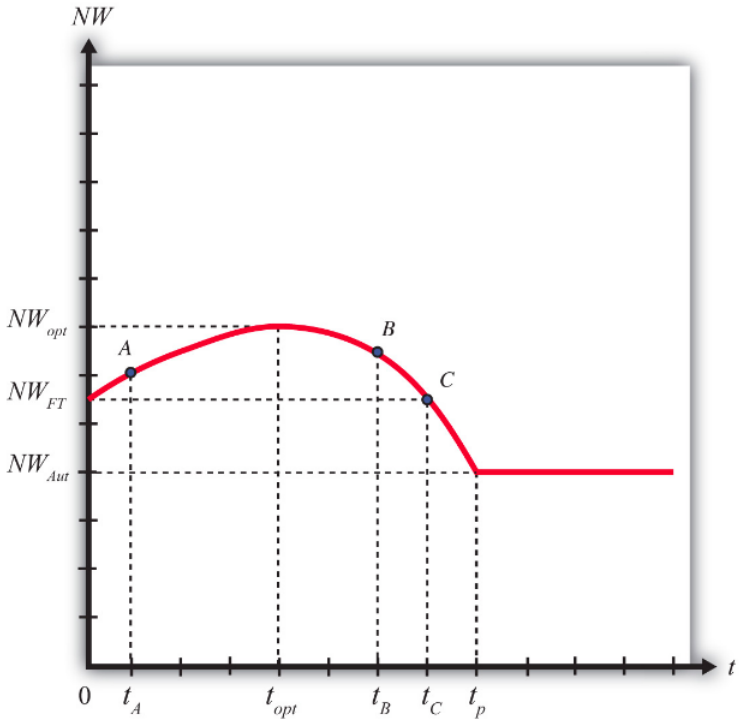


Figure 7.6.2: Optimal Tariff- Large Country Case

If the tariff is raised above the optimal rate, as with an increase from t_{opt} to t_B, then national welfare will fall. The terms of trade gain, which rises as low tariffs are increased, will begin to fall at a higher tariff rate. Since the deadweight losses continue to rise, both effects contribute to the decline in national welfare. Note, however, that at a tariff level like t_B, national welfare still exceeds the free trade level.

Eventually, at even higher tariff rates, national welfare will fall below the free trade level. In Figure 7.6.2, this occurs at tariff rates greater than t_C. The higher the tariff is raised, the lower will be the level of imports. At a sufficiently high tariff, imports will be eliminated entirely. The tariff will prohibit trade. At the prohibitive tariff (t_p), there is no tariff revenue, which implies that the previously positive terms of trade gain is now zero. The only effect of the tariff is the deadweight loss. The economy is effectively in autarky, at least with respect to this one market, hence national welfare is at NW_{Aut}. Note that any additional increases in the tariff above t_p will maintain national welfare at NW_{Aut} since the market remains at the autarky equilibrium.

The National Welfare Effects of Trade Liberalization for a Large Country

Trade liberalization can be represented by a decrease in the tariff rate on imports into a country. If the country is large in international markets, then the analysis in this chapter suggests that the effect on national welfare will depend on the values of the original tariff rate and the liberalized tariff rate.

For example, if the tariff is reduced from t_{opt} to t_A, then national welfare will fall when the country liberalizes trade in this market. However, if the tariff is reduced from t_B to t_{opt}, then national welfare will rise when trade liberalization occurs. This implies that trade liberalization does not necessarily improve welfare for a large importing country.

Key Takeaways

- The optimal tariff is positive for a large importing country.
- National welfare with a zero tariff (free trade) is always higher than national welfare with a prohibitive tariff.
- The maximum revenue tariff is larger than the optimal tariff.
- The reduction of a tariff by a large importing country will lower national welfare if the initial tariff is less than the optimal tariff.

? Exercise 7.6.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. A term used to describe a tariff that will raise national welfare to the greatest extent for a large importing country.
   b. The term used to describe the tariff rate that generates the largest amount of government revenue.
   c. The tariff rate that corresponds to free trade.
   d. The tariff rate that is just sufficient to eliminate trade with the rest of the world.
   e. Of *higher*, *lower*, or *the same*, this is how national welfare in free trade compares with national welfare in autarky.
   f. Of *higher*, *lower*, or *the same*, this is how national welfare at the optimal tariff compares with national welfare in autarky.
   g. Of *higher*, *lower*, or *the same*, this is how national welfare at the maximum revenue tariff compares with national welfare at the optimal tariff.
   h. Of *higher*, *lower*, or *the same*, this is how producer welfare in free trade compares with producer welfare in autarky.
   i. Of *higher*, *lower*, or *the same*, this is how consumer welfare in free trade compares with consumer welfare in autarky.

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7.7: Import Tariffs- Small Country Price Effects 7.7: Import Tariffs- Small Country Price EffectsEdit Update titlecancel

Learning Objectives

1. Identify the effects of a specific tariff on prices in both countries and the quantity traded.
2. Know the equilibrium conditions that must prevail in a tariff equilibrium.

The small country assumption means that the country's imports are a very small share of the world market—so small that even a complete elimination of imports would have an imperceptible effect on world demand for the product and thus would not affect the world price. Thus when a tariff is implemented by a small country, there is no effect on the world price.

The small country assumption implies that the export supply curve is horizontal at the level of the world price. The small importing country takes the world price as exogenous since it can have no effect on it. The exporter is willing to supply as much of the product as the importer wants at the given world price.

When the tariff is placed on imports, two conditions must hold in the final equilibrium—the same two conditions as in the case of a large country—namely,

$$P_T^{Mex} = P_T^{US} + T$$

and

$$XS^{US}(P_T^{US}) = MD^{Mex}(P_T^{Mex}).$$

However, now P_T^{US} remains at the free trade price. This implies that, in the case of a small country, the price of the import good in the importing country will rise by the amount of the tariff, or in other words $P_T^{Mex} = P_{FT} + T$. As seen in Figure 7.7.1, the higher domestic price reduces import demand and export supply to Q_T.

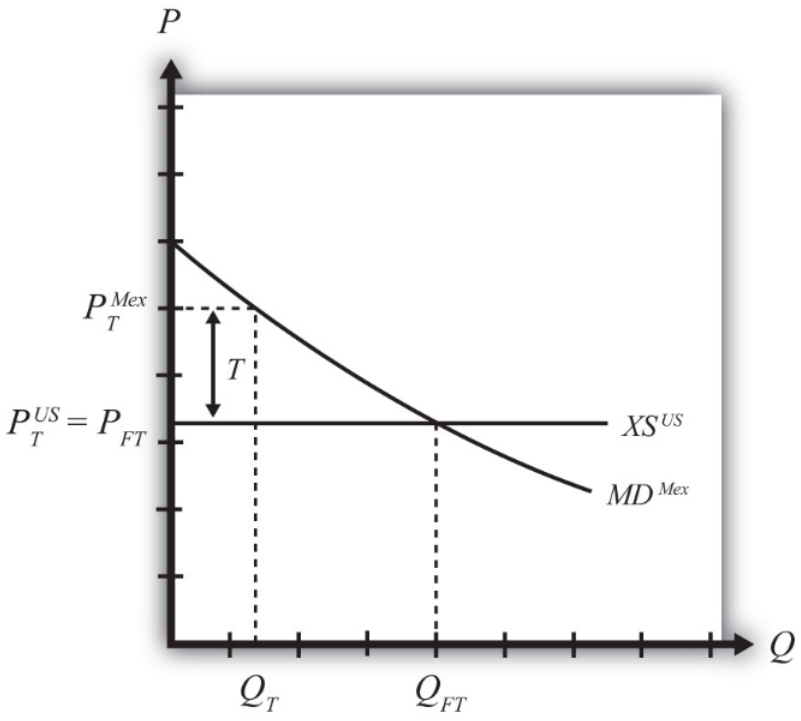


Figure 7.7.1: Depicting a Tariff Equilibrium- Small Country Case

Key Takeaways

- An import tariff will raise the domestic price and, in the case of a small country, leave the foreign price unchanged.
- An import tariff will reduce the quantity of imports.

- An import tariff will raise the domestic price of imports and import-competing goods by the full amount of the tariff.
- With the tariff in place in a two-country model, export supply at the unchanged foreign price will equal import demand at the higher domestic price.

Exercise 7.7.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The world price of butter if a small country has a tariff of $0.50 per pound in place and butter sells for $4.50 per pound.
   b. The amount the domestic auto price rises if a small country places a $100 tariff on auto imports.
   c. Of *increase*, *decrease*, or *stay the same*, the effect on the world price when a small importing country implements a tariff.
   d. Of *increase*, *decrease*, or *stay the same*, the effect on the import volume of a product when a small importing country implements a tariff.
   e. Of *increase*, *decrease*, or *stay the same*, the effect on the exports from the rest of the world when a small importing country implements a tariff on the product.

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7.8: Import Tariffs- Small Country Welfare Effects 7.8: Import Tariffs- Small Country Welfare EffectsEdit Update titlecancel

Learning Objectives

1. Use a partial equilibrium diagram to identify the welfare effects of an import tariff on producer and consumer groups and the government in the importing country.
2. Calculate the national welfare effects of an import tariff.

Consider a market in a small importing country that faces an international or world price of P_{FT} in free trade. The free trade equilibrium is depicted in Figure 7.8.1, where P_{FT} is the free trade equilibrium price. At that price, domestic demand is given by D_{FT}, domestic supply by S_{FT}, and imports by the difference $D_{FT} - S_{FT}$ (the blue line in the figure).

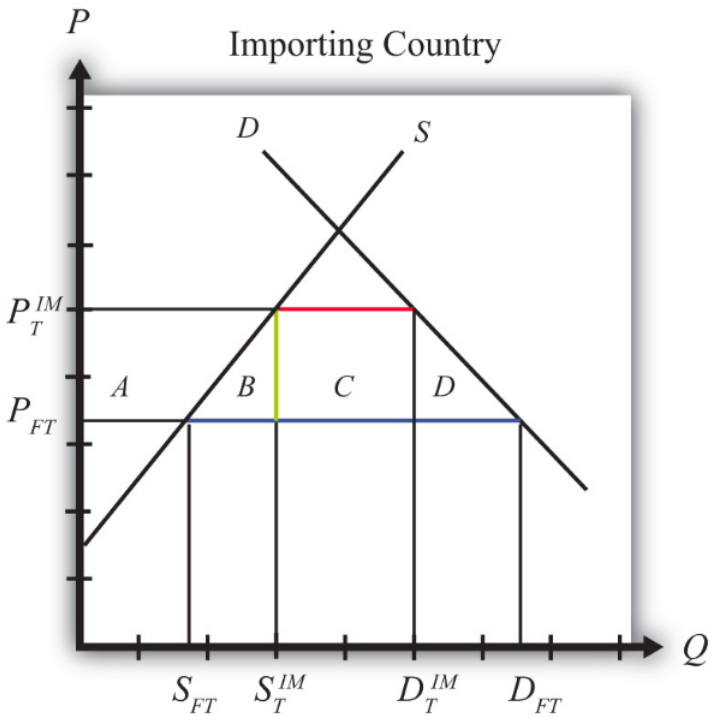


Figure 7.8.1: Welfare Effects of a Tariff- Small Country Case

When a specific tariff is implemented by a small country, it will raise the domestic price by the full value of the tariff. Suppose the price in the importing country rises to P_T^{IM} because of the tariff. In this case, the tariff rate would be $t = P_T^{IM} - P_{FT}$, equal to the length of the green line segment in the figure.

Table 7.8.1 provides a summary of the direction and magnitude of the welfare effects to producers, consumers, and the governments in the importing country. The aggregate national welfare effect is also shown.

Table 7.8.1: Welfare Effects of an Import Tariff

	Importing Country
Consumer Surplus	− (*A* + *B* + *C* + *D*)
Producer Surplus	+ *A*
Govt. Revenue	+ *C*
National Welfare	− *B* − *D*

Refer to Table 7.8.1 and Figure 7.8.1 to see how the magnitudes of the changes are represented.

Tariff effects on the importing country's consumers. Consumers of the product in the importing country are worse off as a result of the tariff. The increase in the domestic price of both imported goods and the domestic substitutes reduces consumer surplus in the market.

Tariff effects on the importing country's producers. Producers in the importing country are better off as a result of the tariff. The increase in the price of their product increases producer surplus in the industry. The price increases also induce an increase in the output of existing firms (and perhaps the addition of new firms), an increase in employment, and an increase in profit, payments, or both to fixed costs.

Tariff effects on the importing country's government. The government receives tariff revenue as a result of the tariff. Who will benefit from the revenue depends on how the government spends it. These funds help support diverse government spending programs; therefore, someone within the country will be the likely recipient of these benefits.

Tariff effects on the importing country. The aggregate welfare effect for the country is found by summing the gains and losses to consumers, producers, and the government. The net effect consists of two components: a negative production efficiency loss (B) and a negative consumption efficiency loss (D). The two losses together are typically referred to as "deadweight losses."

Because there are only negative elements in the national welfare change, the net national welfare effect of a tariff must be negative. This means that **a tariff implemented by a small importing country must reduce national welfare**.

In summary, the following are true:

1. Whenever a small country implements a tariff, national welfare falls.
2. The higher the tariff is set, the larger will be the loss in national welfare.
3. The tariff causes a redistribution of income. Producers and the recipients of government spending gain, while consumers lose.
4. Because the country is assumed to be small, the tariff has no effect on the price in the rest of the world; therefore, there are no welfare changes for producers or consumers there. Even though imports are reduced, the related reduction in exports by the rest of the world is assumed to be too small to have a noticeable impact.

Key Takeaways

- An import tariff lowers consumer surplus and raises producer surplus in the import market.
- An import tariff by a small country has no effect on consumers, producers, or national welfare in the foreign country.
- The national welfare effect of an import tariff is evaluated as the sum of the producer and consumer surplus and government revenue effects.
- An import tariff of any size will result in deadweight losses and reduce production and consumption efficiency.
- National welfare falls when a small country implements an import tariff.

? Exercise 7.8.1

1. Consider the following trade policy action (applied by the domestic country) listed along the top row of the table below. In the empty boxes, use the following notation to indicate the effect of the policy on the variables listed in the first column. Use a partial equilibrium model to determine the answers, and assume that the shapes of the supply and demand curves are "normal." Assume that the policy does not begin with, or result in, prohibitive trade policies. Also assume that the policy does not correct for market imperfections or distortions. Use the following notation:

   + the variable increases

   − the variable decreases

   0 the variable does not change

   A the variable change is ambiguous (i.e., it may rise, it may fall)

Table 7.8.2: Trade Policy Effects

	Import Tariff Reduction by a Small Country
Domestic Market Price	
Domestic Industry Employment	
Domestic Consumer Welfare	

	Import Tariff Reduction by a Small Country
Domestic Producer Welfare	
Domestic Government Revenue	
Domestic National Welfare	
Foreign Price	
Foreign Consumer Welfare	
Foreign Producer Welfare	
Foreign National Welfare	

2. Consider the following partial equilibrium diagram depicting the market for radios in Portugal, a small importing country. Suppose P_{FT} is the free trade price and P_T is the price in Portugal when a tariff is in place. Answer the following questions by referring to the diagram. Assume the letters, A, B, C, D, and E refer to areas on the graph. The letters v, w, x, and y refer to lengths. (Be sure to include the direction of changes by indicating "+" or "−.")

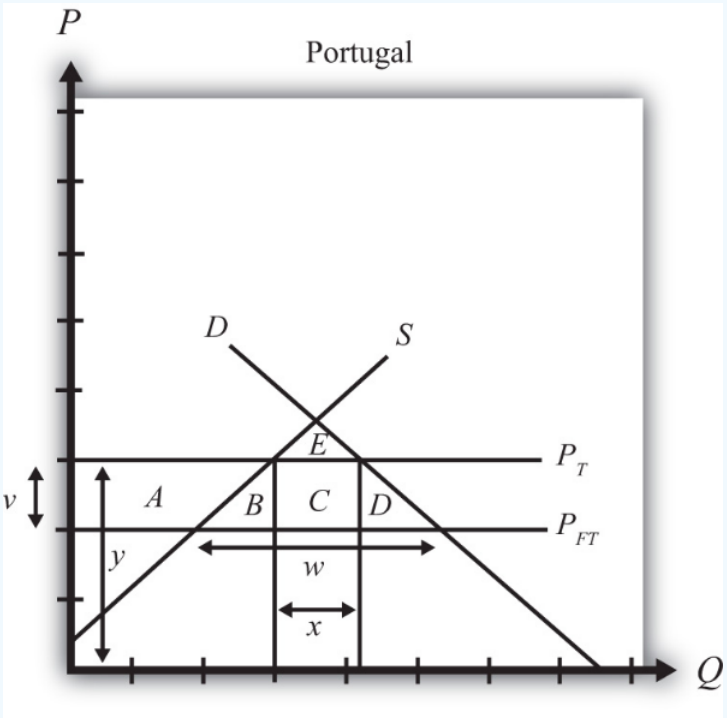


Figure 7.8.2: A Small Trading Country

a. Where on the graph is the level of imports in free trade?
b. Which area or areas represent the *level* of consumer surplus in free trade?
c. Which area or areas represent the *level* of producer surplus in free trade?
d. Where on the graph is the size of the tariff depicted?
e. Where on the graph is the level of imports after the tariff depicted?
f. Which area or areas represent the tariff revenue collected by the importing government with the tariff in place?
g. Which area or areas represent the change (+/−) in consumer surplus when the tariff is applied?
h. Which area or areas represent the change (+/−) in producer surplus when the tariff is applied?
i. Which area or areas represent the change (+/−) in national welfare when the tariff is applied?
j. Which area or areas represent the efficiency losses that arise with the tariff?

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7.9: Retaliation and Trade Wars 7.9: Retaliation and Trade WarsEdit Update titlecancel

Learning Objectives

1. Identify the key components to describe an economic game, including players, strategies, objectives, and equilibrium concepts.
2. Determine both noncooperative and cooperative equilibria in an economic game.

The analysis of tariffs in a perfectly competitive market demonstrates that if a large country imposes a relatively small tariff, or if it imposes an optimal tariff, then domestic national welfare will rise but foreign national welfare will fall. The partial equilibrium analysis shows further that national welfare losses to the exporting nation exceed the national welfare gains to the importing nation. The reason is that any tariff set by a large country also reduces world welfare.

If we assume that nations are concerned about the national welfare effects of trade policies, then the tariff analysis provides a rationale for protectionism on the part of large importing nations. However, if large importing nations set optimal tariffs on all or many of their imported goods, the effect internationally will be to reduce the national welfare of its trading partners. If the trade partners are also concerned about their own national welfare, then they would likely find the optimal tariffs objectionable and would look for ways to mitigate the negative effects.

One effective way to mitigate the loss in national welfare, if the trade partners are also large countries, is to retaliate with optimal tariffs on your own imported goods. Thus if country A imports wine, cheese, and wheat from country B, and A places optimal tariffs on imports of these products, then country B could retaliate by imposing optimal tariffs on its imports of, say, lumber, televisions, and machine tools from country A. By doing so, country B could offset its national welfare losses in one set of markets with national welfare gains in another set.

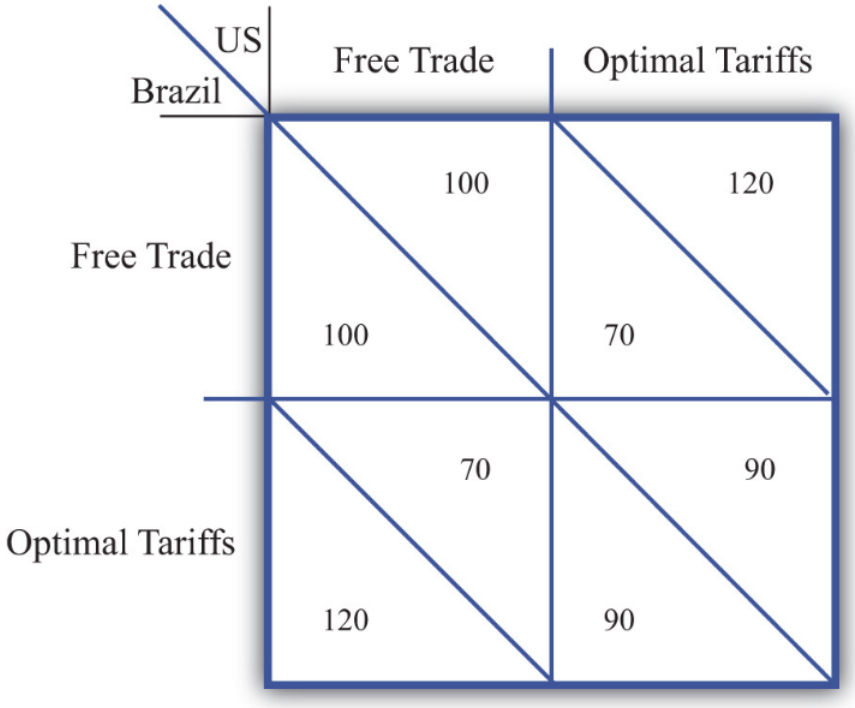


Figure 7.9.1: A Trade Policy Game

We examine the effects of optimal tariffs and retaliation more formally by using a simple game theory setup. Suppose the players in the game are the governments of two large countries, the United States and Brazil. Suppose the United States imports a set of products (A, B, C, etc.) from Brazil, while Brazil imports a different set of products (X, Y, Z, etc.) from the United States. We imagine that each country's government must choose between two distinct trade policies, free trade and optimal tariffs. Each policy choice represents a game strategy. If the United States chooses free trade, then it imposes no tariffs on imports of goods A, B, C,

and so on. If the United States chooses optimal tariffs, then it determines the optimal tariff in each import market and sets the tariff accordingly. Brazil is assumed to have the same set of policy choices available.

In Figure 7.9.1, U.S. strategies are represented by the two columns; Brazilian strategies correspond to the two rows. The numbers represent the payoffs to the countries, measured as the level of national welfare realized in each country in each of the four possible scenarios. For example, if the United States chooses a free trade policy and Brazil chooses to impose optimal tariffs, then the payoffs are shown in the lower left-hand box. The Brazilian payoff is below the diagonal, while the U.S. payoff is above the diagonal. Thus Brazil gets 120 units of welfare, while the United States gets 70 units.

Note that the size of the numbers used in the example is immaterial, but how they relate to the numbers in alternate boxes is not. We will use the results from the tariff analysis section to inform us about the relationship between the numbers.

To begin, let's assume that each country receives 100 units of national welfare when both the United States and Brazil choose free trade. If Brazil decides to impose optimal tariffs on all of its imports and the United States maintains its free trade position, then a partial equilibrium welfare analysis suggests the following:

1. Brazilian welfare will rise (we'll assume from 100 to 120 units).
2. U.S. welfare will fall (we'll assume from 100 to 70 units).
3. World welfare will fall (thus the sum of the U.S. and Brazilian welfare initially is 200 units but falls to 120 + 70 = 190 afterward).

Similarly, if the United States imposes optimal tariffs on all of its imports while Brazil maintains free trade, then the countries will realize the payoffs in the upper right-hand box. The United States would get 120 units of welfare, while Brazil would get 70. To keep the example simple, we are assuming that the effects of tariffs are symmetric. In other words, the effect of U.S. optimal tariffs on the two countries is of the same magnitude as the effects of Brazilian tariffs.

Finally, if both countries set optimal tariffs against each other, then we can simply sum up the total effects. Since each country's actions raise its own welfare by 20 units and lower its trade partner's welfare by 30 units, when both countries impose tariffs, national welfare falls to 90 units in each country.

To determine which strategy the two governments would choose in this game, we need to identify the objectives of the players and the degree of cooperation. Initially, we will assume that each government is interested in maximizing its own national welfare and that the governments do not cooperate with each other. Afterward, we will consider the outcome when the governments do cooperate.

The Noncooperative Solution (Nash Equilibrium)

A noncooperative solution is a set of strategies such that each country maximizes its own national welfare subject to the strategy chosen by the other country. Thus, in general, if the U.S. strategy (r) maximizes U.S. welfare, when Brazil chooses its strategy (s) and if Brazil's strategy (s) maximizes Brazil's welfare when the United States chooses strategy (r), then the strategy set (r,s) is a noncooperative solution to the game. A noncooperative solution is also commonly known as a Nash equilibrium.

How to Find a Nash Equilibrium

One can determine a Nash equilibrium in a simple two-player, two-strategy game by choosing a strategy for one of the players and answering the following series of questions:

1. Given the policy choice of the first player, what is the optimal policy of the second player?
2. Given the policy choice of the second player (from step one), what is the first player's optimal policy choice?
3. Given player one's optimal policy choice (from step two), what is the second player's optimal policy choice?

Continue this series of questions until neither player switches its strategy. Then this set of strategies is a Nash equilibrium.

In the trade policy game, the **Nash equilibrium** or noncooperative solution is the set of strategies (optimal tariffs, optimal tariffs). That is, both the United States and Brazil would choose to implement optimal tariffs. Why?

First, suppose the United States chooses the free trade strategy. Brazil's optimal policy, given the U.S. choice, is to implement optimal tariffs. This is because 120 units of national welfare are greater than 100 units. Second, if Brazil chooses optimal tariffs, then the optimal policy of the United States is optimal tariffs, since 90 units of welfare are greater than 70 units. Finally, if the United States chooses optimal tariffs, then Brazil's best choice is optimal tariffs since 90 is greater than 70.

The Cooperative Solution

A cooperative solution to a game is a set of strategies that would maximize the sum total of the benefits accruing to the players. In some instances, a cooperative outcome may require the transfer of goods or money between players to assure that each player is made better off than under alternative strategy choices. In this game, such a transfer is not required, however.

The cooperative solution in the trade policy game is the set of strategies (free trade, free trade). At this outcome, total world welfare is at a maximum of 200 units.

Implications and Interpretations

First of all, notice that in the noncooperative game, each country is acting in its own best interests, yet the outcome is one that is clearly inferior for both countries relative to the cooperative strategy set (free trade, free trade). When both countries set optimal tariffs, each country realizes 90 units of welfare, while if both countries pursued free trade, each country would realizes 100 units of welfare. This kind of result is often referred to as a prisoner's dilemma outcome. The dilemma is that pursuit of self-interest leads to an inferior outcome for both participants.

However, without cooperation, it may be difficult for the two countries to realize the superior free trade outcome. If both countries begin in free trade, each country has an individual incentive to deviate and implement optimal tariffs. And if either country does deviate, then the other would either suffer the welfare losses caused by the other country's restrictions or retaliate with tariff increases of its own in order to recoup some of the losses. This scenario in which one country retaliates in response to another's trade policy could be thought of as a trade war.

This story closely corresponds with events after the Smoot-Hawley Tariff Act was passed in the United States in 1930. The Smoot-Hawley Tariff Act raised tariffs to an average rate of 60 percent on many products imported into the United States. Although it is unlikely that the U.S. government set optimal tariffs, the tariffs nevertheless reduced foreign exports to the United States and injured foreign firms. In response to the U.S. tariffs, approximately sixty foreign nations retaliated and raised their tariffs on imports from the United States. The net effect was a substantial reduction in world trade, which very likely contributed to the length and severity of the Great Depression.

After World War II, the United States and other allied nations believed that high restrictions on trade were detrimental to growth in the world economy. The General Agreement on Tariffs and Trade (GATT) was initiated to promote trade liberalization among its member countries. The method of GATT was to hold multilateral tariff reduction "rounds." At each round, countries would agree to lower tariffs on imports by a certain average percentage in exchange for a reduction in tariffs by other countries by an equal percentage. Although GATT agreements never achieved a movement to free trade by all member countries, they do represent movements in that direction.

In a sense, then, the GATT represents an international cooperative agreement that facilitates movement toward the free trade strategy set for all countries. If a GATT member nation refuses to reduce its tariffs, then other members refuse to lower theirs. If a GATT member raises its tariffs on some product above the level to which it had previously agreed, then the other member nations are allowed, under the agreement, to retaliate with increases in their own tariffs. In this way, nations have a greater incentive to move in the direction of free trade and a disincentive to take advantage of others by unilaterally raising their tariffs.

The simple prisoner's dilemma trade policy game therefore offers a simple explanation of the need for international organizations like the GATT or the World Trade Organization (WTO). These agreements may represent methods to achieve cooperative solutions between trading countries.

Key Takeaways

- The goal of a noncooperative, or Nash, equilibrium in an optimal tariff game between two countries is for both countries to impose optimal tariffs.
- The goal of a cooperative equilibrium in an optimal tariff game between two countries is for both countries to set zero tariffs—that is, to choose free trade.
- The Nash equilibrium in an optimal tariff game between two countries is a "prisoner's dilemma" outcome because there is another set of strategies (not chosen) that could make both countries better off.
- The WTO, and the GATT before it, represents mechanisms by which countries can achieve the cooperative equilibrium.

Exercise 7.9.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The term used to describe a country’s countertrade actions in response to its trading partner’s increase in tariffs.
   b. The name given to a noncooperative solution to an economic game.
   c. The term used to describe an economic game equilibrium that maximizes the sum of the payoffs to all players.
2. Consider the following trade policy game between two small country governments, Kenya and Ethiopia. The policy choices for each government are either to choose free trade on all imports or to place a 15 percent tariff on all imports. The national welfare payoffs for each country when both choose free trade are given as (100, 100). The first 100 is Kenya’s national welfare; the second is Ethiopia’s.

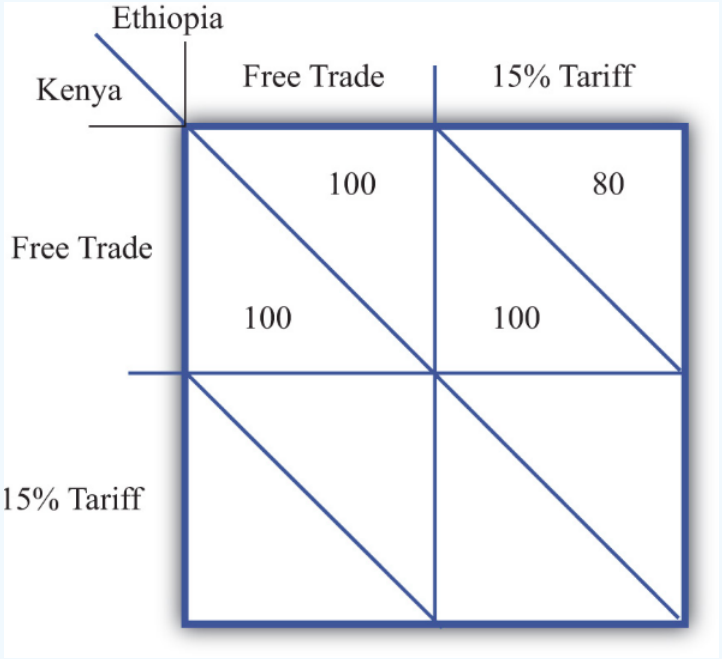


Figure 7.9.2: A Trade Policy Game

   a. Based on the tariff analysis for a small importing country and assuming symmetry between the two countries, complete the empty two cells in the table above.
   b. Based on the numbers you provided in part a, identify which cell corresponds to the Nash (or noncooperative) equilibrium.
   c. Which cell corresponds to the cooperative equilibrium?
   d. Does this game help justify a trade liberalization organization like the WTO?

3. Suppose the United States (US) and Costa Rica (CR) are two countries among many others in the world. The US is a large country and thus its import tariffs will lower the price of CR’s exports. CR, however, is a small country, so its tariffs do not affect prices in the US. Assume the US government can choose free trade, optimal tariffs, or 20 percent tariffs. CR can choose free trade, 10 percent tariffs, or 20 percent tariffs on all imports. The national welfare payoffs for each country in five cases are given. The first term is the US’s national welfare; the second is CR’s.

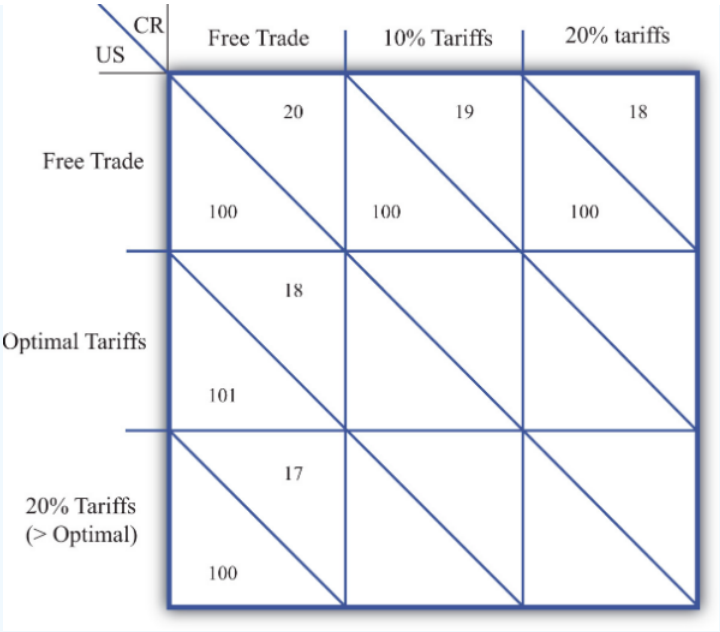


Figure 7.9.3: A Trade Policy Game

a. Use the information provided in the table to complete the four empty cells.
b. Among the nine outcomes, which would CR most prefer?
c. Among the nine outcomes, which would the US most prefer?
d. Identify which cell or cells correspond to a Nash (or noncooperative) equilibrium.
e. Which cell corresponds to the cooperative equilibrium?

4. Consider the following trade policy game between two large country governments, the US and the EU. The policy choices for each government are to choose either free trade on all imports or to place an optimal tariff on all imports. The national welfare payoffs for each country when both choose free trade are given as (50, 50). The first term is the US's national welfare; the second is the EU's.

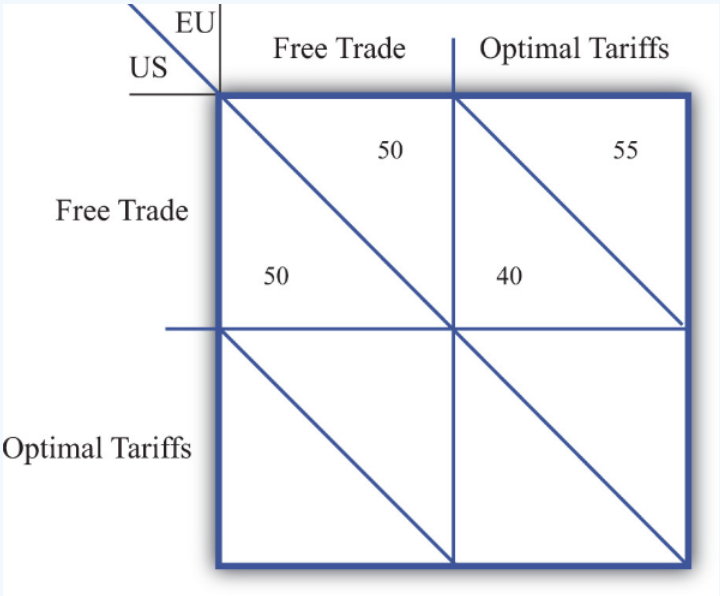


Figure 7.9.4: A Trade Policy Game

a. Based on the tariff analysis for a large importing country and assuming symmetry between the two countries, complete the empty two cells in the table.
b. Among the four outcomes, which would the US most prefer? Which would the EU most prefer?
c. Identify which cell corresponds to the Nash (or noncooperative) equilibrium.

d. Which cell corresponds to the cooperative equilibrium?
e. Does this game help justify a trade liberalization organization like the WTO?

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7.10: Import Quotas- Large Country Price Effects 7.10: Import Quotas- Large Country Price EffectsEdit Update titlecancel

Learning Objectives

1. Identify the effects of an import quota on prices in both countries and the quantity traded.
2. Know the equilibrium conditions that must prevail in a quota equilibrium.

Suppose Mexico, the importing country in free trade, imposes a binding import quota on wheat. The quota will restrict the flow of wheat across the border. As a result, the supply of wheat to the Mexican market will fall, and if the price remains the same, it will cause excess demand for wheat in the market. The excess demand will induce an increase in the price of wheat. Since wheat is homogeneous and the market is perfectly competitive, the price of all wheat sold in Mexico, both Mexican wheat and U.S. imports, will rise in price. The higher price will, in turn, reduce demand and increase domestic supply, causing a reduction in Mexico's import demand.

The restricted wheat supply to Mexico will shift supply back to the U.S. market. Since Mexico is assumed to be a large importer, the supply shifted back to the U.S. market will generate excess supply in the U.S. market at the original price and cause a reduction in the U.S. price. The lower price will, in turn, reduce U.S. supply, raise U.S. demand, and cause a reduction in U.S. export supply.

These price effects are identical in direction to the price effects of an import tax, a voluntary export restraint, and an export tax.

A new quota equilibrium will be reached when the following two conditions are satisfied:

$$MD^{Mex}(P_Q^{Mex}) = \bar{Q}$$

and

$$XS^{US}(P_Q^{US}) = \bar{Q},$$

where $\bar{Q}$ is the quantity at which the quota is set, P_Q^{Mex} is the price in Mexico after the quota, and P_Q^{US} is the price in the United States after the quota.

The first condition says that the price must change in Mexico such that import demand falls to the quota level $\bar{Q}$. In order for this to occur, the price in Mexico rises. The second condition says that the price must change in the United States such that export supply falls to the quota level $\bar{Q}$. In order for this to occur, the price in the United States falls.

The quota equilibrium is depicted on the graph in Figure 7.10.1. The Mexican price of wheat rises from P_{FT} to P_Q^{Mex}, which is sufficient to reduce its import demand from Q_{FT} to $\bar{Q}$. The U.S. price of wheat falls from P_{FT} to P_Q^{US}, which is sufficient to reduce its export supply from Q_{FT} to $\bar{Q}$.

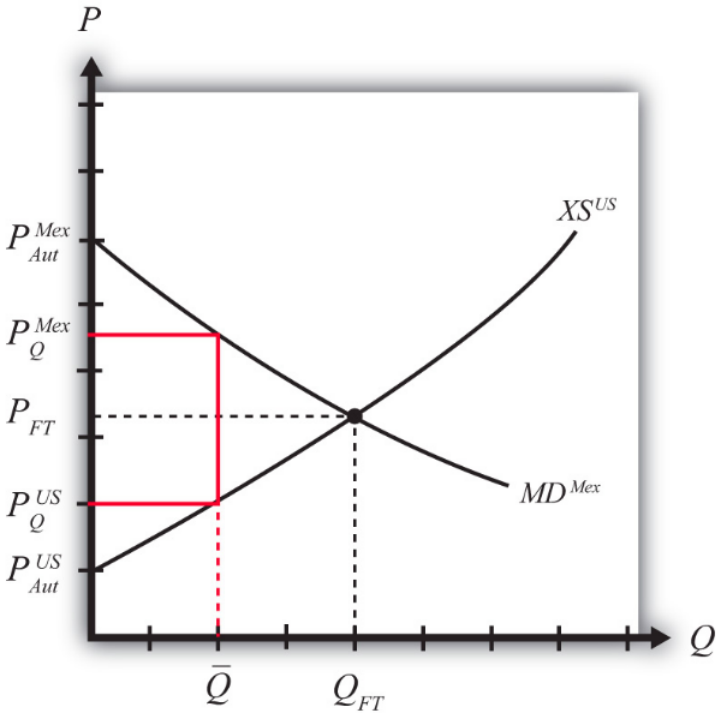


Figure 7.10.1: Depicting a Quota Equilibrium- Large Country Case

Notice that there is a unique set of prices that satisfies the equilibrium conditions for every potential quota that is set. If the quota were set lower than $\bar{Q}$, the price wedge would rise, causing a further increase in the Mexican price and a further decrease in the U.S. price.

At the extreme, if the quota were set equal to zero, then the prices in each country would revert to their autarky levels. In this case, the quota would *prohibit* trade.

Key Takeaways

- An import quota will raise the domestic price and, in the case of a large country, lower the foreign price.
- The difference between the foreign and domestic prices after the quota is implemented is known as a quota rent.
- An import quota will reduce the quantity of imports to the quota amount.

Exercise 7.10.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The direction of change of domestic producer surplus when an import quota is implemented by a domestic country.
   b. The direction of change of the domestic price after a binding import quota is implemented by a domestic country.
   c. The direction of change of the foreign price after a binding import quota is implemented by a large domestic country.
   d. Of *increase*, *decrease*, or *stay the same*, this is the effect on the domestic price after a nonbinding import quota is implemented by a domestic country.
   e. The term used to describe a zero quota that eliminates trade.
   f. Of *increase*, *decrease*, or *stay the same*, this is the effect on the price of U.S.-made automobiles if the United States restricts the quantity of imported foreign automobiles.
   g. Of *increase*, *decrease*, or *stay the same*, this is the effect on the quantity of wheat imports if a binding import quota is implemented.
   h. Of *increase*, *decrease*, or *stay the same*, this is the effect on foreign exports of wheat if a binding import quota is implemented by an importing country.

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7.11: Administration of an Import Quota 7.11: Administration of an Import QuotaEdit Update titlecancel

Learning Objectives

1. Learn the different ways in which an import quota can be implemented to monitor and assure that only the specified amount is allowed to enter.

When a quantity restriction is set by a government, it must implement procedures to prevent imports beyond the restricted level. A binding import quota will result in a higher price in the import country and, in the case of a large country, a price reduction in the exporter's market. The price wedge would generate profit opportunities for anyone who could purchase (or produce) the product at the lower price (or cost) in the export market and resell it at the higher price in the import market.

Three basic methods are used to administer import quotas.

1. *Offer quota rights on a first-come, first-served basis*. The government could allow imports to enter freely from the start of the year until the quota is filled. Once filled, customs officials would prohibit entry of the product for the remainder of the year. If administered in this way, the quota may result in a fluctuating price for the product over the year. During the open period, a sufficient amount of imports may flow in to achieve free trade prices. Once the window is closed, prices would revert to the autarky prices.
2. *Auction quota rights*. Essentially, the government could sell quota tickets, where each ticket presented to a customs official would allow the entry of one unit of the good. If the tickets are auctioned, or if the price is determined competitively, the price at which each ticket would be sold is the difference in prices that exists between the export and import market. The holder of a quota ticket can buy the product at the low price in the exporter's market and resell it at the higher price in the importer's market. If there are no transportation costs, a quota holder can make a pure profit, called a quota rent, equal to the difference in prices. If the government sells the quota tickets at the maximum attainable price, then the government would receive all the quota rents.
3. *Give away quota rights*. The government could give away the quota rights by allocating quota tickets to appropriate individuals. The recipient of a quota ticket essentially receives a windfall profit since, in the absence of transportation costs, they can claim the entire quota rent at no cost to themselves. Governments often allocate the quota tickets to domestic importing companies based on past market shares. Thus, if an importer of the product had imported 20 percent of all imports prior to the quota, then it would be given 20 percent of the quota tickets. Sometimes governments give the quota tickets away to foreigners. In this case, the allocation acts as a form of foreign aid since the foreign recipients receive the quota rents. It is worth noting that because quota rents are so valuable, a government can use them to direct rents toward its political supporters.

Key Takeaways

- To administer a quota, countries generally issue quota tickets, or import licenses, with the allowable import quantity limited in total to the quota level.
- The government earns revenue from the quota rents if it allocates the quota tickets via auction or sale.
- If the government gives the quota tickets away, the recipients of the quota tickets earn the quota rents.

Exercise 7.11.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. Of *domestic* or *foreign* residents, this group receives quota rents when the government sells the right to import.
   b. The term for the quota allocation method in which imports are allowed freely until the quota limit is reached.
   c. The term used to describe the sale of quota rights to the highest bidder.
   d. The likely recipients if new quota rights are given away by the government.
   e. The term used to describe the profit made by a quota rights holder who can purchase the product cheaper in the export market and sell it for more in the import market.

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7.12: Import Quota- Large Country Welfare Effects 7.12: Import Quota- Large Country Welfare EffectsEdit Update titlecancel

Learning Objectives

1. Use a partial equilibrium diagram to identify the welfare effects of an import quota on producer and consumer groups and the government in the importing and exporting countries.
2. Calculate the national and world welfare effects of an import quota.

Suppose for simplicity that there are only two trading countries: one importing country and one exporting country. The supply and demand curves for the two countries are shown in Figure 7.12.1. P_{FT} is the free trade equilibrium price. At that price, the excess demand by the importing country equals the excess supply by the exporter.

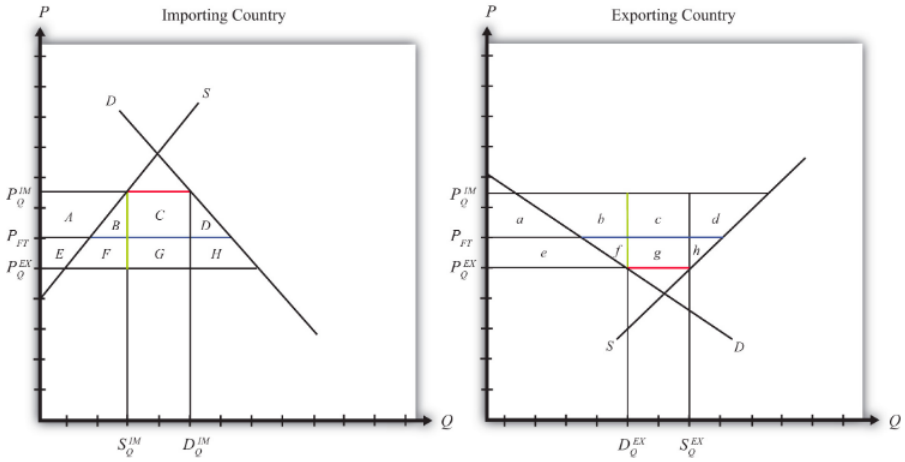


Figure 7.12.1: Welfare Effects of a Quota- Large Country Case

The free trade quantity of imports and exports is shown as the blue line segment on each country's graph (the horizontal distance between the supply and demand curves at the free trade price). Suppose the large importing country implements a binding quota set equal to the length of the red line segment (the horizontal distance between the supply and demand curves at either the higher import price or the lower export price). When a new equilibrium is reached, the price in the importing country will rise until import demand is equal to the quota level. The price in the exporting country will fall until export supply is equal to the quota level.

Table 7.12.1 provides a summary of the direction and magnitude of the welfare effects to producers, consumers, and the governments in the importing and exporting countries. The aggregate national welfare effects and the world welfare effects are also shown.

Table 7.12.1: Welfare Effects of an Import Quota

	Importing Country	Exporting Country
Consumer Surplus	$-(A+B+C+D)$	$+e$
Producer Surplus	$+A$	$-(e+f+g+h)$
Quota Rents	$+(C+G)$	0
National Welfare	$+G-(B+D)$	$-(f+g+h)$
World Welfare	$-(B+D)-(f+h)$	

Refer to Table 7.12.1 and Figure 7.12.1 to see how the magnitude of the changes is represented.

Import quota effects on the importing country's consumers. Consumers of the product in the importing country suffer a reduction in well-being as a result of the quota. The increase in the domestic price of both imported goods and the domestic substitutes reduces the amount of consumer surplus in the market.

Import quota effects on the importing country's producers. Producers in the importing country experience an increase in well-being as a result of the quota. The increase in the price of their product on the domestic market increases producer surplus in the industry. The price increases also induce an increase in the output of existing firms (and perhaps the addition of new firms), an increase in employment, and an increase in profit, payments, or both to fixed costs.

Import quota effects on the quota rents. Who receives the quota rents depends on how the government administers the quota.

1. If the government auctions the quota rights for their full price, then the government receives the quota rents. In this case, the quota is equivalent to a specific tariff set equal to the difference in prices ($T = P_Q^{IM} - P_Q^{EX}$), shown as the length of the green line segment in Figure 7.12.1.
2. If the government gives away the quota rights, then the quota rents accrue to whoever receives these rights. Typically, they would be given to someone in the importing economy, which means that the benefits would remain in the domestic economy.
3. If the government gives the quota rights away to foreigners, then the foreigners receive the quota rents. This would imply that these rents should be shifted to the exporting country's effects and subtracted from the importing country's effects.

Import quota effects on the importing country. The aggregate welfare effect for the country is found by summing the gains and losses to consumers, producers, and the recipients of the quota rents. Assume that the quota rent recipients are domestic residents. The net effect consists of three components: a positive terms of trade effect (G), a negative production distortion (B), and a negative consumption distortion (D).

Because there are both positive and negative elements, the net national welfare effect can be either positive or negative. The interesting result, however, is that it can be *positive*. This means that a quota implemented by a large importing country *may* raise national welfare.

Generally speaking, the following are true:

1. Whenever a large country implements a small restriction on imports, it will raise national welfare.
2. If the quota is too restrictive, national welfare will fall.
3. There will be a positive quota level that will maximize national welfare.

However, it is also important to note that not everyone's welfare rises when there is an increase in national welfare. Instead, there is a redistribution of income. Producers of the product and recipients of the quota rents will benefit, but consumers will lose. A national welfare increase, then, means that the sum of the gains exceeds the sum of the losses across all individuals in the economy. Economists generally argue that, in this case, compensation from winners to losers can potentially alleviate the redistribution problem.

Import quota effects on the exporting country's consumers. Consumers of the product in the exporting country experience an increase in well-being as a result of the quota. The decrease in their domestic price raises the amount of consumer surplus in the market.

Import quota effects on the exporting country's producers. Producers in the exporting country experience a decrease in well-being as a result of the quota. The decrease in the price of their product in their own market decreases producer surplus in the industry. The price decline also induces a decrease in output, a decrease in employment, and a decrease in profit, payments, or both to fixed costs.

Import quota effects on the quota rents. There are no quota rent effects on the exporting country as a result of the importer's quota unless the importing government gives away the quota rights to foreigners. Only in this case would the rents accrue to someone in the exporting country.

Import quota effects on the exporting country. The aggregate welfare effect for the country is found by summing the gains and losses to consumers and producers. The net effect consists of three components: a negative terms of trade effect (g), a negative consumption distortion (f), and a negative production distortion (h).

Since all three components are negative, the importer's tariff must result in a reduction in national welfare for the exporting country. However, it is important to note that a redistribution of income occurs—that is, some groups gain while others lose. In this case, the sum of the losses exceeds the sum of the gains.

Import quota effects on world welfare. The effect on world welfare is found by summing the national welfare effects on the importing and exporting countries. By noting that the terms of trade gain to the importer is equal to the terms of trade loss to the exporter, the world welfare effect reduces to four components: the importer's negative production distortion (B), the importer's

negative consumption distortion (D), the exporter's negative consumption distortion (f), and the exporter's negative production distortion (h). Since each of these is negative, the world welfare effect of the import quota is negative. The sum of the losses in the world exceeds the sum of the gains. In other words, we can say that an import quota results in a reduction in world production and consumption efficiency.

Key Takeaways

- An import quota lowers consumer surplus in the import market and raises it in the export country market.
- An import quota raises producer surplus in the import market and lowers it in the export country market.
- National welfare may rise or fall when a large country implements an import quota.
- National welfare in the exporting country falls when an importing country implements an import quota.
- An import quota of any size will reduce world production and consumption efficiency and thus cause world welfare to fall.

? Exercise 7.12.1

1. Consider the following trade policy action (applied by the domestic country) listed at the top of the second column in the table below. In the empty boxes, use the following notation to indicate the effect of the policy on the variables listed in the first column:

   + the variable increases

   − the variable decreases

   0 the variable does not change

   A the variable change is ambiguous (i.e., it may rise, it may fall)

   Use a partial equilibrium model to determine the answers, and assume that the shapes of the supply and demand curves are "normal." Assume that the policy does not begin with, or result in, prohibitive trade policies. Also assume that the policy does not correct for market imperfections or distortions.

   For example, an import quota applied by a large country will cause an increase in the domestic price of the import good; therefore a + is placed in the first box of the table.

   Table 7.12.2: Import Quota Effects

	An Import Quota by a Large Country Initially in Free Trade
Domestic Market Price	+
Domestic Industry Employment	
Domestic Consumer Welfare	
Domestic Producer Welfare	
Domestic Government Revenue	
Domestic National Welfare	
Foreign Price	
Foreign Consumer Welfare	
Foreign Producer Welfare	
Foreign National Welfare	

2. Suppose there are two large countries, the United States and China. Assume that both countries produce and consume clothing. The United States imports clothing from China. Consider the trade policy action listed at the top of the second column in the table below. In the boxes, indicate the effect of the policy on the variables listed in the first column. Use a partial equilibrium, perfect competition model to determine the answers. You do not need to show your work. Use the following notation:

+ the variable increases

− the variable decreases

0 the variable does not change

A the variable change is ambiguous (i.e., it may rise, it may fall)

Table 7.12.3: Import Quota Elimination Effects

	I
	Elimination of a U.S. Import Quota on Clothing Imports
U.S. Domestic Consumer Welfare	
U.S. Domestic Producer Welfare	
U.S. National Welfare	
Chinese Producer Welfare	
Chinese Consumer Welfare	
Chinese National Welfare	

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7.13: Import Quota- Small Country Price Effects 7.13: Import Quota- Small Country Price EffectsEdit Update titlecancel

Learning Objectives

1. Identify the effects of an import quota on prices in both countries and the quantity traded in the case of a small country.
2. Know the equilibrium conditions that must prevail in a quota equilibrium.

The small country assumption means that the country's imports are a very small share of the world market—so small that even a complete elimination of imports would have an imperceptible effect on world demand for the product and thus would not affect the world price. Thus when a quota is implemented by a small country, there is no effect on the world price.

To depict the price effects of a quota, we use an export supply/import demand diagram shown in Figure 7.13.1. The export supply curve is drawn as a horizontal line since the exporting country is willing to supply as much as the importer demands at the world price. The small importing country takes the world price as exogenous since it can have no effect on it.

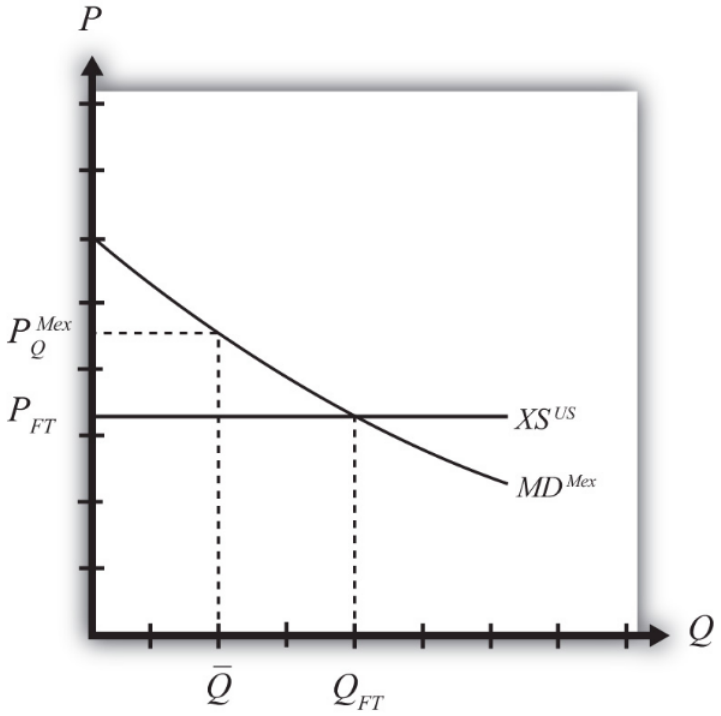


Figure 7.13.1: Depicting a Quota Equilibrium- Small Country Case

When the quota is placed on imports, it restricts supply to the domestic market since fewer imports are allowed in. The reduced supply raises the domestic price. The world price is unaffected by the quota and remains at the free trade level. In the final equilibrium, two conditions must hold—the same two conditions as in the case of a large country, namely,

$$MD^{Mex}(P_Q^{Mex}) = \bar{Q}$$

and

$$XS^{US}(P_{FT}) = \bar{Q}.$$

This implies that, in the case of a small country, the price of the import good in the importing country must rise to the level at which the import demand is equal to the quota level. Export supply merely falls to the lower level now demanded.

Key Takeaways

- An import quota will raise the domestic price and, in the case of a small country, leave the foreign price unchanged.
- A binding import quota will reduce the quantity of imports.

Exercise 7.13.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. Of *increase*, *decrease*, or *stay the same*, the effect on the world price when a small country implements a binding import quota.
   b. Of *increase*, *decrease*, or *stay the same*, the effect on the import volume of a product when a small country implements a binding import quota.
   c. Of *increase*, *decrease*, or *stay the same*, the effect on the exports from the rest of the world when a small country implements a binding import quota.

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7.14: Import Quota- Small Country Welfare Effects 7.14: Import Quota- Small Country Welfare EffectsEdit Update titlecancel

Learning Objectives

1. Use a partial equilibrium diagram to identify the welfare effects of an import quota on producer and consumer groups and the government in the importing country.
2. Calculate the national welfare effects of an import quota.

Consider a market in a small importing country that faces an international or world price of P_{FT} in free trade. The free trade equilibrium is depicted in Figure 7.14.1, where P_{FT} is the free trade equilibrium price. At that price, domestic demand is given by D_{FT}, domestic supply by S_{FT}, and imports by the difference, $D_{FT} - S_{FT}$ (the blue line in the figure).

Suppose an import quota is set below the free trade level of imports. A reduction in imports will lower the supply on the domestic market and raise the domestic price. In the new equilibrium, the domestic price will rise to the level at which import demand equals the value of the quota. Since the country is small, there will be no effect on the world price, which will remain at P_{FT}.

In Figure 7.14.1, if the quota is set equal to $\bar{Q} = D_Q - S_Q$ (the red line segment), then the price will have to rise to P_Q.

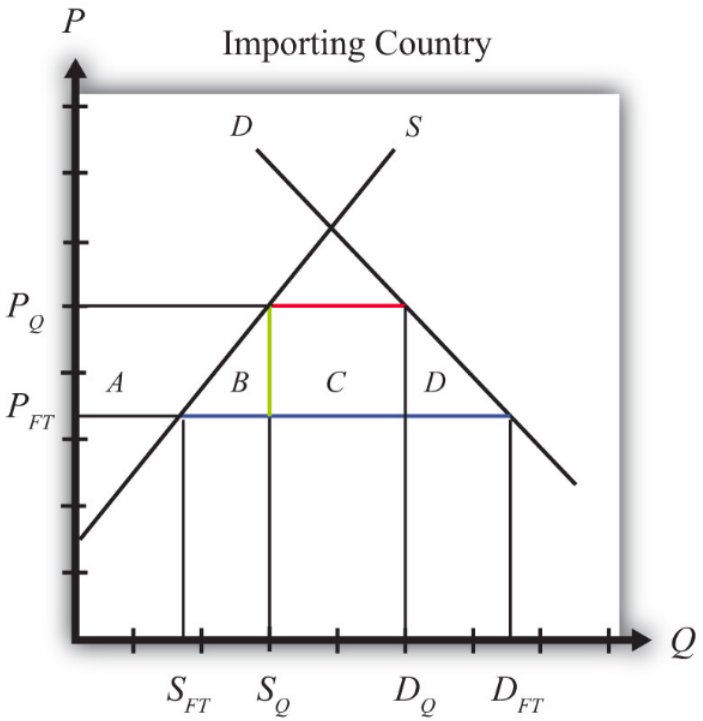


Figure 7.14.1: Welfare Effects of a Quota- Small Country Case

Table 7.14.1 provides a summary of the direction and magnitude of the welfare effects to producers, consumers, and the recipients of the quota rents in the importing country. The aggregate national welfare effects are also shown.

Table 7.14.1: Welfare Effects of an Import Tariff

	Importing Country
Consumer Surplus	− (*A* + *B* + *C* + *D*)
Producer Surplus	+ *A*
Quota Rents	+ *C*
National Welfare	− *B* − *D*

Refer to Table 7.14.1 and Figure 7.14.1 to see how the magnitudes of the changes are represented.

Welfare effects on the importing country's consumers. Consumers of the product in the importing country are worse off as a result of the quota. The increase in the domestic price of both imported goods and the domestic substitutes reduces consumer surplus in the market.

Welfare effects on the importing country's producers. Producers in the importing country are better off as a result of the quota. The increase in the price of their product increases producer surplus in the industry. The price increase also induces an increase in the output of existing firms (and perhaps the addition of new firms), an increase in employment, and an increase in profit, payments, or both to fixed costs.

Welfare effects on the quota rents. Who receives the quota rents depends on how the government administers the quota.

1. If the government auctions the quota rights for their full price, then the government receives the quota rents. In this case, the quota is equivalent to a specific tariff set equal to the difference in prices ($t = P_Q - P_{FT}$), shown as the length of the green line segment in Figure 7.14.1.
2. If the government gives away the quota rights, then the quota rents accrue to whoever receives these rights. Typically, they would be given to someone in the importing economy, which means that the benefits would remain in the domestic economy.
3. If the government gives the quota rights away to foreigners, then people in the foreign country receive the quota rents. In this case, the rents would not be a part of the importing country effects.

Welfare effects on the importing country. The aggregate welfare effect for the country is found by summing the gains and losses to consumers, producers, and the domestic recipients of the quota rents. The net effect consists of two components: a negative production efficiency loss (B) and a negative consumption efficiency loss (D). The two losses together are referred to as "deadweight losses."

Because there are only negative elements in the national welfare change, the net national welfare effect of a quota must be negative. This means that a quota implemented by a small importing country *must* reduce national welfare.

Generally speaking, the following are true:

1. Whenever a small country implements a quota, national welfare falls.
2. The more restrictive the quota, the larger will be the loss in national welfare.
3. The quota causes a redistribution of income. Producers and the recipients of the quota rents gain, while consumers lose.
4. Because the country is assumed to be small, the quota has no effect on the price in the rest of the world; therefore there are no welfare changes for producers or consumers there. Even though imports are reduced, the related reduction in exports by the rest of the world is assumed to be too small to have a noticeable impact.

Key Takeaways

- An import quota lowers consumer surplus in the import market.
- An import quota by a small country has no effect on the foreign country.
- The national welfare effect of an import tariff is evaluated as the sum of the producer and consumer surplus and government revenue effects.
- An import quota of any size will result in deadweight losses and reduce production and consumption efficiency.
- National welfare falls when a small country implements an import quota.

? Exercise 7.14.1

1. Consider the following trade policy action (applied by the domestic country) listed along the top row of the table below. In the boxes, indicate the effect of the policy on the variables listed in the first column. Use a partial equilibrium model to determine the answers. You do not need to show your work. Assume that the policy does not begin with, or result in, prohibitive trade policies. Also assume that the policy does not correct for market imperfections or distortions. Use the following notation:

   \+ the variable increases

   − the variable decreases

   0 the variable does not change

   A the variable change is ambiguous (i.e., it may rise, it may fall)

Table 7.14.2: Import Quota Effects

	Import Quota (Administered by Giving Away Quota Tickets) by a Small Country
Domestic Price	
Domestic Consumer Welfare	
Domestic Producer Welfare	
Domestic Government Revenue	
Domestic National Welfare	
Foreign Price	
Foreign Consumer Welfare	
Foreign Producer Welfare	
Foreign National Welfare	

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7.15: The Choice between Import Tariffs and Quotas 7.15: The Choice between Import Tariffs and QuotasEdit Update titlecancel

Learning Objectives

1. Understand the pros and cons of applying tariffs versus quotas.
2. Learn how tariffs differ from quotas in their protective effects in the face of market changes.

There are two basic ways to provide protection to domestic import-competing industries: a tariff or a quota. The choice between one or the other is likely to depend on several concerns.

One concern is the revenue effects. A tariff has an immediate advantage for governments in that it will automatically generate tariff revenue (assuming the tariff is not prohibitive). Quotas may or may not generate revenue depending on how the quota is administered. If a quota is administered by selling quota tickets (i.e., import rights), then a quota will generate government revenue; however, if the quota is administered on a first-come, first-served basis or if quota tickets are given away, then no revenue is collected.

Administrative costs of tariffs and quotas are also likely to differ. Tariff collection involves product identification, collection, and processing of fees. Quota administration will also involve product identification and some method of keeping track of, or counting, the product as it enters the country in multiple ports of entry. It may also involve some method of auctioning or disbursing quota tickets. It is not obvious which of these two procedures would be less costly, although a good guess would be tariff collection.

Perhaps the most important distinction between the two policies, however, is the protective effect the policy has on the import-competing industries. In one sense, quotas are more protective of the domestic industry because they limit the extent of import competition to a fixed maximum quantity. The quota provides an upper bound to the foreign competition the domestic industries will face. In contrast, tariffs simply raise the price but do not limit the degree of competition or trade volume to any particular level.

In the original General Agreement on Tariffs and Trade (GATT), a preference for the application of tariffs rather than quotas was introduced as a guiding principle. One reason was the sense that tariffs allowed for more market flexibility and thus could be expected to be less protective over time. Another reason concerned transparency. With a quota in place, it is very difficult to discern the degree to which a market is protected since it can be difficult to measure how far the quota is below the free trade import level. With a tariff in place, especially an ad valorem tariff, one can use the tariff percentage as a measure of the degree of protection.

Also, it was considered somewhat easier to negotiate reductions in tariff rates than quota increases during GATT rounds of trade liberalization. Again, the issue of transparency arises. Trade liberalization agreements generally target a fixed percentage for tariff reductions. For example, countries might agree to reduce average tariffs by 30 percent from their current levels. This rule would be perceived as being equal reciprocation in that each country would be liberalizing to the same degree. Hence the agreement could be judged to be fair. However, with quotas in place, it would be difficult, if not impossible, to apply such a straightforward type of fairness principle.

For this reason, current World Trade Organization (WTO) member countries agreed in the Uruguay Round to phase out the use of quotas, used primarily in agriculture industries. Instead, countries will apply tariffs that are equivalent in their market effects to the original quotas. This adjustment is referred to as tariffication. In this way, future rounds of trade liberalization negotiations will be able to use fair reciprocal concessions to bring these tariffs down further.

The Protective Effects of Tariffs versus Quotas with Market Changes

One of the main concerns in choosing between tariffs or quotas is the protective effect of the policy. Although tariffs and quotas are generally equivalent to each other in terms of their static price and welfare effects, this equivalence does not remain true in the face of market changes. In the next sections we consider three such market changes: an increase in domestic demand, an increase in domestic supply, and a decrease in the world price. In each case, we compare the protective effects of a tariff and a quota for the domestic import-competing industries.

An Increase in Domestic Demand

Consider Figure 7.15.1, which depicts a small importing country. P_{FT} is the free trade price. If a tariff of T is put into place, the domestic price rises to P_T and imports equal $D_T - S_T$. A quota set equal to Q_T (the blue line segment) would generate the same increase in price to P_T and the same level of imports. Thus the tariff T and quota Q_T are said to be equivalent to each other.

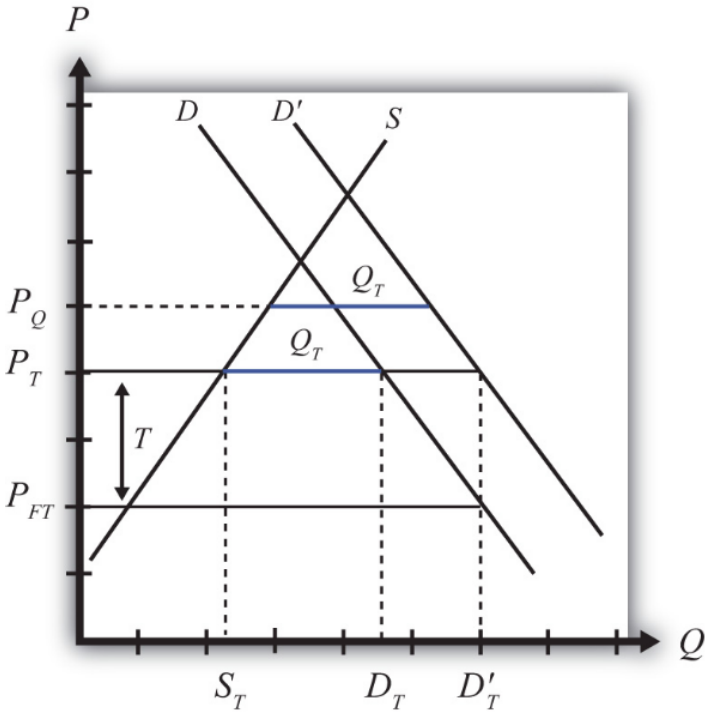


Figure 7.15.1: Effects of a Demand Increase

Next, consider the effects in this market when there is an increase in domestic demand, represented by a rightward shift of the demand curve. A demand increase could arise because of rising incomes in the country or because consumers' preferences become more favorable to this product.

With a tariff in place initially, the increase in domestic demand will leave the domestic price unaffected. Because this is a small country, the world price does not change and thus the domestic tariff-inclusive price remains at $P_T = P_{FT} + T$. Domestic supply also remains at S_T, but demand rises to D'_T, causing an increase in imports to $D'_T - S_T$.

With a quota in place initially, the increase in domestic demand causes the domestic price to rise to P_Q in order to maintain the import level at Q_T (the higher blue line segment). Domestic supply will rise with the increase in price (not labeled), while domestic demand will fall.

The protective effect of the tariff or quota means the degree to which the domestic *producers* are protected in the face of the market change. Since the domestic price rises more with the quota in place than with the tariff, domestic producers will enjoy a larger supply and consequently a higher level of producer surplus (not shown). Thus the quota is more protective than a tariff in the face of an increase in domestic demand.

An Increase in Domestic Supply

Again, consider a small importing country. In Figure 7.15.2, P_{FT} is the free trade price. If a tariff of T is put into place, the domestic price rises to P_T and imports equal $D_T - S_T$. A quota set equal to Q_T (the blue line segment) would generate the same increase in price to P_T and the same level of imports. Thus the tariff T and quota Q_T are said to be equivalent to each other.

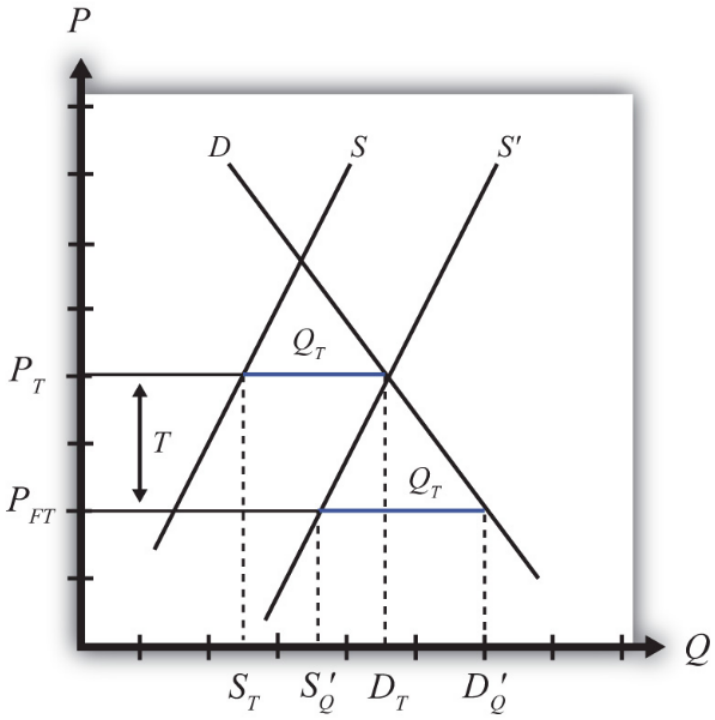


Figure 7.15.2: Effects of a Supply Increase

Next, consider the effects in this market when there is an increase in domestic supply, represented by a rightward shift of the supply curve. A supply increase could arise because of falling production costs or due to improvements in productivity.

With a tariff in place initially, the increase in domestic supply will leave the domestic price unaffected. Because this is a small country, the world price does not change and thus the domestic tariff-inclusive price remains at $P_T = P_{FT} + T$. However, because domestic supply is now higher at every price, at the price P_T, supply equals domestic demand of D_T. This means that with the tariff, imports are reduced to zero.

With a quota in place initially, the increase in domestic supply causes the domestic price to fall back to the free trade level in order to maintain the import level at the level Q_T (the lower blue line segment). Domestic supply will rise to S'_Q with the decrease in price, while domestic demand also will rise to D'_Q.

Since the domestic price rises more with the tariff in place than with the quota, domestic producers will enjoy a larger supply (D_T vs. S'_Q) and consequently a higher level of producer surplus (not shown). Thus the tariff is more protective than a quota in the face of an increase in domestic supply.

A Decrease in the World Price

Again, consider a small importing country. In Figure 7.15.3, P_{FT} is the free trade price. If a tariff of T is put into place, the domestic price rises to P_T and imports equal $D_T - S_T$. A quota set equal to Q_T (the blue line segment) would generate the same increase in price to P_T and the same level of imports. Thus the tariff T and quota Q_T are said to be equivalent to each other.

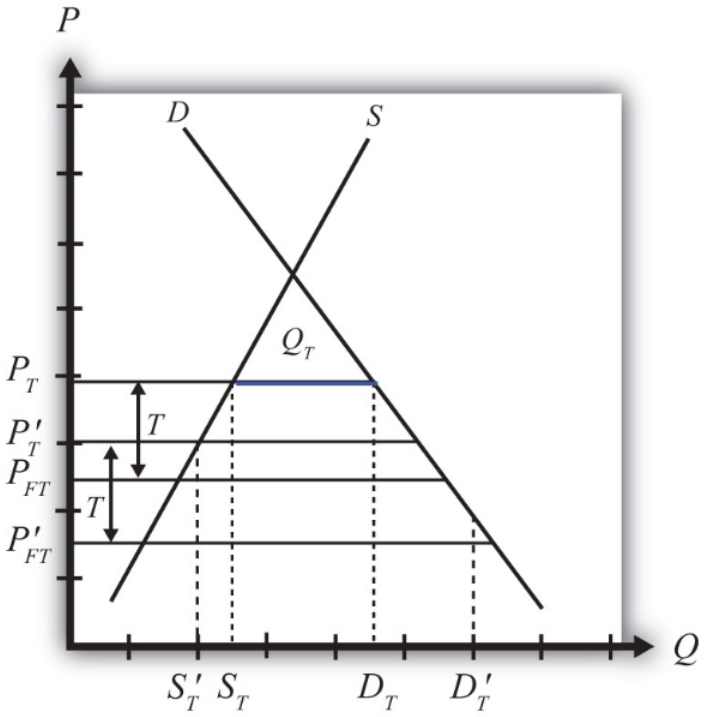


Figure 7.15.3: Effects of a World Price Decrease

Next, consider the effects in this market when there is a decrease in the world free trade price, represented by a downward shift from P_{FT} to P'_{FT}. The world price could fall because of falling world production costs or due to improvements in foreign productivity.

With a tariff in place initially, the decrease in the world price will cause a reduction in the domestic price. Because this is a small country, when the world price falls, the domestic tariff-inclusive price also falls to $P'_T = P'_{FT} + T$. With the lower price, domestic supply falls to S'_T, while domestic demand rises to D'_T. This means that with the tariff in place, imports rise to $D'_T - S'_T$.

With a quota in place initially, the decrease in the world free trade price has no effect on the domestic price. The domestic price remains at P_T since this is the only price that will support the quota Q_T.

Since the domestic price is higher with the quota in place than with the tariff, domestic producers will enjoy a larger supply (S_T vs. S'_T) and consequently a higher level of producer surplus (not shown). Thus the quota is more protective than a tariff in the face of a decrease in the world free trade price.

The General Rule

What we can conclude from the three examples above is that when market conditions change such that imports increase, a quota is more protective than a tariff. This will occur if domestic demand increases, domestic supply decreases, the world price falls, or if some combination of these things occur.

In situations where market changes cause a decrease in imports, a tariff is more protective than a quota. This occurs if domestic demand falls, domestic supply rises, the world price rises, or some combination of these changes occurs.

Since protection is often provided due to the insistence of the domestic import-competing industries—rather than a more comprehensive concern for the general welfare of the country—and since import-competing firms are generally more concerned about situations where imports may increase, industry preferences usually favor quotas over tariffs since quotas will be more protective in these situations. Other government concerns, such as revenue needs, ease of administration, or participation in trade agreements like the GATT/WTO, which contain a preference of tariffs over quotas, have resulted in the widespread application of tariffs rather than quotas in most instances.

Key Takeaways

- The effects of tariffs are more transparent than quotas and hence are a preferred form of protection in the GATT/WTO agreement.
- A quota is more protective of the domestic import-competing industry in the face of import volume increases.
- A tariff is more protective in the face of import volume decreases.

Exercise 7.15.1

1. Draw a diagram depicting a small importing country with a nonprohibitive import tariff (T) in place. On the diagram indicate the tariff rate and the equivalent import quota (Q) that would generate the same domestic price.

   Next, suppose there is a decrease in domestic demand for the good.

   a. Indicate on the graph the new equilibrium with the tariff in place and the quota in place.
   b. Indicate the new level of imports with the tariff and the quota. Which is larger?
   c. Indicate the new domestic price with the tariff and the quota. Which is higher?
   d. Which is more protective of the domestic import-competing industry in this situation, a tariff or quota? Explain why.

2. Draw a diagram depicting a small importing country with a nonprohibitive import tariff (T) in place. On the diagram indicate the tariff rate and the equivalent import quota (Q) that would generate the same domestic price.

   Next, suppose there is an increase in the world price of the good.

   a. Indicate on the graph the new equilibrium with the tariff in place and the quota in place.
   b. Indicate the new level of imports with the tariff and the quota. Which is larger?
   c. Indicate the new domestic price with the tariff and the quota. Which is higher?
   d. Which is more protective of the domestic import-competing industry in this situation, a tariff or quota? Explain why.

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7.16: Export Subsidies: Large Country Price Effects 7.16: Export Subsidies: Large Country Price EffectsEdit Update titlecancel

Learning Objectives

1. Identify the effects of an export subsidy on prices in both countries and the quantity traded in a large country.
2. Know the equilibrium conditions that must prevail in a subsidy equilibrium.

Suppose the United States, the exporting country in free trade, implements a specific export subsidy on exports of wheat. A subsidy to exports will encourage the flow of wheat across the border. It will now cost less to move the product from the United States into Mexico.

As a result, the supply of wheat to the Mexican market will rise, causing a decrease in the price of wheat. Since the United States is assumed to be a large country, the price of all wheat sold in Mexico, both Mexican wheat and U.S. imports, will fall in price. The lower price will raise Mexico's import demand.

The higher wheat supply to Mexico will reduce supply in the U.S. market and induce an increase in the U.S. price. The higher price will raise U.S. export supply.

A new subsidy-ridden equilibrium will be reached when the following two conditions are satisfied:

$$P_S^{US} = P_S^{Mex} + S$$

and

$$XS^{US}(P_S^{US}) = MD^{Mex}(P_S^{Mex}),$$

where S is the specific export subsidy, P_S^{Mex} is the price in Mexico after the subsidy, and P_S^{US} is the price in the United States after the subsidy. The first condition represents a price wedge between the final U.S. price and the Mexican price equal to the amount of the export subsidy. The prices must differ by the subsidy because U.S. suppliers of wheat must receive the same price for their product, regardless of whether the product is sold in the United States or Mexico, and all wheat sold in Mexico must be sold at the same price. Since a subsidy is paid to U.S. exporters, the only way for these price equalities within countries to arise is if the price differs across countries by the amount of the subsidy.

The second condition states that the amount the United States wants to export at its new higher price must be equal to the amount Mexico wants to import at its new lower price. This condition guarantees that world supply of wheat equals world demand for wheat.

The export subsidy equilibrium is depicted graphically in Figure 7.16.1. The Mexican price of wheat falls from P_{FT} to P_S^{Mex}, which raises its import demand from Q_{FT} to Q_S. The Mexican price of wheat falls from P_{FT} to P_S^{Mex}, which raises its import demand from Q_{FT} to Q_S. The U.S. price of wheat rises from P_{FT} to P_S^{US}, which raises its export supply also from Q_{FT} to Q_S. The difference in the prices between the two markets is equal to the export subsidy rate S.

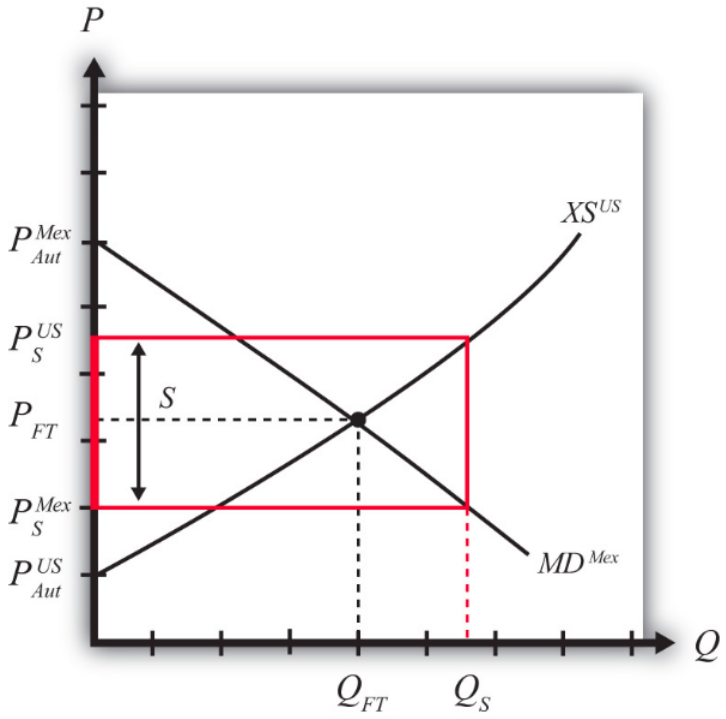


Figure 7.16.1: Depicting a Subsidy Equilibrium- Large Country Case

Key Takeaways

- An export subsidy will raise the domestic price and, in the case of a large country, reduce the foreign price.
- An export subsidy will increase the quantity of exports.
- The export subsidy will drive a price wedge, equal to the subsidy value, between the foreign price and the domestic price of the product.
- With the export subsidy in place in a two-country model, export supply at the higher domestic price will equal import demand at the lower foreign price.

? Exercise 7.16.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The direction of change of the foreign price of soybeans when a large domestic country implements an export subsidy.
   b. The direction of change of the domestic price of corn when a large domestic country implements an export subsidy.
   c. The price of tea in the exporting country if the large exporter sets a subsidy of $0.45 per pound and if the importer country price is $3.25 inclusive of the subsidy abroad.
   d. Of *increase*, *decrease*, or *stay the same*, this is the effect on the quantity of wheat produced domestically when an export subsidy is implemented by a large exporter.
   e. Of *increase*, *decrease*, or *stay the same*, this is the effect on imports of wheat abroad if a wheat subsidy is implemented by a large exporting country.
   f. Of *increase*, *decrease*, or *stay the same*, this is the effect on domestic consumption of cotton if a cotton export subsidy is implemented by a large exporting country.

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7.17: Export Subsidies: Large Country Welfare Effects 7.17: Export Subsidies: Large Country Welfare EffectsEdit Update titlecancel

Learning Objectives

1. Use a partial equilibrium diagram to identify the welfare effects of an export subsidy on producer and consumer groups and the government in the exporting and importing countries.
2. Calculate the national and world welfare effects of an export subsidy.

Suppose that there are only two trading countries: one importing country and one exporting country. The supply and demand curves for the two countries are shown in Figure 7.17.1. P_{FT} is the free trade equilibrium price. At that price, the excess demand by the importing country equals the excess supply by the exporter.

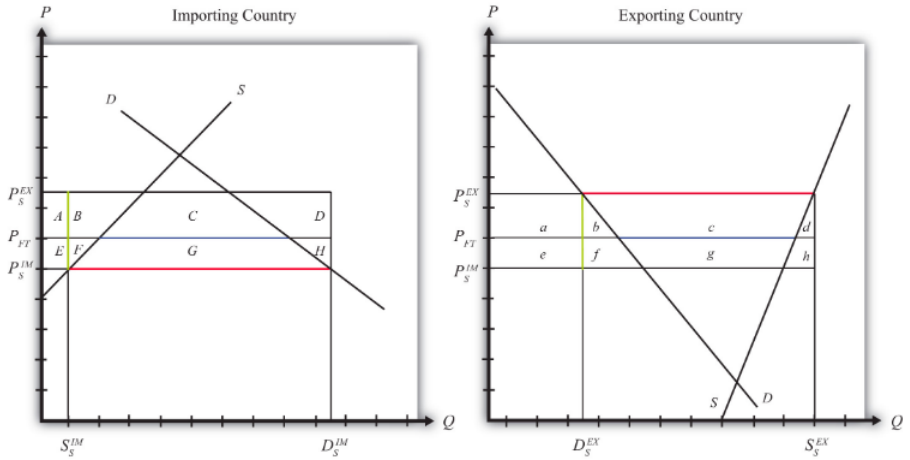


Figure 7.17.1: Welfare Effects of a Subsidy- Large Country Case

The quantity of imports and exports is shown as the blue line segment on each country's graph (the horizontal distance between the supply and demand curves at the free trade price). When a large exporting country implements an export subsidy, it will cause an increase in the price of the good on the domestic market and a decrease in the price in the rest of the world (RoW). Suppose after the subsidy the price in the importing country falls to P_T^{IM} and the price in the exporting country rises toP_T^{EX}. If the subsidy is a specific subsidy, then the subsidy rate would be $S = P_S^{EX} - P_S^{IM}$, equal to the length of the green line segment in Figure 7.17.1.

Table 7.17.1 provides a summary of the direction and magnitude of the welfare effects to producers, consumers, and the governments in the importing and exporting countries. The aggregate national welfare effects and the world welfare effects are also shown.

Table 7.17.1: Welfare Effects of an Export Subsidy

	Importing Country	Exporting Country
Consumer Surplus	+ (*E* + *F* + *G*)	− (*a* + *b*)
Producer Surplus	− (*E* + *F*)	+ (*a* + *b* + *c*)
Govt. Revenue	0	− (*b* + *c* + *d* + *f* + *g* + *h*)
National Welfare	+ *G*	− (*b* + *d* + *f* + *g* + *h*)
World Welfare	− (*F* + *H*) − (*b* + *d*)	

Refer to 7.17.1: Welfare Effects of an Export Subsidy and Figure 7.17.1 to see how the magnitudes of the changes are represented.

Export subsidy effects on the exporting country's consumers. Consumers of the product in the exporting country experience a decrease in well-being as a result of the export subsidy. The increase in their domestic price lowers the amount of consumer surplus in the market.

Export subsidy effects on the exporting country's producers. Producers in the exporting country experience an increase in well-being as a result of the subsidy. The increase in the price of their product in their own market raises producer surplus in the industry. The price increase also induces an increase in output, an increase in employment, and an increase in profit, payments, or both to fixed costs.

Export subsidy effects on the exporting country's government. The government must pay the subsidy to exporters. These payments must come out of the general government budget. Who loses as a result of the subsidy payments depends on how the revenue is collected. If there is no change in total spending when the subsidy payments are made, then a reallocation of funds implies that funding to some other government program is reduced. If the subsidy is funded by raising tax revenues, then the individuals responsible for the higher taxes lose out. If the government borrows money to finance the subsidy payments, then the budget cut or the tax increase can be postponed until some future date. Regardless of how the subsidy is funded, however, someone in the domestic economy must ultimately pay for it.

Export subsidy effects on the exporting country. The aggregate welfare effect for the country is found by summing the gains and losses to consumers and producers. The net effect consists of three components: a negative terms of trade effect ($f + g + h$), a negative consumption distortion (b), and a negative production distortion (d).

Since all three components are negative, the export subsidy must result in a reduction in national welfare for the exporting country. However, it is important to note that a redistribution of income occurs—that is, some groups gain while others lose. The likely reason governments implement export subsidies is because they will benefit domestic exporting firms. The concerns of consumers must be weighed less heavily in their calculation since the sum of their losses exceeds the sum of the producers' gains.

Export subsidy effects on the importing country's consumers. Consumers of the product in the importing country experience an increase in well-being as a result of the export subsidy. The decrease in the price of both imported goods and the domestic substitutes increases the amount of consumer surplus in the market.

Export subsidy effects on the importing country's producers. Producers in the importing country suffer a decrease in well-being as a result of the export subsidy. The decrease in the price of their product on the domestic market reduces producer surplus in the industry. The price decrease also induces a decrease in the output of existing firms, a decrease in employment, and a decrease in profit, payments, or both to fixed costs.

Export subsidy effects on the importing country's government. There is no effect on the importing country's government revenue as a result of the exporter's subsidy.

Export subsidy effects on the importing country. The aggregate welfare effect for the country is found by summing the gains and losses to consumers, producers, and the government. The net effect consists of three components: a positive terms of trade effect ($F + G + H$), a negative production distortion (F), and a negative consumption distortion (H).

Although there are both positive and negative elements, the net national welfare effect reduces to area G, which is positive. This means that an export subsidy implemented by a large exporting country in a perfectly competitive market *will* raise national welfare in the importing country.

This result has inspired some economists to argue that the proper response for an importing country when its trading partner implements an export subsidy is simply to send along a thank you note.

It is worth noting here that the World Trade Organization (WTO) allows countries to impose countervailing duties to retaliate against its trading partners when it can be shown that an exporting country's government has used export subsidies.

It is also important to note that not everyone's welfare rises when there is an increase in national welfare. Instead, there is a redistribution of income. Consumers of the product will benefit, but producers and payers of government taxes will lose. A national welfare increase, then, means that the sum of the gains exceeds the sum of the losses across all individuals in the economy. Economists generally argue that, in this case, compensation from winners to losers can potentially alleviate the redistribution problem.

Export subsidy effects on world welfare. The effect on world welfare is found by summing the national welfare effects on the importing and exporting countries. By noting that the terms of trade gain to the exporter is equal to the terms of trade loss to the importer, the world welfare effect reduces to four components: the importer's negative production distortion (B), the importer's negative consumption distortion (D), the exporter's negative consumption distortion (f), and the exporter's negative production distortion (h). Since each of these is negative, the world welfare effect of the export subsidy is negative. The sum of the losses in

the world exceeds the sum of the gains. In other words, we can say that an export subsidy results in a reduction in world production and consumption efficiency.

Key Takeaways

- An export subsidy lowers consumer surplus and raises producer surplus in the exporter market.
- An export subsidy raises producer surplus in the export market and lowers it in the import country market.
- National welfare falls when a large country implements an export subsidy.
- National welfare in the importing country rises when a large exporting country implements an export subsidy.
- An export subsidy of any size will reduce world production and consumption efficiency and thus cause world welfare to fall.

? Exercise 7.17.1

1. Consider the following trade policy action (applied by the domestic country) listed along the top row of the table below. In the empty boxes, use the following notation to indicate the effect of the policy on the variables listed in the first column:

   + the variable increases

   − the variable decreases

   0 the variable does not change

   A the variable change is ambiguous (i.e., it may rise, it may fall)

   Use a partial equilibrium model to determine the answers and assume that the shapes of the supply and demand curves are "normal." Assume that the policy does not begin with, or result in, prohibitive trade policies. Also assume that the policy does not correct for market imperfections or distortions.

   For example, an export subsidy applied by a large country will cause an increase in the domestic price of the export good; therefor a + is placed in the first box of the table.

Table 7.17.2: Export Subsidy Effects

	Export Subsidy by a Large Country
Domestic Market Price	+
Domestic Industry Employment	
Domestic Consumer Welfare	
Domestic Producer Welfare	
Domestic Government Revenue	
Domestic National Welfare	
Foreign Price	
Foreign Consumer Welfare	
Foreign Producer Welfare	
Foreign National Welfare	

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7.18: Countervailing Duties 7.18: Countervailing DutiesEdit Update titlecancel

Learning Objectives

1. Understand the basic mechanics of an antisubsidy law allowable to members of the World Trade Organization (WTO).
2. Identify the effects of a countervailing duty by an import country in response to a foreign government export subsidy.

The World Trade Organization (WTO) allows countries to implement antisubsidy legislation. The law allows a country to place a **countervailing duty (CVD)** on imports when a foreign government subsidizes exports of the product, which in turn causes injury to the import-competing firms. The countervailing duty is a tariff designed to "counter" the effects of the foreign export subsidy. The purpose of this section is to explain the effects of a countervailing duty in a perfectly competitive market setting. See Chapter 1: Introductory Trade Issues- History, Institutions, and Legal Framework, Section 1.5: The General Agreement on Tariffs and Trade (GATT) for a more complete description of the antisubsidy law.

We will assume that there are two large countries trading a particular product in a partial equilibrium model. The exporting country initially sets a specific export subsidy. That action is countered with a CVD implemented by the importing country. We will first describe the effects of the export subsidy (which will closely mimic the analysis in Chapter 7: Trade Policy Effects with Perfectly Competitive Markets, Section 7.16: Export Subsidies- Large Country Price Effects and Chapter 7: Trade Policy Effects with Perfectly Competitive Markets, Section 7.17: Export Subsidies- Large Country Welfare Effects, after which we will consider the effects of the CVD action in response.

The Initial Export Subsidy

An export subsidy will reduce the price of the good in the import market and raise the price of the good in the export market relative to the free trade price. After the subsidy is imposed, the following two conditions will describe the new equilibrium:

$$P_S^{EX} = P_S^{IM} + S$$

and

$$X_S(P_S^{EX}) = MD(P_S^{IM}),$$

where S is the specific export subsidy, P_S^{IM} is the price that prevails in the import market after the subsidy, and P_S^{EX} is the price that prevails in the export market after the subsidy. The first condition means that prices in the two countries must differ by the amount of the subsidy. The second condition means that export supply at the price that now prevails in the export market must equal import demand at the price that prevails in the import market.

The effects of the subsidy are depicted in Figure 7.18.1. The initial free trade price is labeled P_{FT}. In free trade, the exporting country exports ($S_0^{EX} - D_0^{EX}$) and the importing country imports ($D_0^{IM} - S_0^{IM}$). Since there are only two countries in the model, free trade exports are equal to imports and are shown as the blue line segments in the diagram. When the subsidy is imposed, the price in the export market rises to P_S^{EX}, while the price in the import market falls to P_S^{IM}. The higher level of exports with the subsidy, given by ($S_1^{EX} - D_1^{EX}$), is equal to imports, given by ($D_1^{IM} - S_1^{IM}$), and is depicted by the red line segments in Figure 7.18.1.

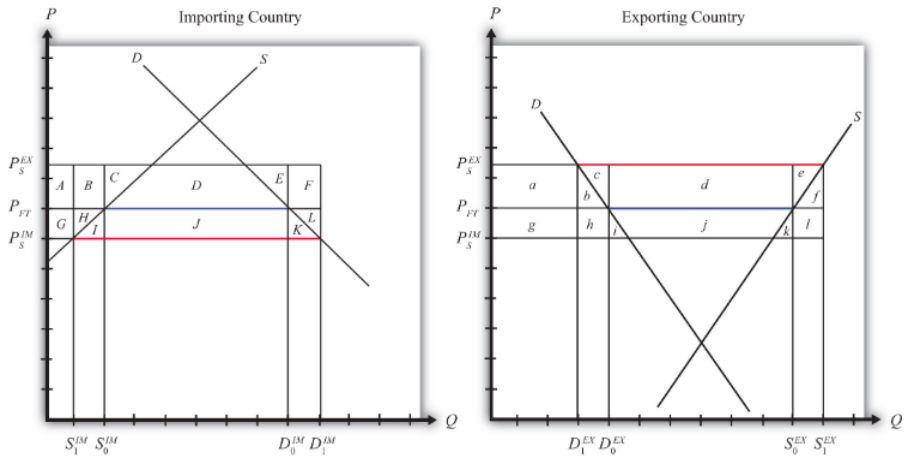


Figure 7.18.1: Depicting an Export Subsidy and a CVD

Table 7.18.1 provides a summary of the direction and magnitude of the welfare effects to producers, consumers, and the governments in the importing and exporting countries as a result of the subsidy. The aggregate national welfare effects and the world welfare effects are also shown.

Table 7.18.1: Welfare Effects of the Initial Export Subsidy

	Importing Country	Exporting Country
Consumer Surplus	+ (*G* + *H* + *I* + *J* + *K*)	− (*a* + *b*)
Producer Surplus	− (*G* + *H*)	+ (*a* + *b* + *c* + *d* + *e*)
Govt. Revenue	0	− (*b* + *c* + *d* + *e* + *f* + *h* + *i* + *j* + *k* + *l*)
National Welfare	+ *I* + *J* + *K*	− (*b* + *f* + *h* + *i* + *j* + *k* + *l*)
World Welfare	− (*I* + *K*) − (*b* + *f*)	

Table 7.18.1 shows that in the case of a large exporting country, the export producers benefit from the subsidy, while the consumers of the product in the exporting country lose. Because of the cost of the subsidy to the exporting country government, which must ultimately be paid by the taxpayers, the net national welfare effect for the exporting country is negative.

The importing country also experiences an income redistribution. The consumers in the importing country benefit from the foreign subsidy, while import-competing producers suffer losses. The net effect for the importing country is positive since the gains to consumers outweigh the losses to producers.

The world welfare effects of the export subsidy are also negative.

The Countervailing Duty

Despite the fact that the export subsidy generates net benefits for the importing country, the importing country is allowed under WTO rules to protect itself from these benefits. A CVD may be placed if it can be shown that a subsidy is indeed in place and if the subsidy causes injury to the import-competing firms.

It is worth emphasizing that the antisubsidy law, in this case, does not protect the "country," nor does it protect consumers. The law is designed to aid import firms exclusively. No evaluation of the effects on consumers and no evaluation of the national welfare effects are required by the law. The only requirement is that injury be caused to the import-competing firms.

In this simple example of a large country implementing an export subsidy, injury would indeed be apparent. The export subsidy lowers the price of the good in the import market in this model and causes an increase in imports from abroad. Supply by the import-competing firms would fall (from S_0^{IM} to S_1^{IM} in Figure 7.18.1). Producer surplus, indicating a reduction in industry profits, would also fall. Since less output would be produced by the import-competing industry, the industry would need fewer factors of production. This would likely mean a reduction in the number of workers employed in the industry. In the adjustment process, firms in the industry may lay off workers and close factories. All these effects are valid criteria used to judge injury in CVD cases.

So let's consider the effects of a countervailing duty in response to the export subsidy described above. A CVD is simply a tariff set on imports to counter the effects of the foreign export subsidy. CVD laws require that the size of the CVD be just enough to offset the effects of the export subsidy. In the United States, the U.S. International Trade Administration determines the size of the foreign subsidy. If a CVD action is taken, the CVD is set equal to the foreign subsidy.

So imagine that the importing country now sets a specific CVD (t) equal to the original export subsidy (S). As with any tariff set by a large importing country, the tariff will cause the price in the importing country to rise and the price in the exporting country to fall. What's different from the standard tariff analysis is that the prices in this case are not equal to each other. Instead, the price in the import market begins lower—by the amount of the export subsidy, S—than the price in the export market. The CVD, then, will drive the prices in the two markets back together.

The final equilibrium must satisfy the following two conditions:

$$P^{EX}_{S+t} + t = P^{IM}_{S+t} + S$$

and

$$XS(P^{EX}_{S+t}) = MD(P^{IM}_{S+t}).$$

However, since $t = S$, the first condition reduces to $P^{EX}_{S+t} = P^{IM}_{S+t}$. This means that in the final equilibrium, the prices must be equal in both countries and export supply must be equal to import demand. These conditions are satisfied only at the free trade price.

Thus the effect of the CVD is to force the prices in the two markets back to the free trade prices.

As a result, imports will fall in the importing country (back to $D^{IM}_0 - S^{IM}_0$ in Figure 7.18.1), domestic supply will rise (from S^{IM}_1 to S^{IM}_0), employment in the import-competing industry will rise, and producer surplus in the industry will also rise. Thus the CVD will be effective in eliminating the injury caused to import-competing firms.

Welfare Effects of the CVD

But let's also take a look at the overall welfare effects of the CVD, assuming, as is often the case, that the CVD and the export subsidy remain in place. There are two ways to consider the effects of the CVD. We can look at the effects relative to when just the export subsidy was in place. Or we can look at the effects relative to when there was no export subsidy and no CVD. We'll do it both ways.

First, let's consider the welfare effects of the CVD relative to when the export subsidy alone was in place. These effects are summarized in Table 7.18.2.

Table 7.18.2: Welfare Effects of a CVD

	Importing Country	Exporting Country
Consumer Surplus	− (*G* + *H* + *I* + *J* + *K*)	+ (*a* + *b*)
Producer Surplus	+ (*G* + *H*)	− (*a* + *b* + *c* + *d* + *e*)
Govt. Revenue	+ (*C* + *D* + *E* + *J*)	+ (*b* + *c* + *e* + *f* + *h* + *l*)
National Welfare	+ (*C* + *D* + *E*) − (*I* + *K*)	+ (*b* + *f* + *h* + *l*) − (*d*)
World Welfare	+ (*b* + *f* + *h* + *l*) − (*I* + *K*) =	*b* + *f* + *I* + *K*

Note that the effects on consumers and producers in both countries are equal and opposite to the effects of the export subsidy. Thus producers in the import-competing industry gain in surplus from the CVD exactly what they had lost as a result of the foreign export subsidy. Consumers in the import industry lose from the CVD, producers in the exporting country lose, and consumers in the exporting country gain.

The importing government now collects tariff revenue from the CVD, which benefits someone in the importing country. The exporting government, however, experiences a reduction in its subsidy expenditures. This occurs because the CVD reduces trade and thus reduces the number of units exported. As a result, the government (i.e., the taxpayers) in the exporting country benefits from the CVD.

The national welfare effects in both countries are ambiguous in general. In the importing country, a terms of trade gain may outweigh two deadweight losses and cause national welfare to rise even further. Interestingly, the export subsidy and the CVD may each raise welfare for the importing country. In the export country, the net national welfare effect may be positive or negative.

The world welfare effects are found by summing the national welfare effects on both countries. The expression is simplified first by noting that area $(C + D + E)$ = area (d) and second by noting that area (h) = twice area I, or $(2I)$, and area (l) = area $(2K)$. The final expression shows that world welfare will rise as a result of the CVD.

Welfare Effects of the Combined Policies (Export Subsidy plus CVD)

Next, let's consider the welfare effects of the export subsidy and the CVD combined. In this case, we compare the welfare status of each country after both policies are in place relative to when neither policy is imposed. The effects can be calculated either by summing the individual welfare effects of each of the two stages depicted above or by noting that prices have not changed from the initial presubsidy state to the final post-CVD state but that the governments do have expenditures and receipts, respectively.

The welfare effects are summarized in Table 7.18.3.

Table 7.18.3: Welfare Effects of an Export Subsidy plus a CVD

	Importing Country	Exporting Country
Consumer Surplus	0	0
Producer Surplus	0	0
Govt. Revenue	+ $(C + D + E + J)$	− $(d + i + j + k)$
National Welfare	+ $(C + D + E + J)$	− $(d + i + j + k)$
World Welfare	0	

Since the prices in each country after the CVD are the same as prices before the export subsidy, there is ultimately no change in producer or consumer surplus in either country. Everyone participating in the market is left as well off as they were at the start.

However, since the exporting country maintains the export subsidy and the import country maintains the CVD, there are government revenue effects. In the exporting country, the government continues to make expenditures for the export subsidy. This represents a cost to the country's taxpayers that does not even generate the intended benefit for the export industry. In the importing country, the government collects tariff revenue as a result of the CVD. This generates benefits to the recipients of the resulting additional government spending.

The net national welfare effect in each country is the same as the government effects. This means that the importing country benefits from the export subsidy plus CVD, while the exporting country loses from the combined policies.

The world welfare effect of the combined policies is neutral. This means that the exporting country loses exactly the same amount as the importing country gains. The ultimate effect of the export subsidy plus the CVD is that the exporting country's government transfers money to the importing country's government with consumers and producers left unaffected. In practice, exporting country producers receive an export subsidy payment from their government when their product leaves the port bound for the importing country. When the product arrives, the importing country's government collects a tariff (or a CVD) exactly equal to the subsidy payment. Thus the export firms turn over the extra monies they had just received from their own government to the government of the importing country.

These effects described here hold only for markets that are perfectly competitive. If the markets are oligopolistic, or contain market imperfections or other distortions, then the effects of the export subsidy and CVD may differ.

Key Takeaways

- An antisubsidy law, allowable under the WTO agreement, enables countries to apply a countervailing duty (CVD)—that is, an import tariff—equal in value to the export subsidy that is shown to be in place by the exporting country in a particular product market.
- A CVD will cause the price of the product in both countries to revert to the free trade price.
- A CVD will raise producer surplus and lower consumer surplus in the import country relative to the equilibrium with just the export subsidy in place.

- The net effect of a CVD and the foreign export subsidy together is a transfer of income from the export country's government to the import country's government.

Exercise 7.18.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The term used to describe the tariff used to offset the injurious effects of a foreign government export subsidy.
   b. Of *increase*, *decrease*, or *stay the same*, the effect on the domestic price of a product, relative to free trade, if a domestic exporting country has an export subsidy of S and the foreign importer has a CVD = C in place such that $C = S$.
   c. Of *increase*, *decrease*, or *stay the same*, the effect on domestic production of a product, relative to free trade, if a domestic exporting country has an export subsidy of S and the foreign importer has a CVD = C in place such that $C = S$.
   d. Of *increase*, *decrease*, or *stay the same*, the effect on domestic consumption of a product, relative to free trade, if a domestic exporting country has an export subsidy of S and the foreign importer has a CVD = C in place such that $C = S$.
   e. Of *increase*, *decrease*, or *stay the same*, the effect on the domestic price of a product, relative to free trade, if a domestic exporting country has an export subsidy of S and the foreign importer has a CVD = C in place such that $C > S$.
2. Consider a market for computers in two large countries. Suppose the exporting country imposes a specific export subsidy equal to $P_H - P_L$. Afterward, the importing country retaliates with a countervailing duty also set equal to $P_H - P_L$. Use the diagram below to answer the following questions.

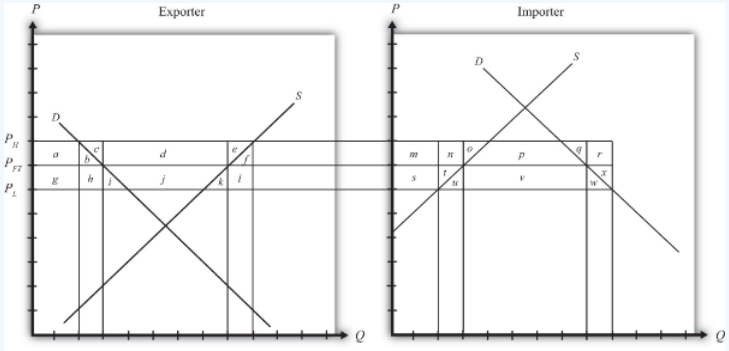


Figure 7.18.2: Two Large Trading Countries

   a. What is the change in consumer surplus in the exporting country when the export subsidy is imposed?
   b. What is the change in producer surplus in the exporting country when the export subsidy is imposed?
   c. What are government subsidy payments in the exporting country when the export subsidy is imposed?
   d. What is the net national welfare effect in the exporting country when the export subsidy is imposed?
   e. What is the net national welfare effect in the importing country when the subsidy is imposed?
   f. What is the change in consumer surplus in the importing country (relative to the subsidy in place) with the CVD?
   g. What is the change in producer surplus in the importing country (relative to the subsidy in place) with the CVD?
   h. What is the change in government revenue in the importing country (relative to the subsidy in place) with the CVD?
   i. What is the change in government revenue in the exporting country (relative to the subsidy in place) with the CVD?
   j. What condition must hold for the CVD to improve welfare in the importing country (relative to the subsidy)?

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7.19: Voluntary Export Restraints (VERs): Large Country Price Effects 7.19: Voluntary Export Restraints (VERs): Large Country Price EffectsEdit Update titlecancel

Learning Objectives

1. Identify the effects of a voluntary export restraint, or export quota, on prices in both countries and the quantity traded.
2. Know the equilibrium conditions that must prevail in a voluntary export restraint (VER) equilibrium.

Suppose the United States, an exporting country in free trade, imposes a binding export quota, often called a voluntary export restraint (VER) when implemented bilaterally, on wheat exports to Mexico. The VER will restrict the flow of wheat across the border. Since the United States is a large exporter, the supply of wheat to the Mexican market will fall, and if the price remained the same it would cause excess demand for wheat in the market. The excess demand will induce an increase in the price of wheat. Since wheat is homogeneous and the market is perfectly competitive, the price of all wheat sold in Mexico, both Mexican wheat and U.S. imports, will rise in price. The higher price will, in turn, reduce demand and increase domestic supply, causing a reduction in Mexico's import demand.

The restricted wheat supply to Mexico will shift supply back to the U.S. market, causing excess supply in the U.S. market at the original price and a reduction in the U.S. price. The lower price will, in turn, reduce U.S. supply, raise U.S. demand, and cause a reduction in U.S. export supply.

These price effects are identical in direction to the price effects of an import tax and an import quota by the importer country, and an export tax by the exporting country.

A new VER equilibrium will be reached when the following two conditions are satisfied:

$$MD^{Mex}(P_V^{Mex}) = \bar{Q}$$

and

$$XS^{US}(P_V^{US}) = \bar{Q},$$

where $\bar{Q}$ is the quantity at which the VER is set, P_V^{Mex} is the price in Mexico after the VER, and P_V^{US} is the price in the United States after the VER.

The first condition says that the price must change in Mexico such that import demand falls to the VER level $\bar{Q}$. In order for this to occur, the price in Mexico rises. The second condition says that the price must change in the United States such that export supply falls to the VER level $\bar{Q}$. In order for this to occur, the price in the United States falls.

The VER equilibrium is depicted graphically in Figure 7.19.1. The Mexican price of wheat rises from P_{FT} to P_V^{Mex}, which is sufficient to reduce its import demand from Q_{FT} to $\bar{Q}$. The U.S. price of wheat falls from P_{FT} to P_V^{US}, which is sufficient to reduce its export supply also from Q_{FT} to $\bar{Q}$.

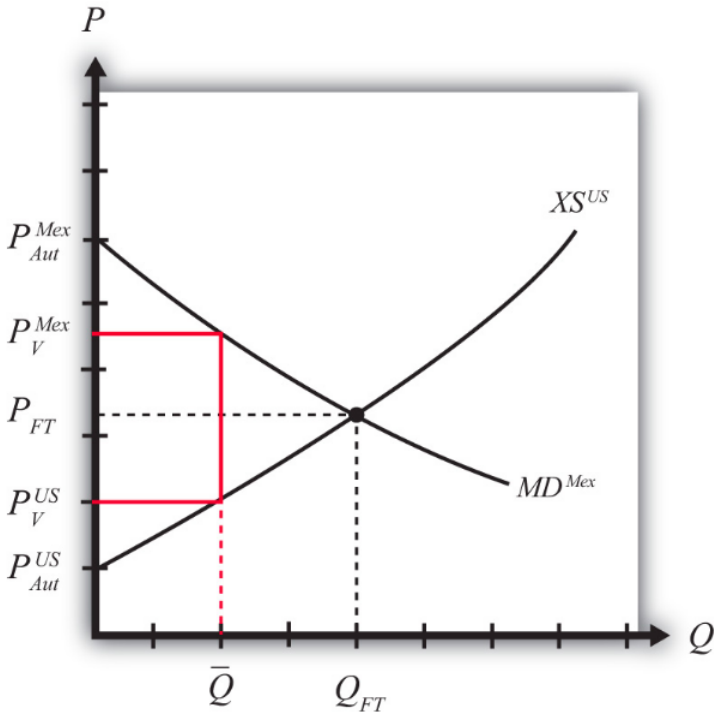


Figure 7.19.1: Depicting a VER Equilibrium- Large Country Case

Notice that a unique set of prices satisfies the equilibrium conditions for every potential VER that is set. If the VER were set lower than $\bar{Q}$, the price wedge would rise, causing a further increase in the Mexican price and a further decrease in the U.S. price.

At the extreme, if the VER were set equal to zero, then the prices in each country would revert to their autarky levels. In this case, the VER would *prohibit* trade. This situation is similar to an export embargo.

Key Takeaways

- A VER implemented by an exporting country will reduce the domestic price and, in the case of a large country, raise the foreign price.
- The difference between the domestic and foreign price after the VER represents a quota rent.
- A VER will reduce the quantity of exports to the quota amount.

? Exercise 7.19.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The direction of change of the domestic price after a binding VER is implemented by an exporting country.
   b. The direction of change of the foreign importer price after a binding VER is implemented by a large exporting country.
   c. Of *increase*, *decrease*, or *stay the same*, this is the effect on the domestic price after a nonbinding export quota is implemented by an exporting country.
   d. Of *increase*, *decrease*, or *stay the same*, this is the effect on the quantity of wheat exports if a binding VER is implemented.
   e. Of *increase*, *decrease*, or *stay the same*, this is the effect on foreign imports of shoes if a binding VER is implemented by an exporting country.

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7.20: Administration of a Voluntary Export Restraint 7.20: Administration of a Voluntary Export RestraintEdit Update titlecancel

Learning Objectives

1. Learn the ways in which a voluntary export restraint (VER) can be implemented to monitor and assure that only the specified amount is exported to the targeted country.

When a government sets a quantity restriction, the government must implement procedures to prevent exports beyond the restricted level. A binding voluntary export restraint (VER) will result in a higher price in the import country and in the case of a large country, a reduction in the price in the exporter's market. The price wedge would generate profit opportunities for anyone who could purchase (or produce) the product at the lower price (or cost) in the export market and resell it at the higher price in the import market.

Three basic methods are used to administer VERs.

1. *Offer export rights on a first-come, first-served basis*. The government could allow exports to exit freely from the start of the year until the VER limit is reached. Once filled, customs officials would prohibit export of the product for the remainder of the year. If administered in this way, the VER may result in a fluctuating price for the product over the year. During the open period, a sufficient amount of imports may flow in to achieve free trade prices. Once the window is closed, prices would revert to the autarky prices.
2. *Auction export rights*. Essentially the government could sell quota tickets where each ticket presented to a customs official would allow the exit of one unit of the good. If the tickets are auctioned, or if the price is determined competitively, the price at which each ticket would be sold is the difference in prices that exist between the export and import market. The holder of a quota ticket can buy the product at the low price in the exporter's market and resell it at the higher price in the importer's market. If there are no transportation costs, a quota holder can make a pure profit, called a quota rent, equal to the difference in prices. If the government sells the quota tickets at the maximum attainable price, then the government would receive all the quota rents.
3. *Give away export rights*. The government could give away the export rights by allocating quota tickets to appropriate individuals. The recipient of a quota ticket essentially receives a windfall profit since, in the absence of transportation costs, they can claim the entire quota rent at no cost to themselves. Many times governments allocate the quota tickets to domestic exporting companies based on past market shares. Thus, if an exporter had exported 40 percent of all exports before the VER, then it would be given 40 percent of the quota tickets. It is worth noting that because quota rents are so valuable, a governmen can use them to direct rents toward its political supporters.

Key Takeaways

- To administer a VER, countries generally assign export rights, or licenses, with the allowable import quantity limited in total to quota level.
- The government earns revenue from the quota rents if it allocates the export licenses via auction or sale.
- If the government gives the export rights away, as it typically does in these cases, the recipients of the rights, typically the export firms themselves, earn the quota rents.

Exercise 7.20.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. Of *domestic* or *foreign* residents, this group receives quota rents when the government sells the right to export.
   b. The term for the quota allocation method in which exports are allowed until the quota limit is reached.
   c. The term used to describe the sale of quota rights to the highest bidder.
   d. The likely recipients if new quota rights are given away by the government.
   e. The term used to describe the profit made by a quota rights holder who can purchase the product cheaper in the export market and sell it for more in the import market.

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7.21: Voluntary Export Restraints: Large Country Welfare Effects 7.21: Voluntary Export Restraints: Large Country Welfare EffectsEdit Update titlecancel

Learning Objectives

1. Use a partial equilibrium diagram to identify the welfare effects of a voluntary export restraint (VER) on producer and consumer groups and the government in the exporting and importing countries.
2. Calculate the national and world welfare effects of a VER in the case of a large country.

Suppose for simplicity that there are only two trading countries: one importing country and one exporting country. The supply and demand curves for the two countries are shown in Figure 7.21.1. P_{FT} is the free trade equilibrium price. At that price, the excess demand by the importing country equals excess supply by the exporter.

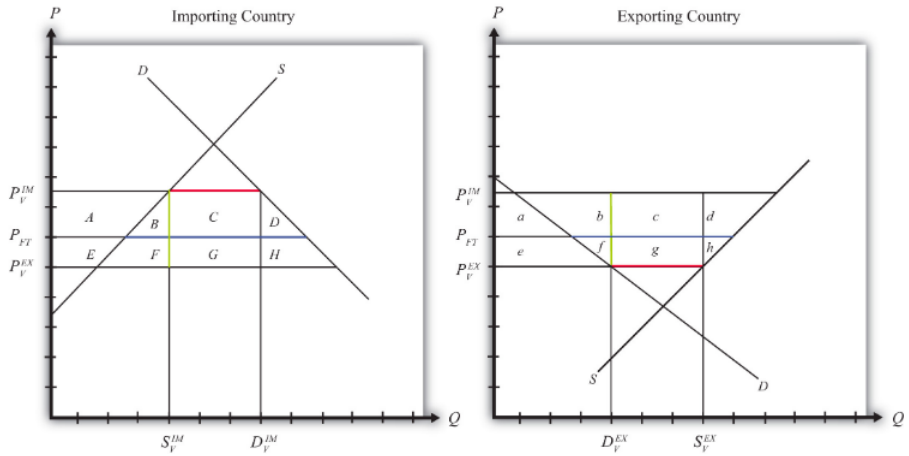


Figure \(\PageIndex{1}\): Welfare Effects of a VER: Large Country Case

The quantity of imports and exports is shown as the blue line segment on each country's graph (the horizontal distance between the supply and demand curves at the free trade price). Suppose the large exporting country implements a binding voluntary export restraint set equal to the length of the red line segment. When a new equilibrium is reached, the price in the importing country will rise to the level at which import demand is equal to the quota level. The price in the exporting country will fall until export supply is equal to the quota level.

Table 7.21.1 provides a summary of the direction and magnitude of the welfare effects to producers, consumers, and the governments in the importing and exporting countries. The aggregate national welfare effects and the world welfare effects are also shown.

Table 7.21.1: Welfare Effects of a Voluntary Export Restraint

	Importing Country	Exporting Country
Consumer Surplus	$-(A+B+C+D)$	$+e$
Producer Surplus	$+A$	$-(e+f+g+h)$
Quota Rents	0	$+(c+g)$
National Welfare	$-(B+C+D)$	$c-(f+h)$
World Welfare	$-(B+D)-(f+h)$	

Refer to Table 7.21.1 and Figure 7.21.1 to see how the magnitudes of the changes are represented.

VER effects on the exporting country's consumers. Consumers of the product in the exporting country experience an increase in well-being as a result of the VER. The decrease in their domestic price raises the amount of consumer surplus in the market.

VER effects on the exporting country's producers. Producers in the exporting country experience a decrease in well-being as a result of the quota. The decrease in the price of their product in their own market decreases producer surplus in the industry. The price decline also induces a decrease in output, a decrease in employment, and a decrease in profit, payments, or both to fixed costs.

VER effects on the quota rents. Who receives the quota rents depends on how the government administers the quota.

1. If the government auctions the quota rights for their full price, then the government receives the quota rents. In this case, the quota is equivalent to a specific export tax set equal to the difference in prices ($T = P_V^{IM} - P_V^{EX}$), shown as the length of the green line segment in Figure 7.21.1.
2. If the government gives away the quota rights, then the quota rents accrue to whoever receives these rights. Typically, they would be given to the exporting producers, which would serve to offset the producer surplus losses. It is conceivable that the quota rents may exceed the surplus loss so that the export industry is better off with the VER than without. Regardless, the benefits would remain in the domestic economy.

VER effects on the exporting country. The aggregate welfare effect for the country is found by summing the gains and losses to consumers, producers, and the recipients of the quota rents. The net effect consists of three components: a positive terms of trade effect (c), a negative production distortion (h), and a negative consumption distortion (f).

Because there are both positive and negative elements, the net national welfare effect can be either positive or negative. The interesting result, however, is that it can be *positive*. This means that a VER implemented by a large exporting country *may* raise national welfare.

Generally speaking, the following are true:

1. Whenever a large country implements a small restriction on exports, it will raise national welfare.
2. If the VER is too restrictive, national welfare will fall.
3. There will be a positive quota level that will maximize national welfare.

However, it is also important to note that not everyone's welfare rises when there is an increase in national welfare. Instead, there is a redistribution of income. Consumers of the product and recipients of the quota rents will benefit, but producers may lose. A national welfare increase, then, means that the sum of the gains exceeds the sum of the losses across all individuals in the economy. Economists generally argue that, in this case, compensation from winners to losers can potentially alleviate the redistribution problem.

VER effects on the importing country's consumers. Consumers of the product in the importing country suffer a reduction in well-being as a result of the VER. The increase in the domestic price of both imported goods and the domestic substitutes reduces the amount of consumer surplus in the market.

VER effects on the importing country's producers. Producers in the importing country experience an increase in well-being as a result of the VER. The increase in the price of their product increases producer surplus in the industry. The price increases also induce an increase in the output of existing firms (and perhaps the addition of new firms), an increase in employment, and an increase in profit, payments, or both to fixed costs.

VER effects on the importing country. The aggregate welfare effect for the country is found by summing the gains and losses to consumers and producers. The net effect consists of three components: a negative terms of trade effect (C), a negative consumption distortion (D), and a negative production distortion (B).

Since all three components are negative, the VER must result in a reduction in national welfare for the importing country. However, it is important to note that a redistribution of income occurs—that is, some groups gain while others lose. This is especially important because VERs are often suggested by the importing country. This occurs because the importing country's government is pressured by the import-competing producers to provide protection in the form of an import tariff or quota. Government reluctance to use these policies often leads the importer to negotiate VERs with the exporting country. Although the importing country's national welfare is reduced, the import-competing producers gain nonetheless.

VER effects on world welfare. The effect on world welfare is found by summing the national welfare effects on the importing and exporting countries. By noting that the terms of trade gain to the importer is equal to the terms of trade loss to the exporter, the world welfare effect reduces to four components: the importer's negative production distortion (B), the importer's negative consumption distortion (D), the exporter's negative consumption distortion (f), and the exporter's negative production distortion (h). Since each of these is negative, the world welfare effect of the VER is negative. The sum of the losses in the world exceeds the sum of the gains. In other words, we can say that a VER results in a reduction in world production and consumption efficiency.

Key Takeaways

- A VER raises consumer surplus in the export market and lowers it in the import country market.
- A VER lowers producer surplus in the export market and raises it in the import country market.
- National welfare may rise or fall when a large exporting country implements a VER.
- National welfare in the importing country rises when a large exporting country implements a VER.
- A VER of any size will reduce world production and consumption efficiency and thus cause world welfare to fall.

? Exercise 7.21.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The direction of change of domestic producer surplus when a binding VER is implemented by an exporting country.
   b. The direction of change of foreign producer surplus when a binding VER is implemented by an exporting country.
   c. The direction of change of domestic consumer surplus when a binding VER is implemented by an exporting country.
   d. The direction of change of foreign consumer surplus when a binding VER is implemented by an exporting country.
2. Consider the following trade policy action listed along the top row of the table below. In the empty boxes, use the following notation to indicate the effect of the policy on the variables listed in the first column:

   \+ the variable increases

   − the variable decreases

   0 the variable does not change

   A the variable change is ambiguous (i.e., it may rise, it may fall)

   Use a partial equilibrium model to determine the answers, and assume that the shapes of the supply and demand curves are "normal." Assume that the policy does not begin with, or result in, prohibitive trade policies. Also assume that the policy does not correct for market imperfections or distortions.

Table 7.21.2: Effects of a VER Elimination

	Elimination of a Binding VER by a Large Exporting Country
Domestic Market Price	
Domestic Industry Employment	
Domestic Consumer Welfare	
Domestic Producer Welfare	
Domestic Government Revenue	
Domestic National Welfare	
Foreign Price	
Foreign Consumer Welfare	
Foreign Producer Welfare	
Foreign National Welfare	

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7.22: Export Taxes- Large Country Price Effects 7.22: Export Taxes- Large Country Price EffectsEdit Update titlecancel

Learning Objectives

1. Identify the effects of an export tax on prices in both countries and the quantity traded in the case of a large country.
2. Know the equilibrium conditions that must prevail in an export tax equilibrium.

Suppose the United States, the exporting country in free trade, imposes a specific export tax on exports of wheat. A tax on exports will reduce the flow of wheat across the border. It will now cost more to move the product from the United States into Mexico.

As a result, the supply of wheat to the Mexican market will fall, inducing an increase in the price of wheat. Since the United States is assumed to be a large country, the price of all wheat sold in Mexico, both Mexican wheat and U.S. imports, will rise in price. The higher price will reduce Mexico's import demand.

The reduced wheat supply to Mexico will shift supply back to the U.S. market and induce a reduction in the U.S. price. The lower price will reduce U.S. export supply.

These price effects are identical in direction to the price effects of a tariff, an import quota, and a voluntary export restraint.

A new tax-ridden equilibrium will be reached when the following two conditions are satisfied:

$$P_T^{Mex} = P_T^{US} + T$$

and

$$XS^{US}(P_T^{US}) = MD^{Mex}(P_T^{Mex}),$$

where T is the export tax, P_T^{Mex} is the price in Mexico after the tax, and P_T^{US} is the price in the United States after the tax.

The first condition represents a price wedge between the final U.S. price and the Mexican price equal to the amount of the export tax. The prices must differ from the tax because U.S. suppliers of wheat must receive the same price for their product regardless of whether the product is sold in the United States or Mexico, and all wheat sold in Mexico must be sold at the same price. Since a tax is collected at the border, the only way for these price equalities within countries to arise is if the price differs across countries by the amount of the tax.

The second condition states that the amount the United States wants to export at its new lower price must be equal to the amount Mexico wants to import at its new higher price. This condition guarantees that world supply of wheat equals world demand for wheat.

The export tax equilibrium is depicted graphically in Figure 7.22.1. The Mexican price of wheat rises from P_{FT} to P_T^{Mex}, which reduces its import demand from Q_{FT} to Q_T. The U.S. price of wheat falls from P_{FT} to P_T^{US}, which reduces its export supply also from Q_{FT} to Q_T. The difference in the prices between the two markets is equal to the export tax rate T.

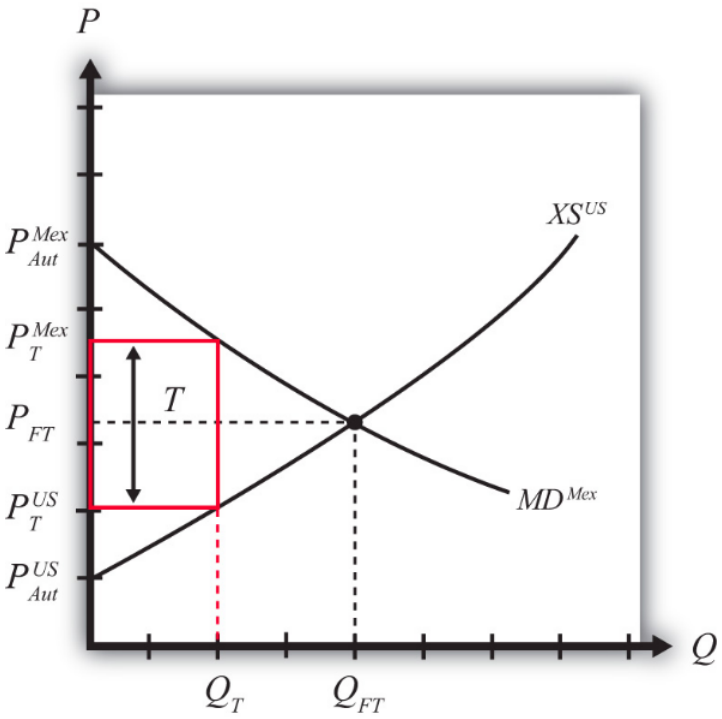


Figure 7.22.1: Depicting an Export Tax Equilibrium- Large Country Case

Notice that there is a unique set of prices that satisfies the equilibrium conditions for every potential export tax that is set. If the tax was set higher than T, the price wedge would rise, causing a further increase in the Mexican price, a further decrease in the U.S. price, and a further reduction in the quantity traded.

Key Takeaways

- An export tax will lower the domestic price and, in the case of a large country, raise the foreign price.
- An export tax will decrease the quantity of exports.
- The export tax will drive a price wedge, equal to the tax rate, between the domestic price and the foreign price of the product.
- With the export tax in place in a two-country model, export supply at the lower domestic price will equal import demand at the higher foreign price.

? Exercise 7.22.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The kind of power a country is said to have when its exports make up a significant share of the world market.
   b. The direction of change of the domestic price after an export tax is implemented by a domestic country.
   c. The direction of change of the foreign price after an export tax is implemented by a large domestic country.
   d. The price of tea in the exporting country if the exporter sets an export tax of $0.75 per pound and if the importer country price is $4.75 inclusive of the tax.
   e. Of *increase*, *decrease*, or *stay the same*, this is the effect on exports of wheat if an export tax on wheat is implemented.
   f. Of *increase*, *decrease*, or *stay the same*, this is the effect on foreign imports of wheat if an export tax on wheat is implemented by an exporting country.

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7.23: Export Taxes- Large Country Welfare Effects 7.23: Export Taxes- Large Country Welfare EffectsEdit Update titlecancel

Learning Objectives

1. Use a partial equilibrium diagram to identify the welfare effects of an export tax on producer and consumer groups and the government in the exporting and importing countries.
2. Calculate the national and world welfare effects of an export tax.

Suppose that there are only two trading countries: one importing country and one exporting country. The supply and demand curves for the two countries are shown in Figure 7.23.1. P_{FT} is the free trade equilibrium price. At that price, the excess demand by the importing country equals excess supply by the exporter.

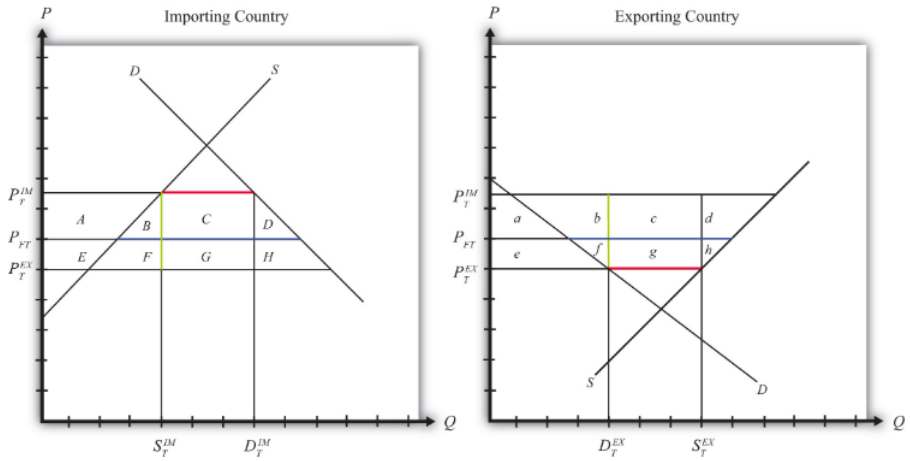


Figure 7.23.1: Welfare Effects of an Export Tax- Large Country Case

The quantity of imports and exports is shown as the blue line segment on each country's graph (the horizontal distance between the supply and demand curves at the free trade price). When a large exporting country implements an export tax, it will cause a decrease in the price of the good on the domestic market and an increase in the price in the rest of the world (RoW). Suppose after the tax, the price in the importing country rises to P_T^{IM} and the price in the exporting country falls to P_T^{EX}. If the tax is a specific tax, then the tax rate would be $T = P_T^{IM} - P_T^{EX}$, equal to the length of the green line segment in Figure 7.23.1. If the tax were an ad valorem tax, then the tax rate would be given by

$$T = \frac{P_T^{IM}}{P_T^{EX}} - 1.$$

Table 7.23.1 provides a summary of the direction and magnitude of the welfare effects to producers, consumers, and the governments in the importing and exporting countries. The aggregate national welfare effects and the world welfare effects are also shown.

Table 7.23.1: Welfare Effects of an Export Tax

	Importing Country	Exporting Country
Consumer Surplus	$-(A+B+C+D)$	$+e$
Producer Surplus	$+A$	$-(e+f+g+h)$
Govt. Revenue	0	$+(c+g)$
National Welfare	$-(B+C+D)$	$+c-(f+h)$
World Welfare	$-(B+D)-(f+h)$	

Refer to Table 7.23.1 and Figure 7.23.1 to see how the magnitudes of the changes are represented.

Export tax effects on the exporting country's consumers. Consumers of the product in the exporting country experience an increase in well-being as a result of the export tax. The decrease in their domestic price raises the amount of consumer surplus in the market.

Export tax effects on the exporting country's producers. Producers in the exporting country experience a decrease in well-being as a result of the tax. The decrease in the price of their product in their own market decreases producer surplus in the industry. The price decline also induces a decrease in output, a decrease in employment, and a decrease in profit, payments, or both to fixed costs.

Export tax effects on the exporting country's government. The government receives tax revenue as a result of the export tax. Who benefits from the revenue depends on how the government spends it. Typically, the revenue is simply included as part of the general funds collected by the government from various sources. In this case, it is impossible to identify precisely who benefits. However, these funds help support many government spending programs, which presumably help either most people in the country, as is the case with public goods, or certain worthy groups. Thus someone within the country is the likely recipient of these benefits.

Export tax effects on the exporting country. The aggregate welfare effect for the country is found by summing the gains and losses to consumers and producers. The net effect consists of three components: a positive terms of trade effect (c), a negative consumption distortion (f), and a negative production distortion (h).

Because there are both positive and negative elements, the net national welfare effect can be either positive or negative. The interesting result, however, is that it can be *positive*. This means that an export tax implemented by a large exporting country *may* raise national welfare.

Generally speaking, the following are true:

1. Whenever a large country implements a small export tax, it will raise national welfare.
2. If the tax is set too high, national welfare will fall.
3. There will be a positive optimal export tax that will maximize national welfare.

However, it is also important to note that not everyone's welfare rises when there is an increase in national welfare. Instead, there is a redistribution of income. Producers of the product and recipients of government spending will benefit, but consumers will lose. A national welfare increase, then, means that the sum of the gains exceeds the sum of the losses across all individuals in the economy. Economists generally argue that, in this case, compensation from winners to losers can potentially alleviate the redistribution problem.

Export tax effects on the importing country's consumers. Consumers of the product in the importing country suffer a reduction in well-being as a result of the export tax. The increase in the price of both imported goods and the domestic substitutes reduces the amount of consumer surplus in the market.

Export tax effects on the importing country's producers. Producers in the importing country experience an increase in well-being as a result of the export tax. The increase in the price of their product on the domestic market increases producer surplus in the industry. The price increase also induces an increase in the output of existing firms (and perhaps the addition of new firms), an increase in employment, and an increase in profit, payments, or both to fixed costs.

Export tax effects on the importing country's government. There is no effect on the importing country's government revenue as a result of the exporter's tax.

Export tax effects on the importing country. The aggregate welfare effect for the country is found by summing the gains and losses to consumers, producers, and the government. The net effect consists of three components: a negative terms of trade effect (C), a negative production distortion (B), and a negative consumption distortion (D).

Since all three components are negative, the export tax must result in a reduction in national welfare for the importing country. However, it is important to note that a redistribution of income occurs—that is, some groups gain while others lose. In this case, the sum of the losses exceeds the sum of the gains.

Export tax effects on world welfare. The effect on world welfare is found by summing the national welfare effects on the importing and exporting countries. By noting that the terms of trade gain to the exporter is equal to the terms of trade loss to the importer, the world welfare effect reduces to four components: the importer's negative production distortion (B), the importer's negative consumption distortion (D), the exporter's negative consumption distortion (f), and the exporter's negative production distortion (h). Since each of these is negative, the world welfare effect of the export tax is negative. The sum of the losses in the world exceeds the sum of the gains. In other words, we can say that an export tax results in a reduction in world production and consumption efficiency.

Key Takeaways

- An export tax raises consumer surplus and lowers producer surplus in the exporter market.
- An export tax lowers producer surplus in the export market and raises it in the import country market.
- National welfare may rise or fall when a large country implements an export tax.
- For any country that is large in an export product, there is a positive optimal export tax.
- National welfare in the importing country falls when a large exporting country implements an export tax.
- An export tax of any size will reduce world production and consumption efficiency and thus cause world welfare to fall.

Exercise 7.23.1

1. Suppose there are two large countries, the United States and China. Assume that both countries produce and consume clothing. The United States imports clothing from China. Consider the trade policy action listed along the top row of the table below. In the boxes, indicate the effect of the policy on the variables listed in the first column. Use a partial equilibrium, perfect competition model to determine the answers. You do not need to show your work. Use the following notation:

   + the variable increases

   − the variable decreases

   0 the variable does not change

   A the variable change is ambiguous (i.e., it may rise, it may fall)

Table 7.23.2: Effects of an Export Tax

	Chinese Implementation of an Export Tax
U.S. Domestic Consumer Price	
U.S. Domestic Consumer Welfare	
U.S. Domestic Producer Welfare	
U.S. National Welfare	
Chinese Producer Welfare	
Chinese Consumer Welfare	
Chinese National Welfare	

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CHAPTER OVERVIEW

8: Domestic Policies and International Trade

Increasingly, at international forums where policymakers are discussing international trade issues, the topic of discussion is not what trade policies countries are using but rather what domestic policies are in place. The reason is that in our interconnected and globalized world, the domestic policies affecting energy, the environment, labor markets, health, and many other matters will affect not only what happens at home but also what, and how much, is traded and invested, and thus the outcomes for producers and consumers abroad. In short, domestic policies have international repercussions.

This chapter explores several simple domestic policies and investigates how these policies can affect trade flows with other countries. It also examines the welfare effects of these policies and concludes with a very important insight: that trade policies can be duplicated with a combination of several domestic policies. The implications of this notable insight are explored.

8.1: Chapter Overview
8.2: Domestic Production Subsidies
8.3: Production Subsidies as a Reason for Trade
8.4: Production Subsidy Effects in a Small Importing Country
8.5: Domestic Consumption Taxes
8.6: Consumption Taxes as a Reason for Trade
8.7: Consumption Tax Effects in a Small Importing Country
8.8: Equivalence of an Import Tariff with a Domestic (Consumption Tax plus Production Subsidy)

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8.1: Chapter Overview 8.1: Chapter OverviewEdit Update titlecancel

Learning Objectives

1. Distinguish trade policies from domestic policies.
2. Identify different types of domestic policies.
3. Learn the effects of simple domestic policies on small trading economies.

Policy analysis in international trade theory generally emphasizes the analysis of *trade* policies specifically. **Trade policy** includes any policy that *directly* affects the flow of goods and services between countries, including import tariffs, import quotas, voluntary export restraints, export taxes, export subsidies, and so on. During the 1980s and 1990s, as trade barriers came down, especially between developed countries, more and more attention was brought to the effects of certain **domestic policy** types, including their international effects.

For example, there is increasing concern in the United States about the environmental and labor policies of many U.S. trade partners. With regard to environmental policies, some have argued that more lenient environmental regulations in many less-developed countries give firms in those countries a competitive edge relative to firms operating in the United States. The same argument is used in regard to labor practices. Many U.S. industry representatives argue that low foreign wages, lenient occupational safety regulations, and in some cases the use of child labor or prison labor give some countries a competitive edge in international markets.

In general, for small countries, domestic policies *will* affect domestic prices, production levels, trade flows, and welfare but *will not* affect foreign prices, production levels, and welfare. This means that countries like the United States may not need to worry much about domestic practices in very small countries. However, when a country is large in international markets, domestic policies will affect prices, production levels, profits, and welfare, both domestically and internationally.

Types of Domestic Policies

In general, any type of domestic tax or subsidy policy, or any type of government regulation that affects the behavior of firms or consumers, can be classified as a domestic policy. There are a wide variety of these policies, any of which can have an impact on international trade.

For example, income taxes are levied on wages and capital incomes of individuals. Profit taxes are levied on the profits of businesses. Sales taxes are generally levied as a percentage of retail sales. In the United States, these taxes are popular within individual states. Excise taxes are specific taxes on particular commodities such as gasoline, alcohol, or cigarettes.

Some domestic government policies take the form of quantity restrictions. An example is controls on the amount of pollutants that industries can emit. Also, in most countries there are restrictions on the production and sale of many drugs. The United States prohibits the use of recreational drugs like marijuana and cocaine, as well as pharmaceuticals that have not been approved by the U.S. Food and Drug Administration.

Governments also provide subsidies for many purposes. They disburse research and development (R&D) subsidies to high-technology industries and encourage R&D through their defense spending contracts. Governments also give out educational subsidies (grants) and subsidize student loans. In agriculture, governments often have elaborate programs designed to raise the incomes of farmers, including the use of price floors, subsidized loans, payments to encourage fallow acreage, and so on. Although many domestic policies are complex regulations, the analysis here will focus on simple domestic tax and subsidy policies applied either to production or to consumption. Many of the insights learned in this analysis, however, do carry over to more complex situations.

Domestic Policy versus Trade Policy Price Effects

One of the most important distinctions between domestic policies and trade policies is the effect on prices. When a trade policy, such as a tariff, is implemented, a price wedge is driven between the domestic price and the foreign price of the good. The domestic producers of the product will receive a higher price for the goods they sell, and domestic consumers will pay the same higher price for the goods they purchase.

In the case of domestic policies, a wedge is driven between domestic prices for the good. For example, if a domestic production subsidy is implemented by a small country, it will raise the price producers receive when they sell their good (we'll call this the

producer price), but it will not affect the price paid by domestic consumers when they purchase the good (we'll call this the **consumer price**). The foreign price would remain equal to the consumer price in the domestic country. Note that we can also call the consumer price the "market price" since this is the price that would appear on a price tag in the domestic market.

If a domestic consumption tax is implemented by a small country, it will raise the domestic consumer price of the good but will not affect the domestic producer price. The foreign price will remain equal to the producer price in this case.

In general, trade policies will always maintain the equality between domestic consumer and producer prices but will drive a wedge between domestic prices and foreign prices. Domestic policies (at least production and consumption taxes and subsidies), in contrast, will drive a wedge between domestic consumption and production prices.

Domestic Policies as a Basis for Trade

One of the first points made in this section is that a domestic policy can be the basis for trade. In other words, even if trade would not occur otherwise between countries, it is possible to show that the imposition of domestic taxes or subsidies can induce international trade, even if a country is small in international markets. Two examples are analyzed.

The first case considers a small country initially in free trade that, by chance, has no desire to export or import a particular commodity. The country then imposes a production subsidy. The subsidy encourages domestic production, but because the country is open to international trade, the domestic consumer price remains the same. Since the price paid by consumers remains the same, so does domestic demand. All the extra production, then, is exported to the rest of the world. Thus a domestic production subsidy can cause a commodity to be exported.

The second case considers the same initial conditions in which a small country in free trade has no desire to trade. In this case, the country implements a consumption tax. The tax raises the price paid by consumers in the domestic market, and this reduces domestic demand. However, because open competition remains with the rest of the world, the domestic producers' price, and therefore domestic production, remains the same. The excess production over demand would now be exported to the rest of the world. Thus a domestic consumption tax can cause a commodity to be exported.

It would be straightforward to show that a production tax or a consumption subsidy (such as a rebate) could cause a country to import a good from the rest of the world.

Welfare Effects of Domestic Policies in Small Trading Economies

If a small country is importing or exporting a commodity initially, a domestic policy will affect the quantity imported or exported; the prices faced by consumers or producers; and the welfare of consumers, producers, the government, and the nation. We consider two examples in this section.

In the first case, we consider a production subsidy implemented by a small country that initially is importing the commodity from the rest of the world. The production subsidy stimulates domestic production by raising the producers' price but has no effect on the world price or the domestic consumers' price. Imports fall as domestic production rises.

Producers receive more per unit of output by the amount of the subsidy, thus producer surplus (or welfare) rises. Consumers face the same international price before and after the subsidy, thus their welfare is unchanged. The government must pay the unit subsidy for each unit produced by the domestic firms, and that represents a cost to the taxpayers in the country. The net national welfare effect of the production subsidy is a welfare loss represented by a production efficiency loss. Note, however, that the national welfare loss arises under an assumption that there are no domestic distortions or imperfections. If market imperfections are present, then a production subsidy can improve national welfare (see especially the infant industry argument in Chapter 9: Trade Policies with Market Imperfections and Distortions, Section 9.5: The Infant Industry Argument and Dynamic Comparative Advantage).

In the second case, we consider a consumption tax implemented by a small country that initially is importing the commodity from the rest of the world. The consumption tax inhibits domestic consumption by raising the consumers' price but has no effect on the world price or the domestic producers' price. Imports fall as domestic consumption falls.

Consumers pay more for each unit of the good purchased, thus consumer surplus (or welfare) falls. Producers face the same international price before and after the tax, thus their welfare is unchanged. The government collects tax revenue for each unit sold in the domestic market, and that facilitates greater spending on public goods, thus benefitting the nation. The net national welfare effect of the consumption tax is a welfare loss represented by a consumption efficiency loss. Note again, however, that the national

welfare loss arises under an assumption that there are no domestic distortions or imperfections. If market imperfections are present, then a consumption tax can improve national welfare.

Equivalency between Domestic and Trade Policies

Once the effects of simple domestic tax and subsidy policies are worked out, it is straightforward to show that a combination of domestic policies can duplicate a trade policy. For example, if a country imposes a specific production subsidy and a specific consumption tax on a product imported into the country and if the tax and subsidy rates are set equal, then the effects will be identical to a specific tariff on imports set at the same rate. If a country exports the product initially, then a production subsidy and consumption tax set at the same rates will be identical to an export subsidy set at the same level. Finally, a production tax coupled with a consumption subsidy (a rebate) imposed on a product that is initially exported and set at the same rate is equivalent to an export tax.

These results are especially important in light of recent movements in the direction of trade liberalization. As each new free trade agreement is reached, or as tariff barriers come down because of World Trade Organization (WTO) / General Agreement on Tariffs and Trade (GATT) negotiations, it seems reasonable to expect the expansion of international trade. Indeed, it is the effect that trade expansion will have on economic efficiency and growth that inspires these agreements in the first place. However, because trade policies are equivalent to a combination of domestic policies, it is possible to thwart the effects of trade liberalization by adjusting one's domestic policies.

Thus suppose a country negotiates and implements a free trade agreement with another country. As shown in our economic models, trade liberalization is likely to benefit some groups at the expense of others. Two main losses arise from trade liberalization. First, import-competing firms would lose out due to the increase in competition from foreign firms. Second, the government would lose tariff revenue.

Groups affiliated with import-competing industries are likely to be reluctant to support a free trade agreement. If these groups (trade associations, labor unions, etc.) are politically powerful, the domestic government may look for ways to reduce the harmful effects of trade liberalization by changing some of its domestic policies. An obvious way to do so would be to offer subsidies of some sort to the industries that are expected to be hurt by the agreement.

The other problem with trade liberalization is that it reduces government revenue. In this era where balanced government budgets are extremely difficult to maintain and where budget deficits are the norm, substantial reductions in government revenue are a serious source of concern. This means that many trade-liberalizing countries are likely to look for ways to mitigate the revenue shortfall. One obvious solution is to raise domestic taxes of some sort.

Although it is unlikely that a country's adjustments to its domestic policies would completely offset the effects of trade liberalization, it is conceivable that such adjustments would have some effect. Thus it is important for trade negotiators to be aware of the potential for domestic policy substitutions to assure that trade liberalizations have a real effect on trade between the countries.

The equivalency between trade and domestic policies may also be relevant to some of the trade disputes between the United States and Japan. Because of the large trade surpluses Japan had with the United States during the 1980s and 1990s, some people in the United States charged Japan with having excessive barriers to trade. Japan had noted, though, that its average tariff rates were roughly equivalent to tariffs charged by the United States and the EU. In the late 1980s, U.S. policymakers focused on Japan's domestic policies as the source of trade problems. In particular, the United States noted that Japan's distribution system and practices such as keiretsu (business groupings) may have been preventing U.S. firms' access to the Japanese market. This led to discussions known as the "Structural Impediments Initiative." Although this section does not suggest that such effects were indeed occurring, it does show that domestic policies can have an impact on trade flows between countries. In other words, it is conceivable that a country's domestic practices and policies could inhibit the inflow of goods into a country and act like tariffs or quotas on imports.

Key Takeaways

- Domestic policies include all policies targeted at domestic production, consumption, or other activities. They include production and consumption taxes and subsidies as well as income sales, property taxes, and domestic regulations.
- In contrast, trade policies are targeted directly at imports and exports such as import tariffs and quotas and export taxes and subsidies.

- Production and consumption taxes and subsidies can stimulate imports or exports to occur. In other words, domestic policies can cause international trade.
- Domestic production and consumption taxes and subsidies will affect the level of international trade with the rest of the world.
- An import tariff applied on an imported product is equivalent in its economic effects to a combination of a domestic production subsidy and a domestic consumption tax of equal value applied on the same product.

? Exercise 8.1.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The term for the full price received by producers per unit of a good sold inclusive of any taxes or subsidies.
   b. The term for the full price that consumers of a good pay to acquire a good inclusive of any taxes or subsidies.
   c. The term for a government policy that directly affects trade between countries.
   d. The term for a government policy that directly affects domestic economic activity.
   e. Of *domestic policy* or *trade policy*, this describes an import quota.
   f. Of *domestic policy* or *trade policy*, this describes a 5 percent state sales tax collected on all retail purchases.
   g. Of *domestic policy* or *trade policy*, this describes a regulation on fuel efficiency standards on all automobiles sold in the United States.

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8.2: Domestic Production Subsidies 8.2: Domestic Production SubsidiesEdit Update titlecancel

Learning Objectives

1. Distinguish domestic production subsidies from export policies.
2. Describe the motivations for government use of production subsidies.

A **domestic production subsidy** is a payment made by a government to firms in a particular industry based on the level of output or production. The subsidy can be specified either as an ad valorem subsidy (a percentage of the value of production) or as a specific subsidy (a dollar payment per unit of output). A domestic production subsidy is different from an export subsidy. A production subsidy provides a payment based on all production regardless of where it is sold. An export subsidy, on the other hand, only offers a payment to the quantity or value that is actually exported. An export subsidy is classified as a trade policy, whereas a production subsidy is a domestic policy.

Domestic production subsidies are generally used for two main reasons. First, subsidies provide a way of raising the incomes of producers in a particular industry. This is in part why many countries apply production subsidies on agricultural commodities: it raises the incomes of farmers. The second reason to use production subsidies is to stimulate output of a particular good. This might be done because the product is assumed to be critical for national security. This argument is sometimes used to justify subsidies to agricultural goods, as well as steel, motor vehicles, the aerospace industry, and many other products. Countries might also wish to subsidize certain industries if it is believed that the industries are important in stimulating growth of the economy. This is the reason many companies receive research and development (R&D) subsidies. Although R&D subsidies are not strictly production subsidies, they can have similar effects.

We will analyze the international trade effects of a domestic production subsidy using a partial equilibrium analysis. We will assume that the market in question is perfectly competitive and that the country is “small.” We will also ignore any benefits the policy may generate, such as creating a more pleasing distribution of income or generating valuable external effects. Instead, we will focus entirely on the producer, consumer, and government revenue effects of each policy.

Next, we consider the effects of a production subsidy under two separate scenarios. In the first case, the subsidy is implemented in a country that is not trading with the rest of the world. This case is used to show how a domestic policy can cause international trade. The second case considers the price and welfare effects of a production subsidy implemented by a country that is initially importing the good from the rest of the world.

Key Takeaways

- Domestic production subsidies are paid to firms for producing a product, whereas export subsidies are paid only to firms that export the product.
- The export subsidy is classified as a trade policy, whereas the production subsidy is a domestic policy.
- Production subsidies are used either to support the incomes within a sector or to stimulate production because it is believed that production will have a subsequent benefit.

Exercise 8.2.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The term describing the type of payment made by a government to a firm for each unit of a good the firm produces.
   b. The term describing the type of payment made by a government to a firm as a percentage of the value of a good the firm produces.
   c. Of *domestic policy* or *trade policy*, this describes a production subsidy.
   d. Of *domestic policy* or *trade policy*, this describes a specific export subsidy.

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8.3: Production Subsidies as a Reason for Trade 8.3: Production Subsidies as a Reason for TradeEdit Update titlecancel

Learning Objectives

1. Describe the price, quantity, and trade effects of a domestic production subsidy implemented by a small open economy.

This section will show how a production subsidy can *cause trade* for a small, perfectly competitive, open economy. The analysis indicates that domestic policies can be a cause of trade even in the absence of other reasons for trade. In other words, even if countries were identical with respect to their resource endowments, their technology, and their preferences and even if there were no economies of scale or imperfectly competitive markets, domestic policies could induce trade between countries.

Consider a small open economy with a perfectly competitive industry. Let the domestic market be represented by the supply and demand curves in Figure 8.3.1. Suppose initially that free trade is allowed with the rest of the world, but by coincidence (actually by assumption), let the free trade price be exactly equal to the autarky price for the good. This is shown as the price, P_{FT}. This implies that no imports or exports occur, even though there is free trade.

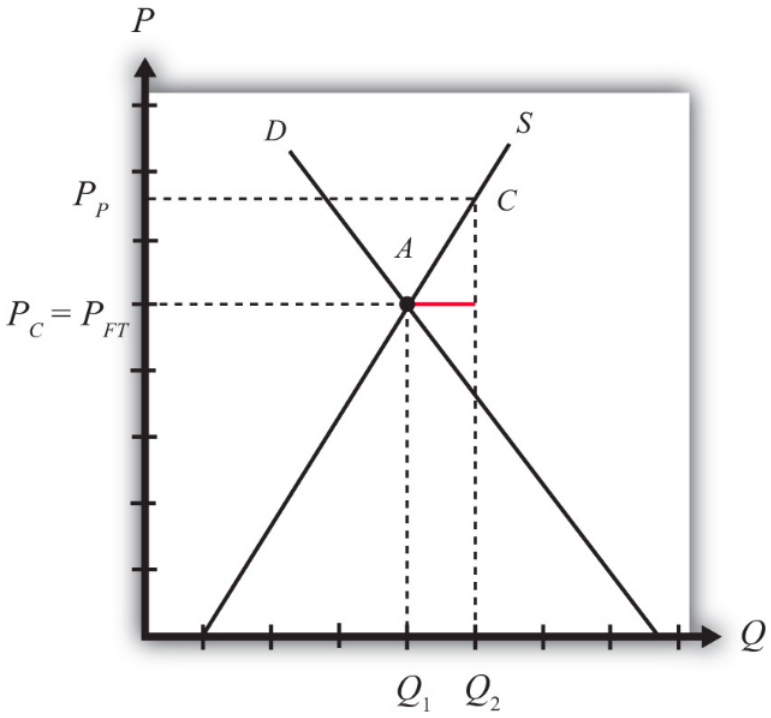


Figure 8.3.1: Inducing Exports with a Domestic Production Subsidy

Next, suppose that the government of this country offers a specific (per unit) production subsidy to the domestic firms. Let the subsidy rate be set at "s." This means the government will pay "s" dollars for every unit the domestic firm produces, regardless of where the product is sold.

The subsidy effectively raises the price that the producer receives for each unit of the good produced and sold. At the same time, the subsidy will not affect the domestic price that consumers pay. In other words, the subsidy will cause the price received by producers (the producer price) to rise above the price paid by consumers (the consumer price). The new producer price is labeled P_P in Figure 8.3.1, while the consumer price, P_C, remains equal to the free trade price. Thus $P_P = P_{FT} + s$ and $P_C = P_{FT}$. These price changes occur because these prices will allow domestic firms in the small country to maximize their profits in the face of free competition with firms in the rest of the world.

The subsidy will increase domestic production. At the market price P_{FT}, domestic firms were willing to supply to Q_1. Once the producer price rises to P_P, domestic supply will rise to Q_2. Demand would remain the same, however, since the consumer price remains fixed. The difference between domestic supply and demand, $Q_2 - Q_1$, represents the level of exports to the rest of the

world. Since exports did not exist prior to the subsidy, this is an example in which a domestic policy (a production subsidy) can cause trade (i.e., exports) to occur.

Key Takeaways

- A production subsidy raises the price received by producers by the full amount of the subsidy when the country is open to international trade.
- A production subsidy has no effect on the price paid by consumers when the country is open to international trade.
- A production subsidy causes exports when implemented by a small country open to trade but not initially trading.

Exercise 8.3.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. Of exports or imports, the one that is likely to be increased as a result of a domestic production subsidy on that product.
   b. Of *increase*, *decrease*, or *stay the same*, the effect on the producer price if a specific production subsidy is implemented by a country open to trade.
   c. Of *increase*, *decrease*, or *stay the same*, the effect on the consumer price if a specific production subsidy is implemented by a country open to trade.

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8.4: Production Subsidy Effects in a Small Importing Country 8.4: Production Subsidy Effects in a Small Importing CountryEdit Update titlecancel

Learning Objectives

1. Identify the winners and losers when a small importing country implements a production subsidy.
2. Identify the national welfare effects when a small importing country implements a production subsidy.

Domestic policies can affect trade in an industry for a country that is either an exporter or an import-competitor initially. In this example, we consider the price, production, and welfare effects of a production subsidy when the subsidized product is initially imported into the country.

We depict this equilibrium in Figure 8.4.1. The free trade price is given by P_{FT}. The domestic supply is S_1, and domestic demand is D_1, which determines imports in free trade as $D_1 - S_1$ (the length of the red line).

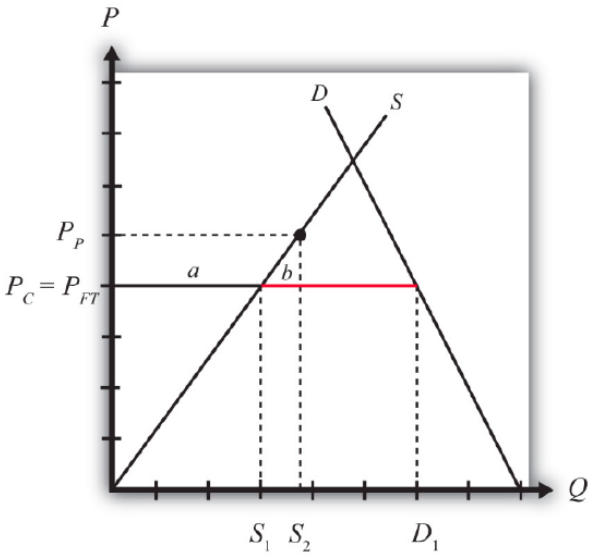


Figure 8.4.1: A Domestic Production Subsidy in a Small Importing Country

When a production subsidy "s" is imposed, the domestic producer price rises by the subsidy value to P_P. Because free trade is maintained and the importing country is small, the domestic consumer price remains at P_{FT}. Thus the effect of the subsidy in this case is to raise domestic supply from S_1 to S_2 while domestic demand remains at D_1. As a result, imports fall from $(D_1 - S_1)$ to $(D_1 - S_2)$.

The welfare effects of the production subsidy are shown in Table 8.4.1. The letters in Table 8.4.1 refer to the areas labeled in Figure 8.4.1.

Table 8.4.1: Static Welfare Effects of a Production Subsidy

Production Subsidy	Importing Country
Consumer Surplus	0
Producer Surplus	+ *a*
Govt. Revenue	− (*a* + *b*)
National Welfare	− *b*

Consumers are left unaffected by the subsidy since the domestic consumer price remains the same. Producers gain in terms of producer surplus. The subsidy causes the price producers receive to rise to P_P, which in turn stimulates an increase in output from S_1 to S_2. The government, however, must pay the subsidy, and that means someone must pay higher taxes to fund it. The total amount of the subsidy payments is given by the product of $(P_P - P_{FT})$ in Figure 8.4.1 (which corresponds to the subsidy rate) and

the quantity produced, S_2. Since the cost of the subsidy exceeds the benefits to producers, the net national welfare effect of the production subsidy is negative. Although one segment of the population benefits—namely, those connected with the import-competing industry—there remains a production efficiency loss, given by area b.

In the rest of the world, the small country assumption implies that this domestic policy (the production subsidy) would have no noticeable effects. Foreign prices would remain unchanged, and although their exports to this country would fall, these changes in trade volumes are too small to be noticed in the rest of the world. Thus the welfare effects on the rest of the world are said to be nonexistent, or zero.

Key Takeaways

- A domestic production subsidy implemented in an import market by a small country will raise producer surplus for the import-competing firms, increase government expenditures and hence harm taxpayers, and leave consumers of the product unaffected.
- A domestic production subsidy implemented in an import market by a small country will create a net production efficiency loss and reduce national welfare.

? Exercise 8.4.1

1. Consider the domestic policy action listed along the top row of the table below. In the empty boxes, use the following notation to indicate the effect of the policy on the variables listed in the first column. Use a partial equilibrium model to determine the answers and assume that the shapes of the supply and demand curves are "normal." Assume that the policy does not begin with, or result in, prohibitive policies. Also assume that the policy does not correct for market imperfections or distortions. Use the following notation:

   \+ the variable increases

   − the variable decreases

   0 the variable does not change

   A the variable change is ambiguous (i.e., it may rise, it may fall)

   For example, a production subsidy applied by a small country to an import-competing industry will have no effect on the domestic market price of the import good; therefore a **0** is placed in the first box of the table.

Table 8.4.2: Effects of a Production Subsidy

	Production Subsidy to an Import Industry by a Small Country
Domestic Market Price	0
Domestic Industry Employment	
Domestic Consumer Welfare	
Domestic Producer Welfare	
Domestic Government Revenue	
Domestic National Welfare	
Foreign Price	
Foreign Consumer Welfare	
Foreign Producer Welfare	
Foreign National Welfare	

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8.5: Domestic Consumption Taxes 8.5: Domestic Consumption TaxesEdit Update titlecancel

Learning Objectives

1. Distinguish domestic consumption taxes from trade taxes.
2. Describe the motivations for government use of consumption taxes.

A **domestic consumption tax** is a tax collected by a government on sales of a particular product. The tax can be levied either as an ad valorem tax (a percentage of the value of the good) or as a specific tax (a charge per unit of the good sold). The domestic consumption tax is different from an import tariff or an export tax. The consumption tax is levied on all the goods sold in the domestic market regardless of where the goods are produced. An import tariff or export tax, on the other hand, is levied only on units of the goods actually imported or exported. An import tariff and an export tax are classified as trade policies, whereas the consumption tax is a domestic policy.

Domestic consumption taxes are often used as a source of government revenue. In the United States, the most common type of ad valorem consumption tax is the sales tax levied by state governments. The most common specific consumption taxes include gasoline, alcohol, and cigarette taxes. The latter two are sometimes referred to as “sin” taxes, since they are also designed to reduce consumption of potentially harmful substances. Thus sometimes consumption taxes are used to discourage certain types of consumption.

We will analyze the international trade effects of a domestic consumption tax using a partial equilibrium analysis. We will assume that the market in question is perfectly competitive and that the country is “small.” We will also ignore any benefits the policy may generate, such as creating a more pleasing distribution of income or generating valuable external effects. Instead, we will focus entirely on the producer, consumer, and government revenue effects of each policy.

Next, we consider the effects of a consumption tax under two separate scenarios. In the first case, the tax is implemented in a country that is not trading with the rest of the world. This case is used to show how a domestic policy can cause international trade. The second case considers the price and welfare effects of a consumption tax implemented by a country that is initially importing the good from the rest of the world.

Key Takeaways

- Domestic consumption taxes are collected from consumers who purchase a product within the country, regardless of its country source, whereas tariffs and export taxes are collected only on the products that are imported or exported.
- An import tariff and an export tax are classified as trade policies, whereas the consumption tax is a domestic policy.
- Domestic consumption taxes are often collected to raise revenue for government expenditures.
- Domestic consumption taxes are sometimes used to discourage the consumption of some products.

Exercise 8.5.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The term describing the type of payment received by a government for each unit of a good purchased by consumers.
   b. The term describing the type of payment received by a government as a percentage of the value of a good purchased by consumers.
   c. Of *domestic policy* or *trade policy*, this describes a consumption tax.
   d. Of *domestic policy* or *trade policy*, this describes an export tax.

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8.6: Consumption Taxes as a Reason for Trade 8.6: Consumption Taxes as a Reason for TradeEdit Update titlecancel

Learning Objectives

1. Describe the price, quantity, and trade effects of a domestic consumption tax implemented by a small open economy.

This section will show how a consumption tax can *cause trade* for a small, perfectly competitive, open economy. In other words, even if countries were identical with respect to their resource endowments, their technology, and their preferences and even if there were no economies of scale or imperfectly competitive markets, a purely domestic policy, such as a consumption tax, can induce trade between countries.

Consider a small open economy with a perfectly competitive industry. Let the domestic market be represented by the supply and demand curves in Figure 8.6.1. Suppose initially that free trade is allowed with the rest of the world, but by coincidence (actually by assumption), let the free trade price be exactly equal to the autarky price for the good. This is shown as the price, P_{FT}. At that price, both supply and demand equal Q_1, and thus no imports or exports occur, even though there is free trade.

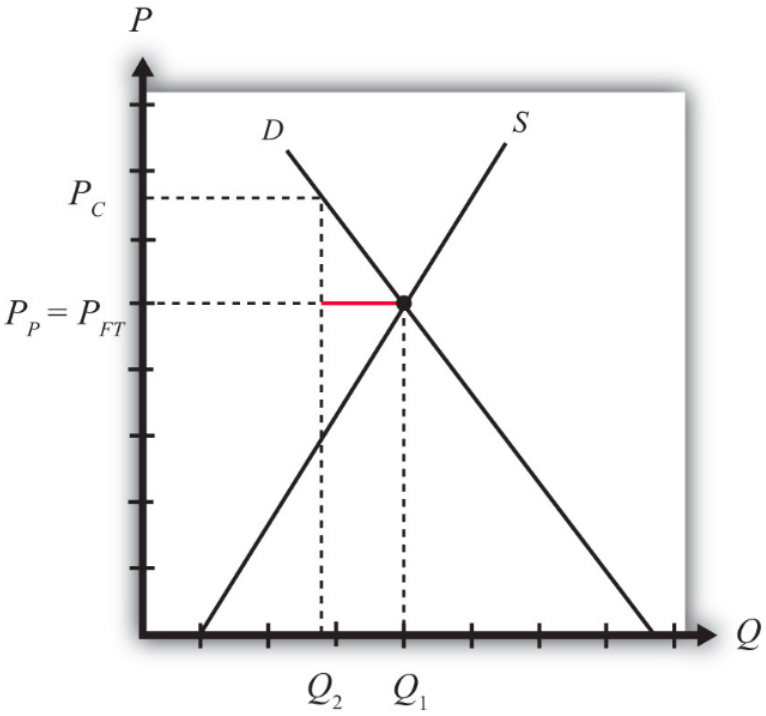


Figure 8.6.1: Inducing Exports with a Domestic Consumption Subsidy

Next, suppose that the government of this country imposes a specific (per unit) consumption tax on this product. Let the tax rate be set at "t." This means the government will collect "t" dollars for every unit of the good sold in the domestic market, regardless of whether the product is produced domestically or imported.

The tax will raise the domestic consumer price of the good by the full amount of the tax to P_C and reduce domestic demand to Q_2. Domestic producers will not be affected by the consumption tax since continued competition in free trade with firms in the rest of the world will allow them to continue to charge the world price of P_{FT}. Note that in a closed economy, the producers would absorb some of the tax burden by lowering their price so as to maintain the profit maximum. However, being open to trade implies that the country can purchase as much as it likes at the world price. This means that the producer price P_P will remain equal to the free trade price P_{FT}, and the full burden of the tax falls on consumers. Thus $P_C = P_{FT} + t$ and $P_P = P_{FT}$.

Since the tax has no effect on the producer price but raises the consumer price, domestic demand falls to Q_2 while domestic supply remains at Q_1. The difference, $Q_1 - Q_2$ (the length of the red line), represents the amount exported to the rest of the world. This

implies that the consumption tax will induce exports of the good. Thus this is an example in which a domestic policy (a consumption tax) can cause trade (i.e., exports) to occur.

Key Takeaways

- A consumption tax raises the price paid by consumers by the full amount of the tax when the country is open to international trade.
- A consumption tax has no effect on the price paid by producers when the country is open to international trade.
- A consumption tax causes exports when implemented by a small country open to trade but not initially trading.

Exercise 8.6.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. Of *increase*, *decrease*, or *stay the same*, the effect on the price consumers pay for a good when the government sets a domestic consumption tax in a freely trading economy.
   b. Of *exports* or *imports*, the one that is likely to be increased as a result of a domestic consumption tax on that product.
   c. Of *increase*, *decrease*, or *stay the same*, the effect on the price producers receive for a good when the government sets a domestic consumption tax in a freely trading economy.

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8.7: Consumption Tax Effects in a Small Importing Country 8.7: Consumption Tax Effects in a Small Importing CountryEdit Update titlecancel

Learning Objectives

1. Identify the winners and losers when a small importing country implements a production subsidy.
2. Identify the national welfare effects when a small importing country implements a production subsidy.

Domestic policies can affect trade in an industry for a country that is either an exporter or an import-competitor initially. In this example, we consider the price, production, and welfare effects of a consumption tax when the taxed commodity is initially imported in the country.

We depict the initial equilibrium in Figure 8.7.1. The free trade price is given by P_{FT}. The domestic supply is S_1, and domestic demand is D_1, which determines imports in free trade as $D_1 - S_1$ (the length of the red line).

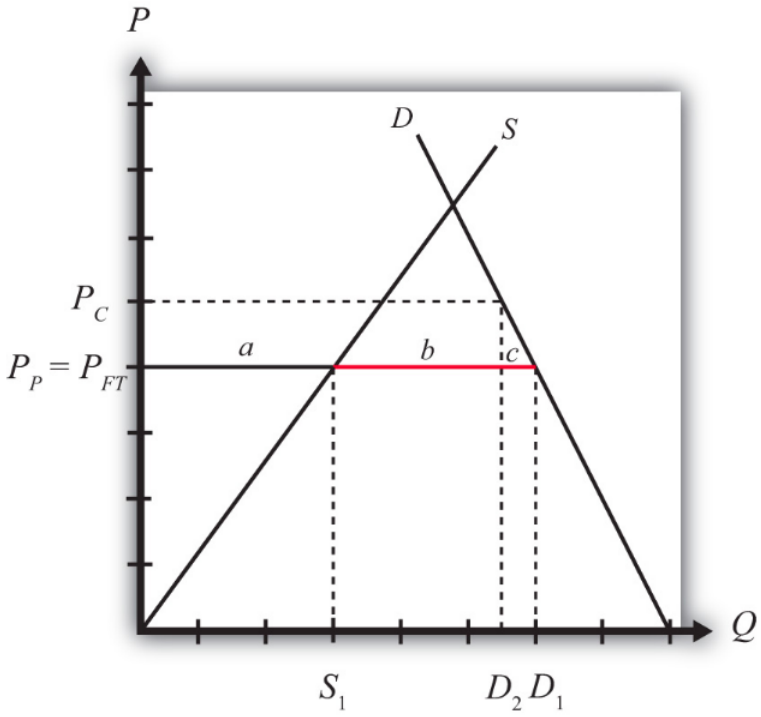


Figure 8.7.1: A Domestic Consumption Tax in a Small Importing Country

When a specific consumption tax "t" is imposed, the consumer price will rise by the amount of the tax to P_C. The higher price paid by consumers will reduce their demand to D_2. The producer price will remain at the free trade price indicated at $P_P = P_{FT}$, and hence domestic supply will remain at S_1. The tax will reduce imports from $(D_1 - S_1)$ to $(D_2 - S_1)$.

The welfare effects of the consumption tax are shown in Table 8.7.1.

Table 8.7.1: Static Welfare Effects of a Consumption Tax

	Importing Country
Consumer Surplus	− (*a* + *b* + *c*)
Producer Surplus	0
Govt. Revenue	+ (*a* + *b*)
National Welfare	− *c*

Consumers suffer a loss in surplus because the price they pay rises by the amount of the consumption tax. Producers experience no change in surplus since the producer price (i.e., the price received by producers) remains at the free trade level. Note that even though imports fall, this decrease has no positive effect on producers in this situation. Finally, the government receives tax revenue from the consumption tax. The revenue is calculated as the tax, t (given by $P_C - P_P$), multiplied by the quantity consumed, D_2.

Since the cost to consumers exceeds the benefits accruing to the government, the net national welfare effect of the consumption tax is negative. Although some segments of the population benefit, there remains a consumption efficiency loss, given by area c.

In the rest of the world, the small country assumption implies that this domestic policy (the consumption tax) would have no noticeable effects. Foreign prices would remain unchanged, and although their exports to this country would fall, these changes in trade volumes are too small to be noticed in the rest of the world. Thus the welfare effects on the rest of the world are said to be nonexistent, or zero.

Key Takeaways

- A domestic consumption tax implemented in an import market by a small country will lower consumer surplus for domestic residents purchasing the product, increase government revenues and thereby benefit the recipients of subsequent government programs, and leave domestic producers of the product unaffected.
- A domestic consumption tax implemented in an import market by a small country will create a net consumption efficiency loss and reduce national welfare.

? Exercise 8.7.1

1. Consider the domestic policy action listed along the top row of the table below. In the empty boxes, use the following notation to indicate the effect of the policy on the variables listed in the first column. Use a partial equilibrium model to determine the answers and assume that the shapes of the supply and demand curves are “normal.” Assume that none of the policy does not begin with, or result in, prohibitive policies. Also assume that the policy does not correct for market imperfections or distortions. Use the following notation:

   + the variable increases

   − the variable decreases

   0 the variable does not change

   A the variable change is ambiguous (i.e., it may rise, it may fall)

Table 8.7.2: Effects of a Consumption Tax

	Consumption Tax on an Import Good by a Small Country
Domestic Market Price	
Domestic Industry Employment	
Domestic Consumer Welfare	
Domestic Producer Welfare	
Domestic Government Revenue	
Domestic National Welfare	
Foreign Price	
Foreign Consumer Welfare	
Foreign Producer Welfare	
Foreign National Welfare	

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8.8: Equivalence of an Import Tariff with a Domestic (Consumption Tax plus Production Subsidy) 8.8: Equivalence of an Import Tariff with a Domestic (Consumption Tax plus Production Subsidy)Edit Update titlecancel

Learning Objectives

1. Learn that a combination of domestic policies can substitute for a trade policy.

We begin by demonstrating the effects of a consumption tax and a production subsidy applied simultaneously by a small importing country. Then we will show why the net effects are identical to an import tariff applied in the same setting and at the same rate.

In Figure 8.8.1, the free trade price is given by P_{FT}. The domestic supply is S_1, and domestic demand is D_1, which determines imports in free trade as $D_1 - S_1$ (the red line).

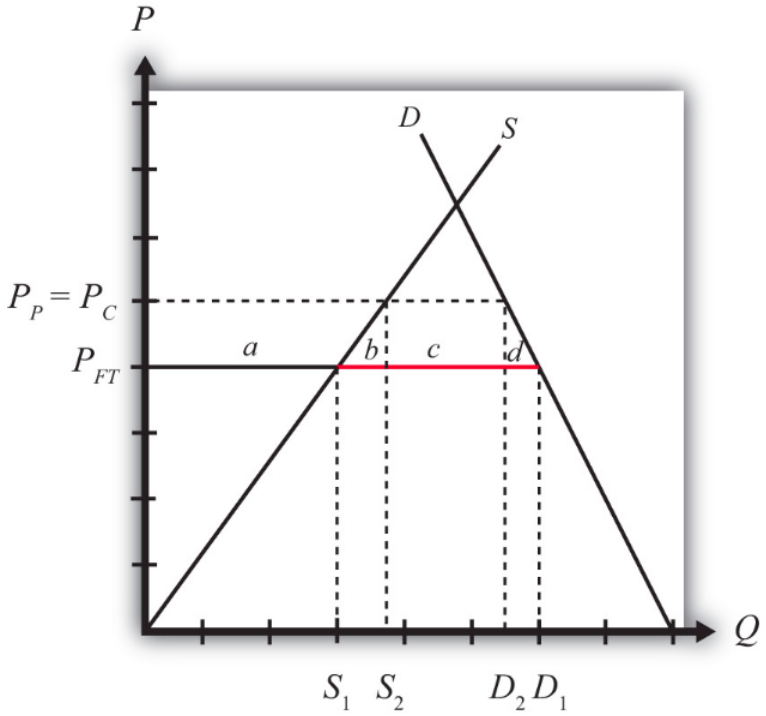


Figure 8.8.1: A Domestic Production Subsidy and Consumption Tax in a Small Importing Country

When a specific consumption tax "t" is implemented, the consumer price increases by the amount of the tax to P_C. Because free trade is maintained, the producer's price would remain at P_{FT}. The increase in the consumer price reduces domestic demand to D_2.

When a specific production subsidy "s" is implemented, the producer price will rise by the amount of the tax to P_P, but it will not affect the consumer price. As long as the production subsidy and the consumption tax are set at the same value (i.e., $t = s$), which we will assume, the new producer price will equal the new consumer price (i.e., $P_C = P_P$).

The effect of the production subsidy and the consumption tax together is to lower imports from $D_1 - S_1$ to $D_2 - S_2$.

The combined welfare effects of the production subsidy and consumption tax are shown in Table 8.8.1.

Table 8.8.1: Static Welfare Effects of a Production Subsidy plus Consumption Tax

	Importing Country
Consumer Surplus	− (*a* + *b* + *c* + *d*)
Producer Surplus	+ *a*
Net Govt. Revenue	+ *c*

	Importing Country
Tax Revenue	+ (a + b + c)
Subsidy Cost	− (a + b)
National Welfare	− (b + d)

Consumers suffer a loss in surplus because the price they pay rises by the amount of the consumption tax.

Producers gain in terms of producer surplus. The production subsidy raises the price producers receive by the amount of the subsidy, which in turn stimulates an increase in output.

The government receives tax revenue from the consumption tax but must pay for the production subsidy. However, since the subsidy and tax rates are assumed to be identical and since consumption exceeds production (because the country is an importer of the product), the revenue inflow exceeds the outflow. Thus the net effect is a gain in revenue for the government.

In the end, the cost to consumers exceeds the sum of the benefits accruing to producers and the government; thus the net national welfare effect of the two policies is negative.

Notice that these effects are identical to the effects of a tariff applied by a small importing country if the tariff is set at the same rate as the production subsidy and the consumption tax. If a specific tariff, "t," of the same size as the subsidy and tax were applied, the domestic price would rise to $P_T = P_{FT} + t$. Domestic producers, who are not charged the tariff, would experience an increase in their price to P_T. The consumer price would also rise to P_T. This means that the producer and consumer welfare effects would be identical to the case of a production subsidy and a consumption tax. The government would only collect a tax on the imported commodities, which implies tariff revenue given by (c). This is exactly equal to the net revenue collected by the government from the production subsidy and consumption tax combined. The net national welfare losses to the economy in both cases are represented by the sum of the production efficiency loss (b) and the consumption efficiency loss (d).

So What?

This equivalence is important because of what might happen after a country liberalizes trade. Many countries have been advised by economists to reduce their tariff barriers in order to enjoy the efficiency benefits that will come with open markets. However, any small country contemplating trade liberalization is likely to be faced with two dilemmas.

First, tariff reductions will quite likely reduce tariff revenue. For many developing countries today, tariff revenue makes up a substantial portion of the government's total revenue, sometimes as much as 20 percent to 30 percent. This is similar to the early days of currently developed countries. In the 1800s, tariff revenue made up as much as 50 percent of the U.S. federal government's revenue. In 1790, at the time of the founding of the nation, the U.S. government earned about 90 percent of its revenue from tariff collections. The main reason tariff revenue makes up such a large portion of a developing country's total government revenue is that tariffs are an administratively simple way to collect revenue. It is much easier than an income tax or profit tax, since those require careful accounting and monitoring. With tariffs, you simply need to park some guards at the ports and borders and collect money as goods come across.

The second problem caused by trade liberalization is that the tariff reductions will injure domestic firms and workers. Tariff reductions will cause domestic prices for imported goods to fall, reducing domestic production and producer surplus and possibly leading to layoffs of workers in the import-competing industries.

Trade-liberalizing countries might like to prevent some of these negative effects from occurring. This section then gives a possible solution. To make up for the lost tariff revenue, a country could simply implement a consumption tax. Consumption taxes are popular forms of taxation around the world. To mitigate the injury to its domestic firms, the country could implement production subsidies, which could forestall the negative impact caused by trade liberalization and could be paid for with extra revenue collected with the consumption tax.

This section demonstrates that if the consumption tax and production subsidy happened to be set on an imported product at equal values and at the same rate as the tariff reduction, then the two domestic policies would combine to fully duplicate the tariff's effects. In this case, trade liberalization would have no effect.

The General Agreement on Tariffs and Trade (GATT) and the World Trade Organization (WTO) agreements have always been cognizant of this particular possibility. The original text says that if after trade liberalization a country takes domestic actions

nullifying the benefit that should accrue to the foreign export firms, then a country would be in violation of its GATT (or now WTO) commitments. In other words, it is a GATT/WTO violation to directly substitute domestic policies that duplicate the original effects of the tariff.

Nonetheless, even though a policy response like a production subsidy/consumption tax combination set only on trade liberalized products is unlikely, countries will still feel the effects of lost revenue and injury to import-competing producers. Thus countries will look for ways to compensate for the lost revenue and perhaps help out hard-hit industries.

This section shows that to the extent those responses affect imported products, they can somewhat offset the effects of trade liberalization. Thus it is well worth knowing that these equivalencies between domestic and trade policies are a possibility.

Key Takeaways

- A domestic consumption tax on a product imported by a small country plus a domestic production subsidy set at the same rate as the tax has the same price and welfare effects as a tariff set at the same rate on the same imported product.
- The effects of trade liberalization could be offset with a domestic production subsidy and consumption tax combination on the imported good. However, these actions would be a WTO violation for WTO member countries.

Exercise 8.8.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The import policy equivalent to a combined domestic production subsidy and consumption tax applied on the same good at the same level.
   b. Of *increase*, *decrease*, or *stay the same*, the effect on the domestic producer price with a combined domestic production subsidy and consumption tax applied on the same good at the same level.
   c. Of *increase*, *decrease*, or *stay the same*, the effect on the domestic consumer price with a combined domestic production subsidy and consumption tax applied on the same good at the same level.
   d. Of *increase*, *decrease*, or *stay the same*, the effect on the foreign price with a combined domestic production subsidy and consumption tax applied by a small country on the same good at the same level.

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CHAPTER OVERVIEW

9: Trade Policies with Market Imperfections and Distortions

Most models showing the advantages of international trade and the costs associated with protection assume that the world is perfectly competitive. The problem is that for a variety of reasons markets are usually not perfectly competitive, at least not completely so. Economists use the term “market imperfections” to describe situations that deviate from perfect competition. And when such deviations occur, interesting things happen.

For example, it is valid to say that in a world with market imperfections, free trade may not be the best policy to maximize national welfare; instead, some type of trade protection may be better. This chapter illustrates a series of examples with models that incorporate market imperfections to demonstrate this result. However, application of another theory in economics, the theory of the second best, and some other issues are shown to mitigate this result. In other words, even though trade policies can be used to raise a nation’s welfare, there may be a better way to achieve a superior result.

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9.1: Chapter Overview 9.1: Chapter OverviewEdit Update titlecancel

Learning Objectives

1. Understand that the presence of market imperfections or distortions in a trade model changes the potential outcomes of trade policies.
2. Learn the basic terminology used in discussing the theory of the second best.

Most of the models previously discussed incorporate a very standard economic assumption: namely, that markets are perfectly competitive. This was true in the Ricardian model, the Heckscher-Ohlin model, the specific factor model, and all the partial equilibrium analyses of trade and domestic policies using supply and demand curves in specific markets. The only deviation from perfect competition was in the discussion of economies-of-scale models and monopolistic competition. This is important because almost all the results concerning the effects of trade and trade policies presume that markets are perfectly competitive. But what if they're not?

Many critics of the economic conclusions about trade argue that the assumptions of perfect competition are unrealistic and that as a result standard trade theory misses some of the important impacts of trade found in the real world. There is much truth to this. By default, perfect competition models include many assumptions that are unrealistic. However, in defense, that is the nature of model building. Simplification is necessary to make the models tractable and solvable. If we were to try to create a model that included many or most of the complexities that we can imagine are present in real-world markets, we would no doubt quickly be overwhelmed with the model's intractability and might find it impossible to even identify an equilibrium solution. Indeed, in the real world, being in "equilibrium" might even be a rare occurrence.

Criticisms of economic theory along these lines, however, fail to recognize that economic analysis includes many attempts to incorporate market realities. Although it remains difficult to include many complexities simultaneously, it is possible to study them in a piecemeal way: one at a time.

The all-encompassing terms economists use to describe these complexities are market imperfections, or market failures, and market distortions. These cases are worthy of study because it is clear that markets rarely satisfy all the assumptions made under perfect competition. These cases offer compelling arguments for protection, including the infant industry argument, the optimal tariff argument, strategic trade policy arguments, and arguments concerning national security.

Market imperfections or market distortions, generally, are any deviations from the assumptions of perfect competition. These include monopoly and oligopoly markets, production with increasing returns to scale, markets that do not clear, negative and positive externalities in production and consumption, and the presence of public goods.

When imperfections or distortions are present in a trade model, it is usually possible to identify a trade policy that can raise aggregate economic efficiency. In this chapter many cases are demonstrated in which trade policies improve national welfare. These welfare-improving policies, although detrimental to national welfare when used in a perfectly competitive setting, act to correct the imperfections or distortions present in the market. As long as the welfare impact of the correction exceeds the standard welfare loss associated with the trade policy, the policy will raise welfare.

Trade policies with market imperfections and distortions represent applications of the **theory of the second best**, formalized by Richard G. Lipsey and Kelvin Lancaster.See R. G. Lipsey and K. Lancaster, "The General Theory of the Second Best," *Review of Economic Studies* 24 (1956): 11–32. When imperfections or distortions are present in an international trade model, we describe the resulting equilibrium as second best. In this case, the standard policy prescriptions to maximize national welfare in a first-best or nondistorted economy will no longer hold true. Also, the implementation of what would be a detrimental policy in a first-best world can become a beneficial policy when implemented within a second-best world. For example, tariffs applied by a small country in the presence of domestic distortions can sometimes raise national welfare.

In 1971, Jagdish Bhagwati presented a general theory of distortions in trade situations.See J. N. Bhagwati, "The Generalized Theory of Distortions and Welfare," in *Trade, Balance of Payments and Growth*, ed. J. N. Bhagwati, R. W. Jones, R. A. Mundell, and J. Vanek (Amsterdam: North-Holland Publishing Co., 1971). He characterized many of the distortions that can occur and considered which policies could be used to correct each distortion and raise national welfare. He considered not only trade policies but also domestic tax or subsidy policies. He showed that for most distortions, a trade policy is inferior (in terms of the extent to which it can raise national welfare) to other purely domestic policies. The most appropriate or **first-best policy**, in general, would

be the policy that most directly corrects the distortion or imperfection present in the market. This chapter provides numerous examples of policy rankings and applications of this general rule.

In one case, a trade policy does prove to be first best. This is the case of a large import or export country in international markets. In this case, the first-best policy is the optimal tariff or the optimal export tax.

Thus the results of this section are somewhat schizophrenic. On the one hand, these models offer some of the most compelling arguments supporting protection. For example, one can easily use these models to justify protection when national defense is a concern, when unemployment may arise in a market, when trade causes environmental degradation, or when there are infant industries in a country. On the other hand, in almost all of these cases, a trade policy is not the most effective policy tool available to correct the problems caused by the distortion or imperfection.

Finally, when more complex markets are considered, as when there are multiple distortions or imperfections present simultaneously, our ability to identify welfare-improving policies rapidly diminishes. The theory of the second best states that correcting one distortion in the presence of many may not improve welfare even if the policy makes perfect sense within the partial equilibrium framework containing the one distortion. The reason is that correcting one distortion may have unintentional (and probably immeasurable) impacts in other sectors due to the presence of other distortions. For example, suppose a trade policy is implemented to correct an environmental problem. One might be able to measure the welfare costs of the trade policy and the environmental benefits that would accrue to society and conclude that the benefits exceed the costs. However, the trade policy will have an impact on prices and resource allocation, potentially spreading across numerous sectors. Suppose one other sector, adversely affected, generates positive spillover effects that act to raise well-being for some groups. Then it is conceivable that the loss of the positive spillover effects would more than outweigh the net benefit accruing to society due to the environmental improvement. This means that the well-intentioned and reasonably measured environmental trade policy could result in an unintentional welfare loss for the nation. The more complex is the economy and the more distortions and imperfections that are present, the more likely it is that we simply cannot *know* what the national effects of trade policies will be.

Key Takeaways

- In the presence of market imperfections or distortions, free trade may no longer be the best policy, even for a small open economy.
- Although trade policies can sometimes generate national welfare improvements, trade policies are often second-best policies, meaning that there are other nontrade policies that are superior (called first-best policies).
- The first-best policy is the policy that targets and corrects the market imperfection as directly as possible.

? Exercise 9.1.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The term describing any assumption that represents a deviation from the standard assumptions of perfect competition.
   b. The term describing a policy that most directly corrects the market imperfection or distortion in a market.
   c. The name of the theory describing the class of models that consider policy implications in the presence of market imperfections and distortions.

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9.2: Imperfections and Distortions Defined 9.2: Imperfections and Distortions DefinedEdit Update titlecancel

Learning Objectives

1. Identify the various types of market imperfections and distortions.
2. Recognize that market imperfections and distortions are widespread in real-world markets.

Market imperfections and distortions, generally, are any deviations from the assumptions of perfect competition. Many of the assumptions in a perfectly competitive model are implicit rather than explicit—that is, they are not always stated.

Below are descriptions of many different types of imperfections and distortions. Perfect competition models assume the absence of these items.

Monopoly, Duopoly, and Oligopoly

Perhaps the most straightforward deviation from perfect competition occurs when there are a relatively small number of firms operating in an industry. At the extreme, one firm produces for the entire market, in which case the firm is referred to as a monopoly. A monopoly has the ability to affect both its output and the price that prevails on the market. A duopoly consists of two firms operating in a market. An oligopoly represents more than two firms in a market but less than the many, many firms assumed in a perfectly competitive market. The key distinction between an oligopoly and perfect competition is that oligopoly firms have some degree of influence over the price that prevails in the market.

Another key feature of these imperfectly competitive markets is that the firms within them make positive economic profits. The profits, however, are not sufficient to encourage entry of new firms into the market. In other words, free entry in response to profit is not possible. The typical method of justifying this is by assuming that there are relatively high fixed costs. High fixed costs, in turn, imply increasing returns to scale. Thus most monopoly and oligopoly models assume some form of imperfect competition.

Large Countries in International Trade

Surprisingly, “large” importing countries and “large” exporting countries have a market imperfection present. This imperfection is more easily understood if we use the synonymous terms for “largeness,” monopsony and monopoly power. Large importing countries are said to have “**monopsony power in trade**,” while large exporting countries are said to have “**monopoly power in trade**.” Let’s first consider monopoly power.

When a large exporting country implements a trade policy, it will affect the world market price for the good. That is the fundamental implication of largeness. For example, if a country imposes an export tax, the world market price will rise because the exporter will supply less. An export tax set optimally will cause an increase in national welfare due to the presence of a positive terms of trade effect. This effect is analogous to that of a monopolist operating in its own market. A monopolist can raise its profit (i.e., its firm’s welfare) by restricting supply to the market and raising the price it charges its consumers. In much the same way, a large exporting country can restrict its supply to international markets with an export tax, force the international price up, and create benefits for itself with the terms of trade gain. The term monopoly “power” is used because the country is not a pure monopoly in international markets. There may be other countries exporting the product as well. Nonetheless, because its exports are a sufficiently large share of the world market, the country can use its trade policy in a way that mimics the effects caused by a pure monopoly, albeit to a lesser degree. Hence the country is not a monopolist in the world market but has “monopoly power” instead.

Similarly, when a country is a large importer of a good, we say that it has “monopsony power.” A monopsony represents a case in which there is a single buyer in a market where there are many sellers. A monopsony raises its own welfare or utility by restricting its demand for the product and thereby forcing the sellers to lower their price. By buying fewer units at a lower price, the monopsony becomes better off. In much the same way, when a large importing country places a tariff on imports, the country’s demand for that product on world markets falls, which in turn lowers the world market price. An import tariff set optimally will raise national welfare due to the positive terms of trade effect. The effects in these two situations are analogous. We say that the country has monopsony “power” because the country may not be the only importer of the product in international markets, yet because of its large size, it has “power” like a pure monopsony.

Externalities

Externalities are economic actions that have effects *external* to the market in which the action is taken. Externalities can arise from production processes (production externalities) or from consumption activities (consumption externalities). The external effects can be beneficial to others (positive externalities) or detrimental to others (negative externalities). Typically, because the external effects impact someone other than the producer or consumers, the producer and the consumers do not take the effects into account when they make their production or consumption decisions. We shall consider each type in turn.

Positive Production Externalities

Positive production externalities occur when production has a beneficial effect in other markets in the economy. Most examples of positive production externalities incorporate some type of learning effect.

For example, manufacturing production is sometimes considered to have positive spillover effects, especially for countries that are not highly industrialized. By working in a factory, the production workers and managers all learn what it takes to operate the factory successfully. These skills develop and grow over time, a process sometimes referred to as *learning by doing*. The skills acquired by the workers, however, are likely to spill over to others in the rest of the economy. Why? Because workers will talk about their experiences with other family members and friends. Factory managers may teach others their skills at local vocational schools. Some workers will leave to take jobs at other factories, carrying with them the skills that they acquired at the first factory. In essence, learning spillovers are analogous to infectious diseases. Workers who acquire skills in one factory in turn will *infect* other workers they come into contact with and will spread the *skill disease* through the economy.

A similar story is told concerning research and development (R&D). When a firm does R&D, its researchers learn valuable things about production that in turn are transmitted through the rest of the economy and have positive impacts on other products or production processes.

Negative Production Externalities

Negative production externalities occur when production has a detrimental effect in other markets in the economy. The negative effects could be felt by other firms or by consumers. The most common example of negative production externalities involves pollution or other environmental effects.

When a factory emits smoke into the air, the pollution will reduce the well-being of all the individuals who must breathe the polluted air. The polluted air will also likely require more frequent cleaning by businesses and households, raising the cost incurred by them.

Water pollution would have similar effects. A polluted river cannot be used for recreational swimming or at least reduces swimmers' pleasures as the pollution rises. The pollution can also eliminate species of flora and fauna and change the entire ecosystem.

Positive Consumption Externalities

Positive consumption externalities occur when consumption has a beneficial effect in other markets in the economy. Most examples of positive consumption externalities involve some type of aesthetic effect.

Thus when homeowners landscape their properties and plant beautiful gardens, it benefits not only themselves but also neighbors and passersby. In fact, an aesthetically pleasant neighborhood where yards are neatly kept and homes are well maintained would generally raise the property values of all houses in the neighborhood.

One could also argue that a healthy lifestyle has positive external effects on others by reducing societal costs. A healthier person would reduce the likelihood of expensive medical treatment and lower the cost of insurance premiums or the liability of the government in state-funded health care programs.

Negative Consumption Externalities

Negative production externalities occur when consumption has a detrimental effect in other markets in the economy. Most examples of negative consumption externalities involve some type of dangerous behavior.

Thus a mountain climber in a national park runs the risk of ending up in a precarious situation. Sometimes climbers become stranded due to storms or avalanches. This usually leads to expensive rescue efforts, the cost of which is generally borne by the government and hence the taxpayers.

A drunk driver places other drivers at increased risk. In the worst outcome, the drunk driver causes the death of another. A smoker may also put others at risk if secondhand smoke causes negative health effects. At the minimum, cigarette smoke surely bothers nonsmokers when smoking occurs in public enclosed areas.

Public Goods

Public goods have two defining characteristics: nonrivalry and nonexcludability. **Nonrivalry** means that the consumption or use of a good by one consumer does not diminish the usefulness of the good to another. **Nonexcludability** means that once the good is provided, it is exceedingly costly to exclude nonpaying customers from using it. The main problem posed by public goods is the difficulty of getting people to pay for them in a free market.

The classic example of a public good is a lighthouse perched on a rocky shoreline. The lighthouse sends a beacon of light outward for miles, warning every passing ship of the danger nearby. Since two ships passing are equally warned of the risk, the lighthouse is nonrival. Since it would be impossible to provide the lighthouse services only to those passing ships that paid for the service, the lighthouse is nonexcludable.

The other classic example of a public good is national security or national defense. The armed services provide security benefits to everyone who lives within the borders of a country. Also, once provided, it is difficult to exclude nonpayers.

Information has public good characteristics as well. Indeed, this is one reason for the slow start of electronic information services on the World Wide Web. Once information is placed on a Web site, it can be accessed and used by millions of consumers almost simultaneously. Thus it is nonrival. Also, it can be difficult, although not impossible, to exclude nonpaying customers from accessing the services.

Nonclearing Markets

A standard assumption in general equilibrium models is that markets always clear—that is, supply equals demand at the equilibrium. In actuality, however, markets do not always clear. When markets do not clear, for whatever reason, the market is distorted.

The most obvious case of a nonclearing market occurs when there is unemployment in the labor market. Unemployment could arise if there is price stickiness in the downward direction, as when firms are reluctant to lower their wages in the face of restricted demand. Alternatively, unemployment may arise because of costly adjustment when some industries expand while others contract. As described in the immobile factor model, many factors would not immediately find alternative employment after being laid off from a contracting industry. In the interim, the factors must search for alternative opportunities, may need to relocate to another geographical location, or may need to be retrained. During this phase, the factors remain unemployed.

Imperfect Information

One key assumption often made in perfectly competitive models is that agents have perfect information. If some of the participants in the economy do not have full and complete information in order to make decisions, then the market is distorted.

For example, suppose entrepreneurs did not know that firms in an industry were making positive economic profits. Without this information, new firms would not open to force economic profit to zero in the industry. As such, imperfect information can create a distortion in the market.

Policy-Imposed Distortions

Another type of distortion occurs when government policies are set in markets that are perfectly competitive and exhibit no other distortions or imperfections. These were labeled policy-imposed distortions by Jagdish Bhagwati since they do not arise naturally but rather via legislation.

Thus suppose the government of a small country sets a trade policy, such as a tariff on imports. In this case, the equilibrium that arises with the tariff in place is a distorted equilibrium.

Key Takeaways

- An implicit assumption of perfect competition models is that there are no market imperfections or distortions in place.
- Among some of the most common market imperfections are monopolies, oligopolies, large countries in trade, externalities, public goods, nonclearing markets, imperfect information, and government tax and subsidy policies.

- Externality effects can arise from production or consumption activities.
- Externalities can be positive or negative in their effects.

? Exercise 9.2.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The term used to describe the favorable effect that a production activity can have in another market.
   b. The term used to describe the detrimental effect that a consumption activity can have on another person.
   c. The two characteristics that identify “public goods.”
   d. The term used to describe the type of distortion that occurs when governments implement taxes, subsidies, or regulations in otherwise perfectly competitive markets.
   e. The type of power a large importing country is said to have.
   f. The type of power a large exporting country is said to have.

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9.3: The Theory of the Second Best 9.3: The Theory of the Second BestEdit Update titlecancel

Learning Objectives

1. Understand the key features of the theory of the second best.
2. Distinguish between first-best and second-best equilibria.
3. Distinguish between first-best and second-best policies.

The theory of the second best was formalized by Richard Lipsey and Kelvin Lancaster in 1956. The primary focus of the theory is what happens when the optimum conditions are not satisfied in an economic model. Lipsey and Lancaster's results have important implications for the understanding of not only trade policies but also many other government policies.

In this section, we will provide an overview of the main results and indicate some of the implications for trade policy analysis. We will then consider various applications of the theory to international trade policy issues.

First of all, one must note that economic models consist of exercises in which a set of assumptions is used to deduce a series of logical conclusions. The solution of a model is referred to as an equilibrium. An equilibrium is typically described by explaining the conditions or relationships that must be satisfied in order for the equilibrium to be realized. These are called the equilibrium conditions. In economic models, these conditions arise from the maximizing behavior of producers and consumers. Thus the solution is also called an optimum.

For example, a standard perfectly competitive model includes the following equilibrium conditions: (1) the output price is equal to the marginal cost for each firm in an industry, (2) the ratio of prices between any two goods is equal to each consumer's marginal rate of substitution between the two goods, (3) the long-run profit of each firm is equal to zero, and (4) supply of all goods is equal to demand for all goods. In a general equilibrium model with many consumers, firms, industries, and markets, there will be numerous equilibrium conditions that must be satisfied simultaneously.

Lipsey and Lancaster's analysis asks the following simple question: What happens to the other optimal equilibrium conditions when one of the conditions cannot be satisfied for some reason? For example, what happens if one of the markets does not clear—that is, supply does not equal demand in that one market? Would it still be appropriate for the firms to set the price equal to the marginal cost? Should consumers continue to set each price ratio equal to their marginal rate of substitution? Or would it be better if firms and consumers deviated from these conditions? Lipsey and Lancaster show that, generally, when one optimal equilibrium condition is not satisfied, for whatever reason, all the other equilibrium conditions will change. Thus if one market does not clear, it would no longer be optimal for firms to set the price equal to the marginal cost or for consumers to set the price ratio equal to the marginal rate of substitution.

First-Best versus Second-Best Equilibria

Consider a small perfectly competitive open economy that has no market imperfections or distortions, no externalities in production or consumption, and no public goods. This is an economy in which all resources are privately owned, the participants maximize their own well-being, firms maximize profit, and consumers maximize utility—always in the presence of perfect information. Markets always clear and there are no adjustment costs or unemployment of resources.

The optimal government policy in this case is laissez-faire. With respect to trade policies, the optimal policy is free trade. Any type of tax or subsidy implemented by the government under these circumstances can only reduce economic efficiency and national welfare. Thus with a laissez-faire policy, the resulting equilibrium would be called *first best*. It is useful to think of this market condition as *economic nirvana* since there is no conceivable way of increasing economic efficiency at a **first-best equilibrium**.

Of course, the real world is unlikely to be so perfectly characterized. Instead, markets will likely have numerous distortions and imperfections. Some production and consumption activities have externality effects. Some goods have public good characteristics. Some markets have a small number of firms, each of which has some control over the price that prevails and makes positive economic profit. Governments invariably set taxes on consumption, profit, property and assets, and so on. Finally, information is rarely perfectly and costlessly available.

Now imagine again a small, open, perfectly competitive economy with no market imperfections or distortions. Suppose we introduce one distortion or imperfection into such an economy. The resulting equilibrium will now be less efficient from a national

perspective than when the distortion was not present. In other words, the introduction of *one* distortion would reduce the optimal level of national welfare.

In terms of Lipsey and Lancaster's analysis, the introduction of the distortion into the system would sever one or more of the equilibrium conditions that must be satisfied to obtain economic nirvana. For example, suppose the imperfection that is introduced is the presence of a monopolistic firm in an industry. In this case, the firm's profit-maximizing equilibrium condition would be to set its price greater than the marginal cost rather than equal to the marginal cost as would be done by a profit-maximizing perfectly competitive firm. Since the economic optimum obtained in these circumstances would be less efficient than in economic nirvana, we would call this equilibrium a **second-best equilibrium**. Second-best equilibria arise whenever all the equilibrium conditions satisfying economic nirvana cannot occur simultaneously. In general, second-best equilibria arise whenever there are market imperfections or distortions present.

Welfare-Improving Policies in a Second-Best World

An economic rationale for government intervention in the private market arises whenever there are uncorrected market imperfections or distortions. In these circumstances, the economy is characterized by a second-best rather than a first-best equilibrium. In the best of cases, the government policy can correct the distortions completely and the economy would revert back to the state under economic nirvana. If the distortion is not corrected completely, then at least the new equilibrium conditions, altered by the presence of the distortion, can all be satisfied. In either case, an appropriate government policy can act to correct or reduce the detrimental effects of the market imperfection or distortion, raise economic efficiency, and improve national welfare.

It is for this reason that many types of trade policies can be shown to improve national welfare. Trade policies, chosen appropriate to the market circumstances, act to correct the imperfections or distortions. This remains true even though the trade policies themselves would act to reduce economic efficiency if applied starting from a state of economic nirvana. What happens is that the policy corrects the distortion or imperfection and thus raises national welfare by more than the loss in welfare arising from the application of the policy.

Many different types of policies can be applied, even for the same distortion or imperfection. Governments can apply taxes, subsidies, or quantitative restrictions. They can apply these to production, to consumption, or to factor usage. Sometimes they even apply two or more of these policies simultaneously in the same market. Trade policies, like tariffs or export taxes, are designed to directly affect the flow of goods and services between countries. Domestic policies, like production subsidies or consumption taxes, are directed at a particular activity that occurs within the country but is not targeted directly at trade flows.

One prominent area of trade policy research focuses on identifying the optimal policy to be used in a particular second-best equilibrium situation. Invariably, this research has considered multiple policy options in any one situation and has attempted to rank order the potential policies in terms of their efficiency-enhancing capabilities. As with the ranking of equilibria described above, the ranking of policy options is also typically characterized using the first-best and second-best labels.

Thus the ideal or optimal policy choice in the presence of a particular market distortion or imperfection is referred to as a first-best policy. The first-best policy will raise national welfare, or enhance aggregate economic efficiency, to the greatest extent possible in a particular situation.

Many other policies can often be applied, some of which would improve welfare. If any such policy raises welfare to a lesser degree than a first-best policy, then it would be called a **second-best policy**. If there are many policy options that are inferior to the first-best policy, then it is common to refer to them all as second-best policies. Only if one can definitively rank three or more policy options would one ever refer to a third-best or fourth-best policy. Since these rankings are often difficult, third-best (and so on) policies are not commonly denoted.

Trade Policies in a Second-Best World

In a 1971 paper, Jagdish Bhagwati provided a framework for understanding the welfare implications of trade policies in the presence of market distortions.See J. N. Bhagwati, "The Generalized Theory of Distortions and Welfare," in *Trade, Balance of Payments and Growth*, ed. J. N. Bhagwati, R. W. Jones, R. A. Mundell, and J. Vanek (Amsterdam: North-Holland Publishing Co., 1971). This framework applied the theory of the second best to much of the welfare analysis that had been done in international trade theory up until that point. Bhagwati demonstrated the result that trade policies can improve national welfare if they occur in the presence of a market distortion and if they act to correct the detrimental effects caused by the distortion. However, Bhagwati also showed that in almost all circumstances a trade policy will be a second-best rather than a first-best policy choice. The first-best policy would likely be a purely domestic policy targeted directly at the distortion in the market. One exception to this rule occurs

when a country is “large” in international markets and thus can affect international prices with its domestic policies. In this case, as was shown with optimal tariffs, quotas, voluntary export restraints (VERs), and export taxes, a trade policy is the first-best policy.

Since Bhagwati’s paper, international trade policy analysis has advanced to include market imperfections such as monopolies, duopolies, and oligopolies. In many of these cases, it has been shown that appropriately chosen trade policies can improve national welfare. The reason trade policies can improve welfare, of course, is that the presence of the market imperfection means that the economy begins at a second-best equilibrium. The trade policy, if properly targeted, can reduce the negative aggregate effects caused by the imperfection and thus raise national welfare.

Summary of the Theory of the Second Best

In summary, the theory of the second best provides the theoretical underpinning to explain many of the reasons that trade policy can be shown to be welfare enhancing for an economy. In most (if not all) of the cases in which a trade policy is shown to improve national welfare, the economy begins at an equilibrium that can be characterized as second best. Second-best equilibria arise whenever the market has distortions or imperfections present. In these cases, it is relatively straightforward to conceive of a trade policy that corrects the distortion or imperfection sufficiently to outweigh the detrimental effects of the policy itself. In other words, whenever market imperfections or distortions are present, it is always theoretically or conceptually possible to design a trade policy that would improve national welfare. As such, the theory of the second best provides a rationale for many different types of protection in an economy.

The main criticism suggested by the theory is that rarely is a trade policy the first-best policy choice to correct a market imperfection or distortion. Instead, a trade policy is second best. The first-best policy, generally, would be a purely domestic policy targeted directly at the market imperfection or distortion.

In the remaining sections of this chapter, we use the theory of the second best to explain many of the justifications commonly given for protection or for government intervention with some form of trade policy. In each case, we also discuss the likely first-best policies.

Key Takeaways

- A first-best equilibrium occurs in a perfectly competitive market when no imperfections or distortions are present.
- A second-best equilibrium arises whenever a market includes one or more imperfections or distortions.
- A first-best policy is that policy that can improve national welfare to the greatest extent when beginning in a second-best equilibrium.
- A second-best policy is one whose best national welfare effect is inferior to a first-best policy when beginning in a second-best equilibrium.
- As a general rule of thumb, beginning in a second-best equilibrium, the first-best policy will be a policy that attacks the market imperfection or distortion as directly as possible.
- As a general rule of thumb, domestic policies are usually first-best policies, whereas trade policies are usually second-best policies.
- One exception to the previous rule of thumb is that a trade policy is the first-best policy choice to correct the imperfection of a large country in international markets.

? Exercise 9.3.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The term used to describe an equilibrium that arises in the presence of market imperfections and distortions.
   b. The term used to describe a policy action that can raise economic efficiency to the greatest extent possible.
   c. The names of the economists who first formalized the theory of the second best.
   d. The term used to describe an equilibrium that arises in the absence of market imperfections and distortions.
   e. The term used to describe a policy action whose best effect is inferior to another policy option.

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9.4: Unemployment and Trade Policy 9.4: Unemployment and Trade PolicyEdit Update titlecancel

Learning Objectives

1. Understand that unemployment of workers in a labor market is a type of market imperfection since supply of labor does not equal demand.
2. Recognize that a trade policy can be used to correct for an unemployment imperfection.
3. Learn the first-best and second-best policy options to correct for an unemployment imperfection in an import market.

Consider a small perfectly competitive economy. Suppose this economy has a market imperfection in the form of relatively immobile factors of production across industries. We will imagine that the labor force develops sector-specific skills as the time of employment in an industry increases. Thus if a worker works in an industry—say, the textile industry—for a long period of time, her productivity in textile production rises relative to nontextile workers who might begin employment in the textile industry. Similarly, other workers become more productive in their own industries relative to a textile worker who might begin employment in another industry.

These assumptions imply that although workers might be free to move across sectors of the economy, they might not be easily or costlessly transferred. Workers in one industry, accustomed to being paid a wage proportional to their productivity, might be unwilling to accept a lower wage in another industry even though the lower wage would reflect their productivity in that industry. A worker's reluctance to transfer could lead to a long search time between jobs as the worker continues to look for an acceptable job at an acceptable wage.

During the search period, a variety of adjustment costs would be incurred by the unemployed worker and by the government. The worker would suffer the anxiety of searching for another job. His or her family would have to adjust to a reduced income, and previous savings accounts would be depleted. At the worst, assets such as cars or homes may be lost. The government would compensate for some of the reduced income by providing unemployment compensation. This compensation would be paid out of tax revenues and thus represents a cost to others in the economy.

In some instances, the productivity of transferred workers could be raised by incurring training costs. These costs might be borne by the individual worker, as when the individual enrolls in a vocational training school. The costs might also be borne by an employer who hires initially low-productivity workers but trains them to raise their skills and productivity in the new industry.

In any case, the economy is assumed to have an unemployment imperfection that arises whenever resources must be transferred across industries. In every other respect, assume the economy is a small open economy with perfectly competitive markets and no other distortions or imperfections.

In the standard case of a small perfectly competitive economy, the optimal trade policy is free trade. Any tariff or quota on imports, although beneficial to the import-competing industry, will reduce aggregate efficiency—that is, the aggregate losses will exceed the aggregate benefits.

Imagine, however, that the economy initially has full employment of labor but that it has the unemployment imperfection described above. Suppose that initially the free trade price of textiles is given by P_1 in Figure 9.4.1. At that price, demand is given by D_1, supply by S_1, and imports by $D_1 - S_1$ (the blue line segment).

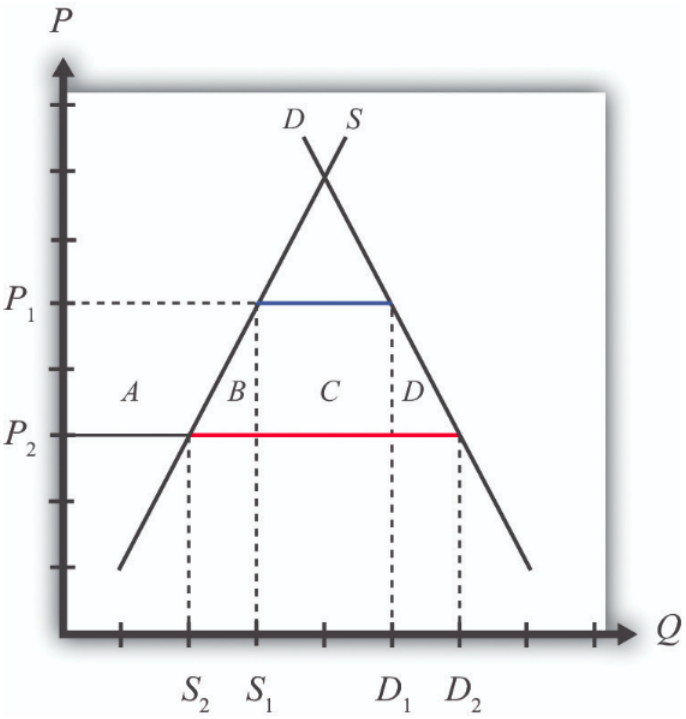


Figure 9.4.1: Unemployment in a Small Country Import Market

Suppose that international market conditions suddenly change such that a surge of imports begins in the textile industry.

The surge can be represented by a reduction in the world price of the imported good from P_1 to P_2. This would occur if there is an increase in total world supply of textiles of sufficient size to reduce the world price of the good. Since this importing country is assumed to be small, it must take the world price as given.

Domestic import-competing textile firms, to maintain profitability, would adjust to the lower free trade price by reducing output; supply would fall from S_1 to S_2. The lower price would stimulate demand for the product, which would rise to D_2. Thus imports would rise to $D_2 - S_2$ (the red line segment). The welfare effects of the lower world price are shown in Table 9.4.1.

Table 9.4.1: Welfare Effects of a Lower Free Trade Price

	Importing Country
Consumer Surplus	+ (*A* + *B* + *C* + *D*)
Producer Surplus	− *A*
Unemployment Cost	− *F*
National Welfare	(*B* + *C* + *D*) − *F*

Consumers benefit from the lower free trade price. Producers lose in terms of a reduction in producer surplus. However, the unemployment imperfection implies that there is an additional cost that is hidden in this analysis. For domestic firms to reduce output requires them to reduce variable costs of production, which will include layoffs of workers. This means that the adjustment to the new free trade equilibrium will cause unemployment and its associated costs. We'll represent these unemployment or adjustment costs by the variable F. Note that these costs do not appear in Figure 9.4.1.

The national welfare effects of the import surge depend on how high the unemployment costs (F) are compared to the aggregate benefits ($B + C + D$). Thus the national welfare effect could be positive or negative.

Effects of an Import Tariff

It is possible to eliminate the costs of unemployment by applying a tariff on imports of textiles. Suppose in response to the sudden drop in the free trade price, the government responds by implementing a tariff equal to $P_1 - P_2$. In this case, the domestic price

would rise by the amount of the tariff. Instead of facing the new world price P_2, the domestic country will face the original price P_1. The tariff would eliminate the unemployment in the industry by keeping the domestic price at the original level. Domestic supply would remain at S_1 and employment would also remain at its original level.

However, implementing the tariff will also impose other costs on the economy. Table 9.4.2 provides a summary of the direction and magnitude of the welfare effects to producers, consumers, and the government in the importing country. These effects are calculated relative to the economic situation *after* the surge of imports occurs. The aggregate national welfare effects are also shown.

Table 9.4.2: Welfare Effects of an Import Tariff

	Importing Country
Consumer Surplus	$-(A+B+C+D)$
Producer Surplus	$+A$
Govt. Revenue	$+C$
Unemployment Cost	$+F$
National Welfare	$F-(B+D)$

Tariff effects on the importing country's consumers. Consumers of the product in the importing country suffer a reduction in well-being as a result of the tariff. The increase in the domestic price of both imported goods and the domestic substitutes reduces the amount of consumer surplus in the market. Refer to Table 9.4.2 and Figure 9.4.1 to see how the magnitude of the change in consumer surplus is represented.

Tariff effects on the importing country's producers. Producers in the importing country experience an increase in well-being as a result of the tariff. The increase in the price of their product on the domestic market increases producer surplus in the industry. Refer to Table 9.4.2 and Figure 9.4.1 to see how the magnitude of the change in producer surplus is represented.

Tariff effects on the importing country's government. The government receives tariff revenue as a result of the tariff. Who benefits from the revenue depends on how the government spends it. Typically, the revenue is simply included as part of the general funds collected by the government from various sources. In this case, it is impossible to identify precisely who benefits. However, these funds help support many government spending programs that presumably either help most people in the country, as is the case with public goods, or target certain worthy groups. Thus someone within the country is the likely recipient of these benefits. Refer to Table 9.4.2 and Figure 9.4.1 to see how the magnitude of the tariff revenue is represented.

Unemployment Costs

The tariff eliminates the unemployment or adjustment costs that would have been incurred in the absence of protection. Hence welfare rises by the amount F.

The aggregate welfare effect for the importing country is found by summing the gains and losses to consumers, producers, the government, and the potentially unemployed workers. The net effect consists of three components: a positive effect on workers who are saved from the negative effects of unemployment (F), a negative production distortion (B), and a negative consumption distortion (D).

Whether the country benefits from protection in the presence of an unemployment imperfection depends on how the cost of unemployment compares with the standard aggregate welfare cost of protection. If the aggregate costs of unemployment (F) that would arise in the absence of a tariff exceed the deadweight costs of the tariff (i.e., $B+D$), then national welfare would rise when the tariff is implemented. The tariff would eliminate the adjustment costs of unemployment while imposing other lower costs on consumers who would lose the benefit of lower prices.

With a more completely specified model, one could determine the optimal level of protection in these circumstances. It is not necessarily true that the optimal tariff will be the tariff that maintains the price at the original level. Instead, the optimal tariff will be achieved when the marginal cost of raising it further is just equal to the marginal benefit of the reduction in unemployment costs. This may be lower than the level set in the example above.

Objections to Protection

Of course, it is also conceivable that the aggregate costs of the tariff ($B + D$) exceed the aggregate adjustment costs (F) incurred by those who would become unemployed. In this case, the optimal tariff would remain zero and it would be best for the country to allow the adjustment to proceed. Thus the mere presence of unemployment is not sufficient evidence to justify the use of protection.

Also, even if protection is beneficial in the aggregate, it is important to remember that protection generates a redistribution of income. A tariff will force consumers to pay higher prices than they would have to pay in free trade. The extra costs to consumers are essentially being transferred to the firms and workers in the import-competing industry and to the government in the form of tariff revenue.

Finally, one could object to protection by noting that the benefit of protection—that is, eliminating unemployment—represents the permanent avoidance of temporary costs. If free trade were maintained in the face of the import surge, unemployment and its associated costs would be incurred, but these costs are likely to be temporary. Eventually workers will find alternative employment opportunities in other industries and the adjustment costs will dissipate. However, the benefits of free trade in the form of lower prices for consumers would be permanent benefits. Lower prices would presumably prevail period after period into the future. This means that even if the one-period benefits of eliminating unemployment exceed the one-period costs of protection, this may not hold if evaluated over multiple periods.

First-Best versus Second-Best Policies

Another objection to the use of a tariff to eliminate the cost of unemployment is that a tariff will be a second-best policy to correct the unemployment imperfection. The first-best policy would be a policy targeted more directly at the source of the market imperfection—in this case, the unemployment. Many such policies would be superior to a tariff. One easy-to-analyze policy is a production subsidy. A production subsidy means that the government would make payments, say, per unit of output produced by the domestic firms.

Begin with the same surge of imports described in Figure 9.4.1 in the import market and with the same welfare costs and benefits. This time, however, suppose that the government offers a production subsidy sufficient to raise output in the domestic industry back to the original level. Recall that a production subsidy will raise the producer's price by the amount of the subsidy for a small country and will maintain the consumer price at its original level. A specific production subsidy "s" set equal to the difference $P_1 - P_2$ would cause the producer price to rise to P_1 while the consumer price would remain at P_2. The higher producer price will induce domestic firms to raise their supply back to the original level of S_1, but the constant consumer price will keep domestic demand at D_2.

Table 9.4.3 provides a summary of the direction and magnitude of the welfare effects to producers, consumers, and the government in the importing country as a result of the production subsidy. These effects are calculated relative to the economic situation *after* the surge of imports occurs. The aggregate national welfare effects are also shown.

Table 9.4.3: Welfare Effects of a Production Subsidy

	Importing Country
Consumer Surplus	0
Producer Surplus	$+ A$
Govt. Revenue	$- (A + B)$
Unemployment Cost	$+ F$
National Welfare	$F - B$

Production subsidy effects on the importing country's consumers. Consumers of the product in the importing country are unaffected by the subsidy since there is no change in the domestic price of the good.

Production subsidy effects on the importing country's producers. Producers in the importing country experience an increase in well-being as a result of the tariff. Although they receive the same free trade price in the market as before, they now also receive the per-unit subsidy payment from the government. That means that their surplus is measured off of the original supply curve. Refer to Table 9.4.3 and Figure 9.4.1 to see how the magnitude of the change in producer surplus is represented.

Production subsidy effects on the importing country's government. The government must pay the per-unit production subsidy. The per-unit subsidy rate is given as the price difference ($P_1 - P_2$), while the quantity of domestic production is given by S_1. The product of these two terms gives the value of the subsidy payments made by the government. Who loses from the subsidy payments depends on where the tax revenue is collected. Generally, it is impossible to identify precisely which taxpayers lose. Refer to Table 9.4.3 and Figure 9.4.1 to see how the magnitude of the subsidy payments is represented.

Unemployment Costs

The subsidy eliminates the unemployment or adjustment costs that would have been incurred in the absence of the subsidy. Hence welfare rises by the amount F.

The aggregate welfare effect for the importing country is found by summing the gains and losses to consumers, producers, the government, and the potentially unemployed workers. The net effect consists of two components: a positive effect on workers who are saved from the negative effects of unemployment (F) and a negative production distortion (B).

Whether the country benefits from a production subsidy in the presence of an unemployment imperfection depends on how the cost of unemployment compares with the standard aggregate welfare cost of protection. If the aggregate costs of unemployment (F) that would arise in the absence of a tariff exceed the production efficiency losses of the subsidy (i.e., B), then national welfare would rise when the production subsidy is implemented. The production subsidy would eliminate the adjustment costs of unemployment but would cost the taxpayer extra money to finance the subsidy.

However, the key difference is the comparison of the production subsidy with the import tariff. Both policy actions could generate an improvement in national welfare, but the production subsidy would raise national welfare by more than the import tariff. In Figure 9.4.1, it can be seen that $F - B > F - B - D$. For this reason, we might refer to the production subsidy as a first-best policy, while the import tariff is second best.

The production subsidy is superior because it corrects the imperfection more directly. By targeting production, the production subsidy creates a production distortion (B) but eliminates an unemployment imperfection. The tariff, on the other hand, creates a production and consumption distortion ($B + D$) to eliminate the same unemployment imperfection. Generally, it is preferable to introduce as few other distortions as possible in designing a policy to correct another.

This example shows how a production subsidy is superior to a tariff. However, in the case of an unemployment imperfection, there are likely to be policies superior to the production subsidy. It would seem that some policies would target the imperfection even more directly.

For example, the government could use a labor employment subsidy if the primary problem were the potential unemployment of labor. In this case, the government would make a payment to firms for each worker hired. If set at the correct level, the subsidy could eliminate the negative effects caused by unemployment. However, since firms would remain free to substitute labor for other inputs, industry production levels might not be the same as with a production subsidy. Firms' freedom to adjust output could further reduce the cost of the additional distortion.

A labor employment subsidy, however, would not solve the problem of long-term adjustment. As mentioned, the cost associated with unemployment is likely to be temporary, while the cost of eliminating the unemployment with a subsidy would require a permanent taxpayer cost. Thus an even more superior policy would probably be one that is targeted even more directly at the source of the problem. Recall that the problem is in the adjustment process. Superior policies might be those that facilitate the adjustment of labor resources across industries.

In a sense, this is the purpose behind policies like trade adjustment assistance (TAA). TAA was originally implemented in the 1962 U.S. Trade Act. It provides for the extension of unemployment compensation, loans, and grants for technical retraining and other types of support programs for workers who are displaced as a result of trade liberalization. If TAA is designed and implemented in a cost-efficient manner, it could be first among the contenders for a first-best policy to correct an unemployment imperfection.

Key Takeaways

- An import tariff that reduces unemployment costs sufficiently can raise national welfare, even for a small importing country.
- An import tariff is a second-best policy to correct for an unemployment imperfection after an import surge.
- A production subsidy is superior to an import tariff as a policy to correct for an unemployment imperfection after an import surge.

- A production subsidy might be classified as first best in this situation, except that even more targeted policies, like worker retraining, could be superior.
- In the presence of an unemployment imperfection after an import surge, a domestic policy is first best, while the best trade policy is second best.

Exercise 9.4.1

1. Consider the following imperfect market situations in the table below. From the following list of policy options, identify all types of trade policies *and* all types of domestic policies that could potentially raise national welfare in the presence of each imperfection. Consider only the partial equilibrium effects of each policy.

   Options: An import tariff, an import quota, a voluntary export restraint (VER), an export tax, an export subsidy, a production tax, a production subsidy, a consumption tax, and a consumption subsidy.

   Table 9.4.4: Welfare Improving Policies

	Trade Policy	Domestic Policy
1. Unemployment in a small import-competing industry suffering from a surge of imports		
2. A small country in which an export decline causes unemployment		

2. Consider the policy actions listed along the top row of the table below. In the empty boxes, use the following notation to indicate the effect of each policy on the variables listed in the first column. Use a partial equilibrium model to determine the answers and assume that the shapes of the supply and demand curves are "normal." Assume that none of the policies begin with, or result in, prohibitive policies. Use the following notation:

   + the variable increases

   – the variable decreases

   0 the variable does not change

   A the variable change is ambiguous (i.e., it may rise, it may fall)

   Table 9.4.5: Effects of Policies to Alleviate Unemployment

	Import Tariff by a Small Country with Unemployment	Production Subsidy by a Small Country with Unemployment
Domestic Consumer Price		
Domestic Producer Price		
Domestic Industry Employment		
Unemployment Welfare Effect		
Domestic Consumer Welfare		
Domestic Producer Welfare		
Domestic Government Revenue		
Domestic National Welfare		

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9.5: The Infant Industry Argument and Dynamic Comparative Advantage 9.5: The Infant Industry Argument and Dynamic Comparative AdvantageEdit Update titlecancel

Learning Objectives

1. Learn that the infant industry argument presumes a market imperfection—the presence of a positive production externality.
2. Recognize that a trade policy can be used to correct for an infant industry production externality imperfection.
3. Learn the first-best and second-best policy options to correct for an infant industry production externality imperfection.
4. Learn the practical implementation problems that can arise when governments attempt to apply infant industry protection.

One of the most notable arguments for protection is known as the **infant industry** argument. The argument claims that protection is warranted for small new firms, especially in less-developed countries. New firms have little chance of competing head-to-head with the established firms located in the developed countries. Developed country firms have been in business longer and over time have been able to improve their efficiency in production. They have better information and knowledge about the production process, about market characteristics, about their own labor market, and so on. As a result, they are able to offer their product at a lower price in international markets and still remain profitable.

A firm producing a similar product in a less-developed country (LDC), on the other hand, would not have the same production technology available to it. Its workers and management would lack the experience and knowledge of its developed country rivals and thus would most likely produce the product less efficiently. If forced to compete directly with the firms in the developed countries, the LDC firms would be unable to produce profitably and thus could not remain in business.

Protection of these LDC firms, perhaps in the form of an import tariff, would raise the domestic price of the product and reduce imports from the rest of the world. If prices are raised sufficiently, the domestic firms would be able to cover their higher production costs and remain in business. Over time, these LDC firms would gain production and management experience that would lower their production costs. Essentially, the firms would follow the same path that the developed country firms had followed to realize their own production efficiency improvements. Protection, then, allows an infant industry time to “grow up.”

Furthermore, since the LDC firms would improve their productive efficiency over time, the protective tariffs could be gradually reduced until eventually, when the tariffs are eliminated, they would compete on an equal footing with the developed country firms.

Many people have argued that this was precisely the industrial development strategy that was pursued by countries like the United States and Germany during their rapid industrial development before the turn of the twentieth century. Both the United States and Germany had high tariffs during their industrial revolution periods. These tariffs helped protect fledgling industries from competition with more-efficient firms in Britain and may have been the necessary requirement to stimulate economic growth.

One counterargument to this theory is that by protecting infant industries, countries are not allocating resources in the short run on the basis of comparative advantage. The Ricardian and Heckscher-Ohlin models of trade show that resources will be allocated most efficiently if countries produce goods whose before-trade prices are lower than those in the rest of the world. This implies that the United States and Germany should have simply imported the cheaper industrial goods from Britain and shifted their own resources to other goods in which they had a comparative advantage if they wished to maximize economic efficiency.

The reason for the discrepancy in policy prescriptions can easily be seen by noting the difference between static comparative advantage and dynamic comparative advantage. The traditional Ricardian theory of comparative advantage identifies the most efficient allocation of resources at one point in time. In this sense, it is a *static* theory. The policy prescription is based on a snapshot in time.

On the other hand, the infant industry argument is based on a dynamic theory of comparative advantage. In this theory, one asks what is best for a country (i.e., what is most efficient) in the long run. The most efficient long-run strategy may well be different from what is best initially. Here’s why.

The problem faced by many LDCs is that their static comparative advantage goods, in most instances, happen to be agricultural commodities and natural resources. Reliance on production of these two types of goods can be problematic for LDCs. First of all, the prices of agricultural commodities and natural resources have historically been extremely volatile. In some years prices are very high, and in other years the prices are very low. If a country allocates many of its resources to production of goods with volatile prices, then the gross domestic product (GDP) will fluctuate along with the prices. Some years will be very good, and others will be

very bad. Although a wealthier country may be able to smooth income by effectively using insurance programs, a poor country might face severe problems, perhaps as severe as famine, in years when the prices of their comparative advantage goods are depressed.

In addition, many people argue that the management and organizational skills necessary to produce agricultural goods and natural resources are not the same as the skills and knowledge needed to build an industrial economy. If true, then concentrating production in one's static comparative advantage goods would prevent the development of an industrial economy. Thus one of the reasons for protecting an infant industry is to stimulate the learning effects that will improve productive efficiency. Furthermore, these learning effects might spill over into the rest of the economy as managers and workers open new businesses or move to other industries in the economy. To the extent that there are positive spillovers or externalities in production, firms are unlikely to take account of these in their original decisions. Thus, if left alone, firms might produce too little of these types of goods and economic development would proceed less rapidly, if at all.

The solution suggested by the infant industry argument is to protect the domestic industries from foreign competition in order to generate positive learning and spillover effects. Protection would stimulate domestic production and encourage more of these positive effects. As efficiency improves and other industries develop, economic growth is stimulated. Thus by protecting infant industries a government might facilitate more rapid economic growth and a much faster improvement in the country's standard of living relative to specialization in the country's static comparative advantage goods.

An Analytical Example

Consider the market for a manufactured good such as textiles in a small, less-developed country.

Suppose that the supply and demand curves in the country are as shown in Figure 9.5.1. Suppose initially free trade prevails and the world price of the good is P_1. At that price, consumers would demand D_1, but the domestic supply curve is too high to warrant any production. This is the case, then, where domestic producers simply could not produce the product cheaply enough to compete with firms in the rest of the world. Thus the free trade level of imports would be given by the blue line segment, which is equal to domestic demand, D_1.

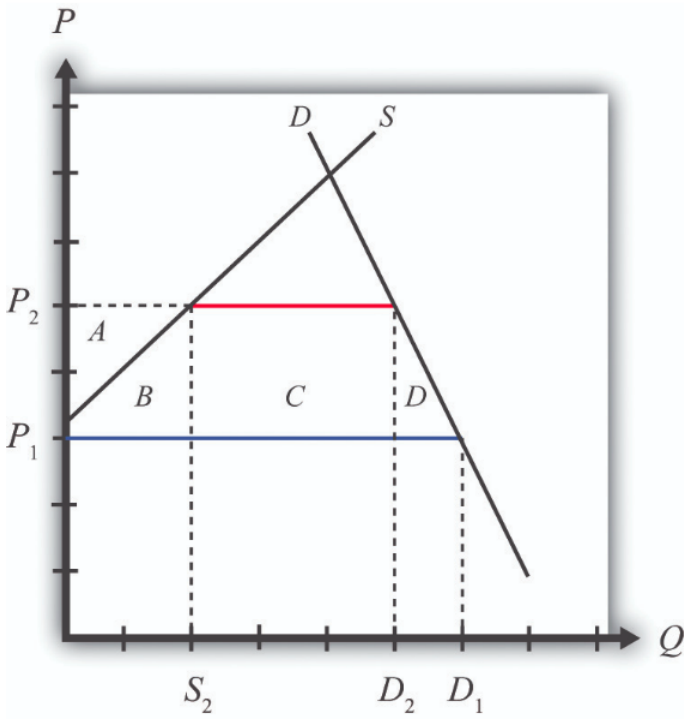


Figure 9.5.1: An Infant Industry in a Small Importing Country

Suppose that the infant industry argument is used to justify protection for this currently nonexistent domestic industry. Let a specific tariff be implemented that raises the domestic price to P_2. In this case, the tariff would equal the difference between P_2 and

P_1—that is, $t = P_2 - P_1$. Notice that the increase in domestic price is sufficient to stimulate domestic production of S_2. Demand would fall to D_2 and imports would fall to $D_2 - S_2$ (the red line segment).

The static (i.e., one-period) welfare effects of the import tariff are shown in Table 9.5.1.

Table 9.5.1: Static Welfare Effects of a Tariff

	Importing Country
Consumer Surplus	− (*A* + *B* + *C* + *D*)
Producer Surplus	+ *A*
Govt. Revenue	+ *C*
National Welfare	− *B* − *D*

Consumers of textiles are harmed because of the higher domestic price of the good. Producers gain in terms of producer surplus. In addition, employment is created in an industry that did not even exist before the tariff. Finally, the government earns tariff revenue, which benefits some other segment of the population.

The net national welfare effect of the import tariff is negative. Although some segments of the population benefit, two deadweight losses to the economy remain. Area B represents a production efficiency loss, while area D represents a consumption efficiency loss.

Dynamic Effects of Infant Industry Protection

Now suppose that the infant industry argument is valid and that by stimulating domestic production with a temporary import tariff, the domestic industry improves its own productive efficiency. We can represent this as a downward shift in the domestic industry supply curve. In actuality, this shift would probably occur gradually over time as the learning effects are incorporated in the production process. For analytical simplicity, we will assume that the effect occurs as follows. First, imagine that the domestic industry enjoys one period of protection in the form of a tariff. In the second period, we will assume that the tariff is removed entirely but that the industry experiences an instantaneous improvement in efficiency such that it can maintain production at its period one level but at the original free trade price. This efficiency improvement is shown as a supply curve shift from S to S' in Figure 9.5.2.

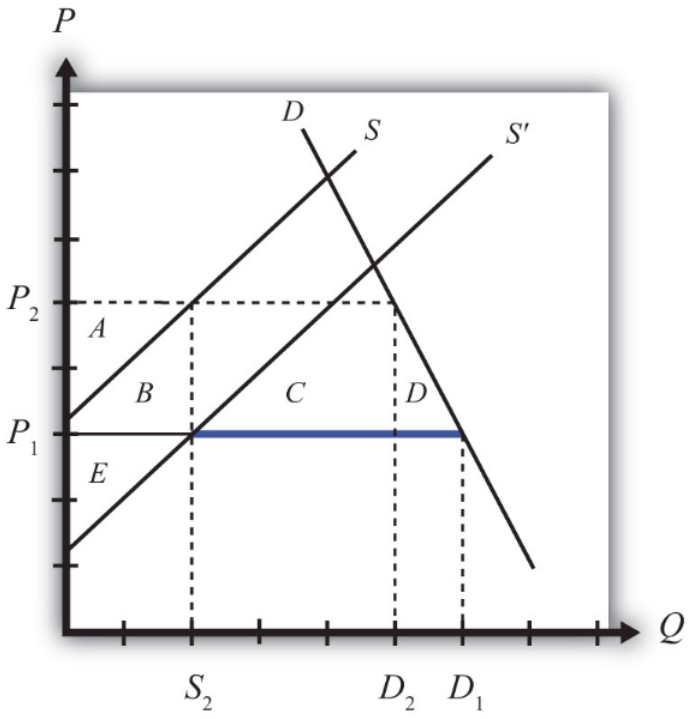


Figure 9.5.2: Efficiency Improvement in a Small Importing Country

This means that in the second period, free trade again prevails. The domestic price returns to the free trade price of P_1, while domestic demand rises to D_1. Because of the efficiency improvement, domestic supply in free trade is given by S_2 and the level of imports is $D_1 - S_2$ (the blue segment).

The static (one-period) welfare effects of the tariff removal and efficiency improvement are summarized in Table 9.5.2. Note that these effects are calculated relative to the original equilibrium before the original tariff was implemented. We do this because we want to identify the welfare effects in each period relative to what would have occurred had the infant industry protection not been provided.

Table 9.5.2 Static Welfare Effects of Tariff Removal and Efficiency Improvement

	Importing Country
Consumer Surplus	0
Producer Surplus	+ *E*
Govt. Revenue	0
National Welfare	+ *E*

Consumers again face the same free trade price that they would have faced if no protection had been offered. Thus they experience no loss or gain. Producers, however, face a new supply curve that generates a producer surplus of $+E$ at the original free trade price. The government tariff is removed, so the government receives no tariff revenue. The net national welfare effect for the second period then is simply the gain in producer surplus.

The overall welfare impact over the two periods relative to no infant industry protection over two periods is simply the sum of each period's welfare effects. This corresponds to the sum of areas ($+E - B - D$), which could be positive or negative. If the second-period producer surplus gain exceeds the first-period deadweight losses, then the protection has a positive two-period effect on national welfare.

But wait. Presumably the efficiency improvement in the domestic industry would remain, if not improve, in all subsequent periods as well. Thus it is not complete to consider the effects only over two periods. Instead, and for simplicity again, suppose that the new supply curve prevails in all subsequent periods. In this case, the true dynamic national welfare effects would consist of area *E* multiplied by the number of future periods we wish to consider minus the one-period deadweight losses. Thus even if the costs of the tariff are not made up in the second period, they may well be made up eventually at some point in the future. This would make it even more likely that the temporary protection would be beneficial in the long run.

If, in addition to the direct efficiency effects within the industry, there are spillover efficiency effects on other industries within the domestic economy, then the likelihood that temporary protection is beneficial is enhanced even further. In other words, over time, workers and managers from the protected industries may establish firms or take jobs in other sectors of the economy. Since they will bring their newly learned skills with them, it will cause an improvement in productive efficiency in those sectors as well. In this way, the supply of many manufacturing industries will be increased, allowing these sectors to compete more easily with firms in the rest of the world. Industrialization and GDP growth then is stimulated by the initial protection of domestic industries.

In summary, we have shown the possibility that protection of an infant industry may be beneficial for an economy. At the heart of the argument is the assumption that production experience generates efficiency improvements either directly in the protected industry or indirectly in other industries as a learning spillover ensues. The infant industry argument relies on a dynamic view of the world rather than the static description used in classical trade models. Although protection may be detrimental to national welfare in the short run, it is conceivable that the positive dynamic long-run effects will more than outweigh the short-run (or static) effects.

The Economic Argument against Infant Industry Protection

The main economic argument against infant industry protection is that protection is likely to be a second-best policy choice rather than a first-best policy choice. The key element of the infant industry argument is the presence of a positive dynamic production externality. It is assumed that production experience causes learning, which improves future productive efficiency. Alternatively, it is assumed that these learning effects spill over into other industries and improve those industries' future productive efficiencies as well.

The theory of the second best states that in the presence of a market distortion, such as a production externality, it is possible to conceive of a trade policy that can improve national welfare. However, in this case, the trade policy—namely, the import tariff—is not the first-best policy because it does not attack the distortion most directly. In this case, the more-efficient policy is a production subsidy targeted at the industries that generate the positive learning effects.

To demonstrate this result, consider the following analytical example. We will use the same supply and demand conditions as depicted in Figure 9.5.2. The domestic supply and demand curves are given by D and S, respectively. The initial free trade world price of the good is P_1. At that price, consumers would demand D_1, but the domestic supply curve is too high to warrant any production. Thus the level of imports is given by D_1.

Now suppose that the government implements a specific production subsidy equal to the difference in prices, $P_2 - P_1$. The subsidy would raise the producer price by the amount of the subsidy to P_2, and hence domestic supply will rise to S_2. The domestic consumer price would remain at P_1, so demand would remain at D_1. Imports would fall to $D_1 - S_2$.

The static (i.e., one-period) welfare effects of the production subsidy are shown in Table 9.5.3: Static Welfare Effects of a Production Subsidy.

Table 9.5.3: Static Welfare Effects of a Production Subsidy

	Importing Country
Consumer Surplus	0
Producer Surplus	+ A
Govt. Revenue	− (A + B)
National Welfare	− B

Consumers of textiles are left unaffected by the subsidy since the domestic price remains the same. Producers gain in terms of producer surplus since the subsidy is sufficient to cause production to begin. In addition, employment is created in an industry. The government, however, must pay the subsidy. Thus someone pays higher taxes to fund the subsidy.

The net national welfare effect of the production subsidy is negative. Although some segments of the population benefit, there remains a production efficiency loss.

Note, however, that relative to an import tariff that generates the same level of domestic production, the subsidy is less costly in the aggregate. The production subsidy causes only a production efficiency loss, while the tariff causes an additional consumption efficiency loss. If the positive dynamic gains in efficiency in subsequent periods are the same, then the production subsidy would generate the same positive stream of benefits but at a lower overall cost to the country. For this reason, the production subsidy is the first-best policy to choose in light of the dynamic production externality. The import tariff remains second best.

For this reason, economists sometimes argue that although an import tariff may indeed be beneficial in the case of infant industries, it does not necessarily mean that protection is appropriate.

Other Arguments against Infant Industry Protection

Political economy problems. Political pressures in democratic economies can make it difficult to implement infant industry protection in its most effective manner. In order for protection to work in the long run, it is important that protection be temporary. There are two main reasons for this. First, it may be that the one-period efficiency improvement is less than the sum of the deadweight costs of protection. Thus if protection is maintained, then the sum of the costs may exceed the efficiency improvements and serve to reduce national welfare in the long run. Second, and more critically, if protection were expected to be long lasting, then the protected domestic firms would have less incentive to improve their productive efficiency. If political pressures are brought to bear whenever the tariffs are scheduled to be reduced or removed, industry representatives might convince legislators that more time is needed to guarantee the intended efficiency improvements. In other words, firms might begin to claim that they need more time to compete against firms in the rest of the world. As long as legislators provide more time to catch up to world efficiency standards, protected firms have little incentive to incur the investment and training costs necessary to compete in a free market. After all, the tariff keeps the price high and allows even relatively inefficient production to produce profits for the domestic firms.

Thus one big problem with applying the infant industry protection is that the protection itself may eliminate the need for the firms to grow up. Without the subsequent efficiency improvements, protection would only generate costs for the economy in the aggregate.

Informational problems. In order for infant industry protection to work, it is important for governments to have reliable information about industries in their economies. They need to know which industries have strong learning effects associated with production and which industries are most likely to generate learning spillover effects to other industries. It would also be useful to know the size of the effects as well as the timing. But governments must decide not only which industries to protect but also how large the protective tariffs should be and over what period of time the tariff should be reduced and eliminated. If the government sets the tariff too low, the protection may be insufficient to generate very much domestic production. If the tariff is set too high, the costs of the tariff might outweigh the long-term efficiency improvements. If the tariff is imposed for too long a period, then firms might not have enough of an incentive to make the changes necessary to improve efficiency. If set for too short a time, then firms may not learn enough to compete with the rest of the world once the tariffs are removed.

Thus in order for infant industry protection to work, it is important to set the tariff for the correct industries, at the correct level, and for the correct period of time. Determining the correct industries, tariff level, and time period is not a simple matter. Indeed, some people argue that it is impossible to answer these questions with a sufficient amount of accuracy to warrant applying these policies.

Failure of import-substitution strategies. One popular development strategy in the 1950s and 1960s was known as import substitution. Essentially, this strategy is just an application of the infant industry argument. However, many of the countries that pursued these kinds of inward-looking strategies, most notably countries in Latin America and Africa, performed considerably less well economically than many countries in Asia. The Asian countries—such as South Korea, Taiwan, Hong Kong, and Japan—pursued what have been labeled export-oriented strategies instead. Since many of these Southeast Asian countries performed so much better economically, it has lent some empirical evidence against the application of infant industry protection.

Key Takeaways

- An import tariff that stimulates infant industry production sufficiently can raise national welfare over time, even for a small importing country.
- An import tariff is a second-best policy to correct for an infant industry production externality imperfection.
- A production subsidy is superior to an import tariff as a policy to correct for an infant industry production externality imperfection.
- In the presence of an infant industry production externality imperfection, a domestic policy is first best, while the best trade policy is second best.

? Exercise 9.5.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The term used to describe firms in less-developed countries that have a significant cost disadvantage compared with established firms located in the developed countries.
   b. The type of comparative advantage that is not present in the short run but that develops in the long run.
   c. The first-best policy option for a government that wishes to support an infant industry.
   d. A second-best policy option for a government that wishes to support an infant industry.
   e. Of *increase*, *decrease*, *no change*, or *ambiguous*, the effect of infant industry protection on national welfare under standard assumptions in the early periods while protection is in place.
   f. Of *increase*, *decrease*, *no change*, or *ambiguous*, the effect of infant industry protection on national welfare under standard assumptions in the later periods after protection is removed.
   g. Of *increase*, *decrease*, *no change*, or *ambiguous*, the effect of infant industry protection on overall national welfare under standard assumptions over all periods.

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9.6: The Case of a Foreign Monopoly 9.6: The Case of a Foreign MonopolyEdit Update titlecancel

Learning Objectives

1. Learn that a foreign monopoly supplying products to domestic consumers is a type of market imperfection.
2. Recognize that a trade policy can be used to correct for a foreign monopolist imperfection.
3. Learn the first-best and second-best policy options to correct for a foreign monopolist imperfection.

Consider a domestic market supplied by a foreign monopoly firm. The domestic market consists of many consumers who demand the product but has no domestic producers of the product. All supply of the product comes from a single foreign firm.

Although this situation is not very realistic, it is instructive as an application of the theory of the second best. In this case, the market imperfection is that there are not a multitude of firms supplying the market. Rather, we have assumed the extreme opposite case of a monopoly supplier. To make this an international trade story, we simply assume the monopoly happens to be a foreign firm.

Consider the market described in Figure 9.6.1. Domestic consumer demand is represented by a linear demand curve, D. When demand is linear, it follows that the marginal revenue curve will have twice the slope and will equal demand when the quantity is zero. Let the flat MC line represent a constant marginal cost in production for the foreign monopolist.

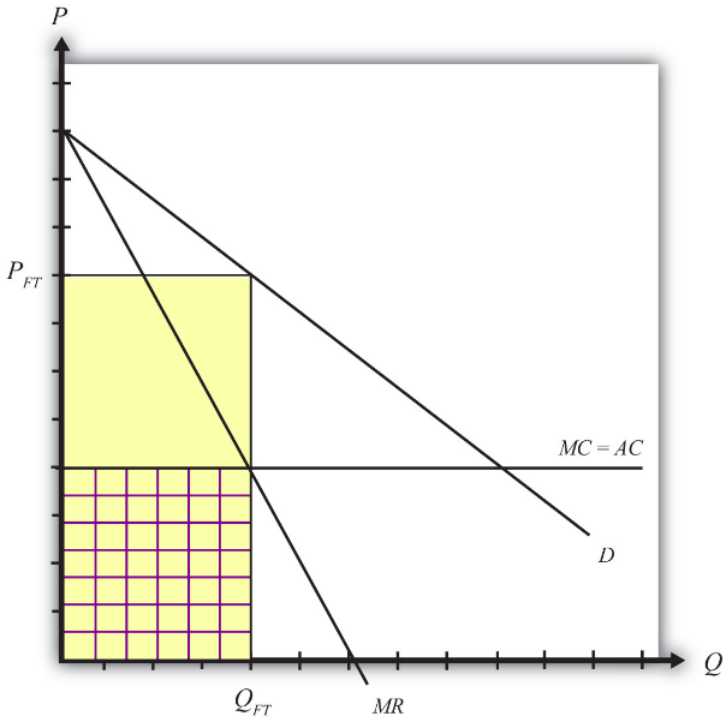


Figure 9.6.1: Imports from a Foreign Monopoly Firm

Assuming the monopolist maximizes profit, the profit-maximizing output level is found by setting marginal cost equal to marginal revenue. Why? Profit-maximizing output occurs at the quantity level Q_{FT}. At that quantity, the monopolist would set the price at P_{FT}, the only price that equalizes demand with its supply.

The monopolist's profit is the difference between total revenue and total cost. Total revenue is given by the product ($P_{FT}Q_{FT}$), the yellow area in the graph. Total cost is equal to average cost (AC) multiplied by output (Q_{FT}), given by the checkered area. The monopolist's profit is represented by the uncheckered yellow rectangular area in Figure 9.6.1.

Strategic Trade Policy

Generally, strategic trade policy refers to cases of advantageous protection when there are imperfectly competitive markets. The case of a foreign monopolist represents one such case.

More specifically, though, the presence of imperfect competition implies that firms can make positive economic profit. Strategic trade policies typically involve the shifting of profits from foreign firms to domestic firms. In this way, national welfare can be improved, although it is often at the expense of foreign countries.

In this example, we shall consider the welfare effects of a specific tariff set equal to t. The tariff will raise the cost of supplying the product to the domestic market by exactly the amount of the tariff. We can represent this in Figure 9.6.2 by shifting the marginal cost curve upward by the amount of the tariff to $MC + t$. The monopolist will reduce its profit-maximizing output to Q_T and raise its price to P_T. Note that the price rises by less than the amount of the tariff.

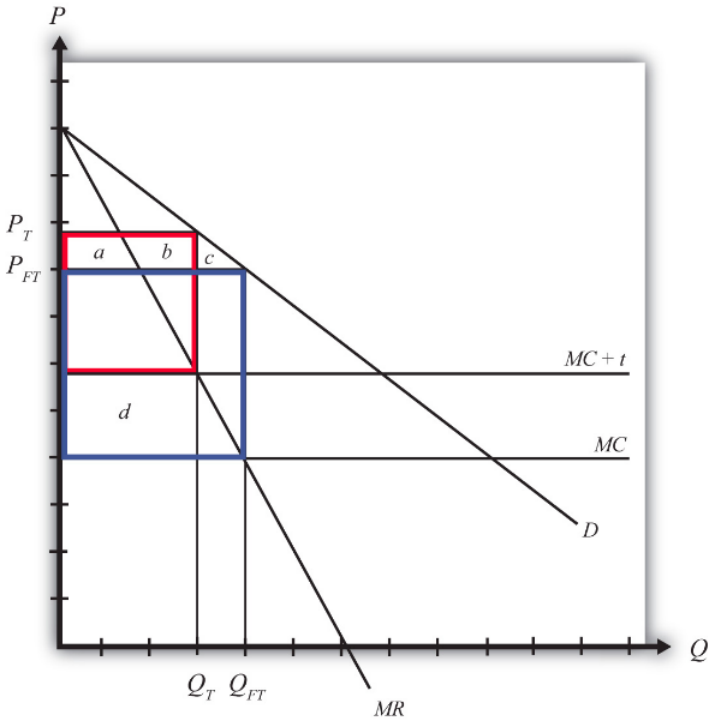


Figure 9.6.2: A Tariff on Imports from a Foreign Monopoly Firm

Table 9.6.1 provides a summary of the direction and magnitude of the welfare effects to producers, consumers, and the government in the importing country as a result of the import tariff. The aggregate national welfare effects are also shown.

Table 9.6.1: Welfare Effects of a Tariff

	Importing Country
Consumer Surplus	− (*a* + *b* + *c*)
Producer Surplus	0
Govt. Revenue	+ *d*
National Welfare	*d* − (*a* + *b* + *c*)

Import tariff effects on the importing country's consumers. Consumers of the product in the importing country suffer a reduction in surplus because of the higher price that prevails. Refer to Table 9.6.1 and Figure 9.6.2 to see how the magnitude of the change in producer surplus is represented.

Import tariff effects on the importing country's producers. It is assumed that there are no domestic producers of the goods; thus there are no producer effects from the tariff.

Import tariff effects on the importing country's government. The government receives tariff revenue given by the per-unit tax (t) multiplied by the quantity of imports (Q_T). Who gains from the tariff revenue depends on how the government spends the money. Presumably these revenues help support the provision of public goods or help sustain transfer payments. In either case, someone in the economy ultimately benefits from the revenue. Refer to Table 9.6.1 and Figure 9.6.2 to see how the magnitude of the subsidy payments is represented.

The aggregate welfare effect for the importing country is found by summing the gains and losses to consumers, producers, and the government. The net effect consists of two components: a positive effect on the recipients of the government tariff revenue (d) and a negative effect on consumers ($a + b + c$), who lose welfare due to higher prices.

If demand is linear, it is straightforward to show that the gains to the country will always exceed the losses for some positive nonprohibitive tariff. In other words, there will exist a positive optimal tariff. Thus a tariff can raise national welfare when the market is supplied by a foreign monopolist.

One reason for this positive effect is that the tariff essentially shifts profits away from the foreign monopolist to the domestic government. Note that the original profit level is given by the large blue rectangle shown in Figure 9.6.2. When the tariff is implemented, the monopolist's profit falls to a level given by the red rectangle. Thus, in this case, the tariff raises aggregate domestic welfare as it reduces the foreign firm's profit.

First-Best Policy

Although a tariff can raise national welfare in this case, it is not the first-best policy to correct the market imperfection. A first-best policy must attack the imperfection more directly. In this case, the imperfection is the monopolistic supply of the product to the market. A monopoly maximizes profit by choosing an output level such that marginal revenue is equal to marginal cost. This rule deviates from what a perfectly competitive firm would do—that is, set price equal to marginal cost. When a firm is one among many, it must take the price as given. It cannot influence the price by changing its output level. In this case, the price is its marginal revenue. However, for a monopolist, which can influence the market price, price exceeds marginal revenue. Thus when the monopolist maximizes profit, it sets a price greater than marginal cost. This deviation—that is, $P > MC$—is at the core of the market imperfection.

The standard way of correcting this type of imperfection in a domestic context is to regulate the industry. For example, electric utilities are regulated monopolies in the United States. Power can generally be purchased from only one company in any geographical area. To assure that these firms do not set exorbitant prices, the government issues a set of pricing rules that the firms must follow. The purpose is to force the firms to set prices closer, if not equal to, the marginal cost of production.

Now, in the case of utilities, determining the marginal cost of production is a rather difficult exercise, so the pricing rules to optimally regulate the industry are relatively complicated. In the case of a foreign monopolist with a constant marginal cost supplying a domestic market, however, the optimal policy is simple. The domestic government could merely set a price ceiling equal to the firm's marginal cost in production.

To see why a price ceiling is superior to a tariff, consider Figure 9.6.3. A second-best policy is the tariff. It would raise national welfare by the area ($h - a - b - c$), which as mentioned will be positive for some tariffs and for a linear demand curve. The first-best policy is a price ceiling set equal to the marginal cost at P_C. The price ceiling would force the monopolist to set the price equal to the marginal cost and induce an increase in supply to Q_C. Consumers would experience an increase in consumer surplus, given by the area ($d + e + f + g + h + i + j + k$), because of the decline in price. Clearly, in this example, the consumer surplus gain with the price ceiling exceeds the national welfare gain from a tariff.

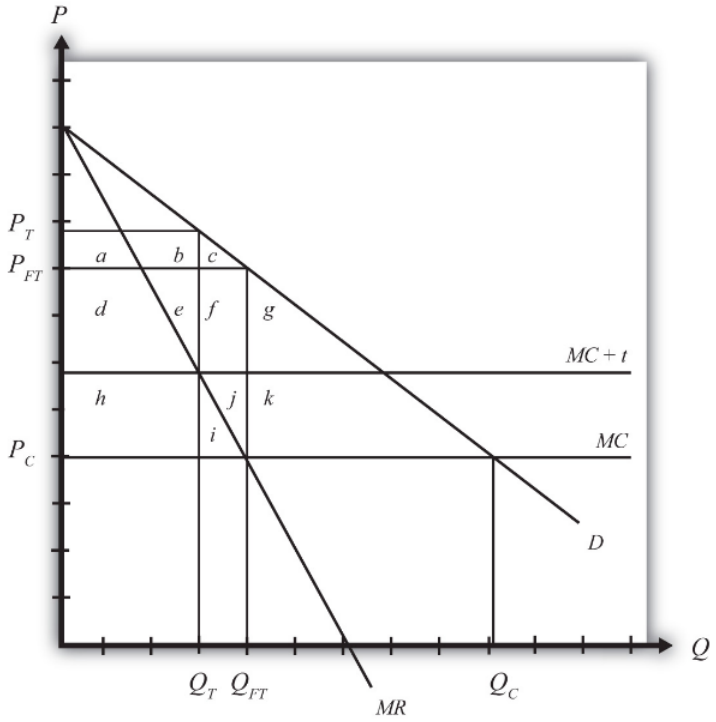


Figure 9.6.3: A Price Ceiling on Imports from a Foreign Monopoly Firm

This shows that although a tariff can improve national welfare, it is not the best policy to correct this market imperfection. Instead, a purely domestic policy—a price ceiling in this case—is superior.

Key Takeaways

- A strategic trade policy attempts to shift foreign profits toward the importing economy.
- An import tariff levied against a foreign monopoly firm supplying domestic demand can raise national welfare.
- An import tariff is a second-best policy to correct for the imperfection of a foreign monopoly firm supplying domestic demand.
- A price ceiling is superior to an import tariff as a policy to correct for the imperfection of a foreign monopoly firm supplying domestic demand.
- In the presence of the imperfection of a foreign monopoly firm supplying domestic demand, a domestic policy is first best, while the best trade policy is second best.

? Exercise 9.6.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The first-best policy option for a government that faces a foreign monopoly (with constant marginal costs) as the sole firm selling a product in the domestic market.
   b. A second-best policy for a government that faces a foreign monopoly (with constant marginal costs) as the sole firm selling a product in the domestic market.
   c. The term used to describe a policy that shifts profits from foreign firms toward groups in the domestic economy.
2. Suppose the U.S. market demand for VCRs is given by $D = 1,000–2P$. The U.S. market is supplied by a foreign monopolist with a constant marginal cost of production equal to $200. The marginal revenue curve faced by the supplier is given by $MR = 500–Q$.
   a. Calculate the equilibrium price and quantity of imports of VCRs. Depict this equilibrium graphically.
   b. Calculate consumer surplus in this market equilibrium.

   Suppose the government imposes a specific tariff of $100.

   c. Calculate the new equilibrium price and quantity.

d. Calculate the change in consumer surplus and the tariff revenue.
e. What is the change in national welfare?
f. What is the first-best policy action to raise national welfare in this case? If this policy is applied, what would be the domestic price and quantity imported?
g. Calculate the change in national welfare if the first-best policy is applied rather than the tariff. Compare this with the national welfare effect of the tariff.
h. Briefly explain how to identify first-best policies in general and explain why the policy in this case satisfies the criterion.

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9.7: Monopoly and Monopsony Power and Trade 9.7: Monopoly and Monopsony Power and TradeEdit Update titlecancel

Learning Objectives

1. Learn that monopoly power and monopsony power in trade are types of market imperfections.
2. Recognize that a trade policy can be used to correct for a large-country imperfection.
3. Learn the first-best and second-best policy options to correct for a large-country imperfection.

Perhaps surprisingly, “large” importing countries and “large” exporting countries have a market imperfection present. This imperfection is more easily understood if we use the synonymous terms for “largeness”: monopsony power and monopoly power. Large importing countries are said to have “monopsony power in trade,” while large exporting countries are said to have “monopoly power in trade.” As this terminology suggests, the problem here is that the international market is not perfectly competitive. For complete perfect competition to prevail internationally, we would have to assume that all countries are “small” countries.

Let’s first consider monopoly power. When a large exporting country implements a trade policy, it will affect the world market price for the good. That is the fundamental implication of largeness. For example, if a country imposes an export tax, the world market price will rise because the exporter will supply less. It was shown in Chapter 7: Trade Policy Effects with Perfectly Competitive Markets, Section 7.23: Export Taxes- Large Country Welfare Effects that an export tax set optimally will cause an increase in national welfare due to the presence of a positive terms of trade effect. This effect is analogous to that of a monopolist operating in its own market. A monopolist can raise its profit (i.e., its firm’s welfare) by restricting supply to the market and raising the price it charges its consumers. In much the same way, a large exporting country can restrict its supply to international markets with an export tax, force the international price up, and create benefits for itself with the terms of trade gain. The term monopoly “power” is used because the country is not a pure monopoly in international markets. There may be other countries exporting the product as well. Nonetheless, because its exports are a sufficiently large share of the world market, the country can use its trade policy in a way that mimics the effects caused by a pure monopoly, albeit to a lesser degree. Hence the country is not a monopolist in the world market but has monopoly “power” instead.

Similarly, when a country is a large importer of a good, we say that it has “monopsony power.” A monopsony is a single buyer in a market consisting of many sellers. A monopsony raises its own welfare or utility by restricting its demand for the product and thereby forcing the sellers to lower their price. By buying fewer units at a lower price, the monopsony becomes better off. In much the same way, when a large importing country places a tariff on imports, the country’s demand for that product on world markets falls, which in turn lowers the world market price. It was shown in Chapter 7: Trade Policy Effects with Perfectly Competitive Markets, Section 7.6: The Optimal Tariff that an import tariff, set optimally, will raise national welfare due to the positive terms of trade effect. The effects in these two situations are analogous. We say that the country has monopsony “power” because the country may not be the only importer of the product in international markets, yet because of its large size, it has the “power” of a pure monopsony.

First-Best or Second-Best Trade Policies

It has already been shown that a trade policy can improve a country’s national welfare when that country is either a large importer or a large exporter. The next question to ask is whether the optimal tariff or the optimal export tax, each of which is the very best “trade” policy that can be chosen, will raise national welfare to the greatest extent or whether there is another purely domestic policy that can raise welfare to a larger degree.

Because a formal graphical comparison between the first-best and second-best policies is difficult to construct in this case, we will rely on an intuitive answer based on what has been learned so far. It is argued in Chapter 9: Trade Policies with Market Imperfections and Distortions, Section 9.3: The Theory of the Second Best that the first-best policy will always be that policy that attacks the market imperfection or market distortion most directly. In the case of a large country, it is said that the market imperfection is a country’s monopsony or monopoly power. This power is exercised in “international” markets, however. Since benefits accrue to a country by changing the international terms of trade in a favorable direction, it is through trade that the monopsony or monopoly power can “best” be exercised. This observation clearly indicates that trade policies will be the first-best policy options. When a country is a large importing country, an optimal tariff or import quota will be first best. When a country is a large exporting country, an optimal export tax or voluntary export restraint (VER) will be first best.

Now, of course, this does not mean that a purely domestic policy cannot raise national welfare when a country is "large." In fact, it was shown in Chapter 8: Domestic Policies and International Trade, Section 8.4: Production Subsidy Effects in a Small Importing Country that an import tariff is equivalent to a domestic production subsidy and a domestic consumption tax set at the same level; thus setting one of these policies at an appropriate level may also be able to raise national welfare. To see that this is true, let's consider a large importing country initially in free trade. Because it is in free trade, there is a market imperfection present that has not been taken advantage of. Suppose this country's government implements a production subsidy provided to the domestic import-competing firm. We can work out the effects of this production subsidy in Figure 9.7.1.

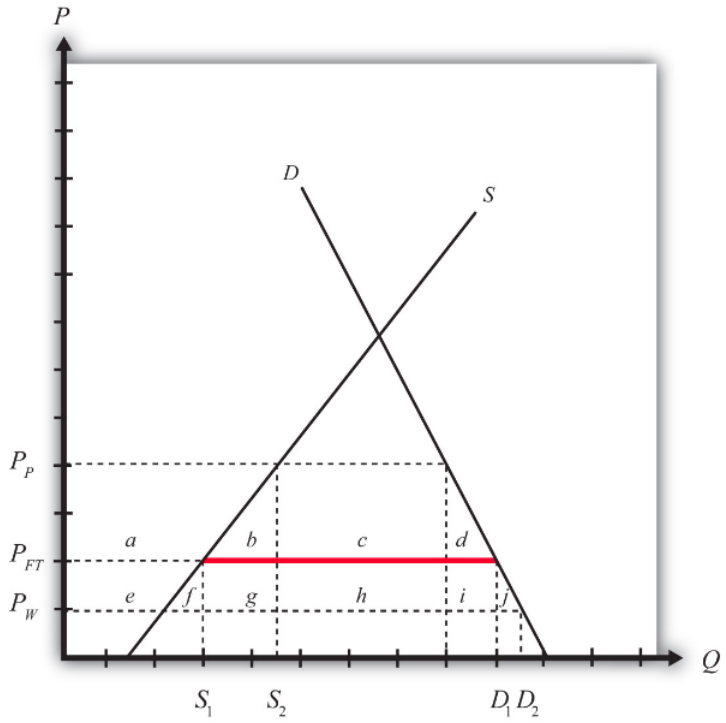


Figure 9.7.1: Domestic Production Subsidy by a Large Importing Country

The free trade price is given by P_{FT}. The domestic supply in free trade is S_1, and domestic demand is D_1, which determines imports in free trade as $D_1 - S_1$ (the red line in Figure 9.7.1).

When a specific production subsidy is imposed, the producer's price rises, at first by the value of the subsidy. The consumer's price is initially unaffected. This increase in the producer's price induces the producer to increase its supply to the market. The supply rises along the supply curve and imports begin to fall. However, because the country is a large importer, the decrease in imports represents a decrease in the world demand for the product. As a result, the world price of the good falls, which in turn means that the price paid by consumers in the import market also falls. When a new equilibrium is reached, the producer's price will have risen (to P_P in Figure 9.7.1), the consumer's price will have fallen (to P_W), and the difference between the producer and consumer prices will be equal to the value of the specific subsidy ($s = P_P - P_W$). Note that the production subsidy causes an increase in supply from S_1 to S_2 and an increase in demand from D_1 to D_2. Because both supply and demand rise, the effect of the subsidy on imports is, in general, ambiguous.

The welfare effects of the production subsidy are shown in Table 9.7.1. The letters refer to the area in Figure 9.7.1.

Table 9.7.1: Welfare Effects of a Production Subsidy in a Large Country

Consumer Surplus	$+ (e + f + g + h + i + j)$
Producer Surplus	$+ a$
Govt. Revenue	$- (a + b + e + f + g)$
National Welfare	$h + i + j - b$

The first thing to note is that the production subsidy causes welfare improvements for both producers and consumers. All previous policies have these two groups always experiencing opposite effects. It would appear, in this case, we have struck the "mother lode"—finally, a policy that benefits both consumers and producers. Of course, the effects are not all good. To achieve this effect, the government must pay the subsidy to the firms, and that must come from an increase in taxes either now or in the future. So the country must incur a cost in the form of government expenditures. The final effect—that is, the effect on national welfare—is ambiguous. However, it is conceivable that the area given by $(h + i + j)$ may exceed the area (b), in which case, national welfare will rise. Of course, if a different subsidy level is set, it is also possible that national welfare will fall. It will depend on the value of the subsidy, and it will vary across every separate market.

In the case that welfare does rise, it will occur because the country is a large importer. The domestic production subsidy allows the country to take advantage of its monopsony power in trade. By stimulating domestic production, the subsidy reduces import demand, which pushes the price of the country's import good down in the world market. In other words, the country's terms of trade improves. In this way, a country can take advantage of its monopsony power by implementing a domestic policy, such as a production subsidy to an import-competing industry. Note well, though, that not every subsidy provided will raise national welfare. The subsidy must be set at an appropriate level for the market conditions to assure an increase in national welfare. In general, a relatively small subsidy will achieve this objective. If the subsidy is set too high, the losses from government expenditures will exceed the gains to consumers and producers, and the country will suffer national welfare losses.

Other domestic policies can also be used to raise national welfare in the case of a large importing country. Indeed, any policy that restricts international demand for a product will potentially raise national welfare—only "potentially" because it is necessary to set the policy at the proper level. The other obvious domestic policy that can achieve this result is a domestic consumption tax on the imported product. Recall that a consumption tax is one of the two domestic policies that, when applied together, substitutes for an import tariff. Since the import tariff can raise welfare, so can its constituent parts.

Key Takeaways

- A market imperfection exists whenever a country is "large": either a large importer, a large exporter, or both.
- In these cases, international perfect competition does not prevail. We say that a large exporting country has monopoly power in trade, while a large importing country has monopsony power in trade.
- Due to the presence of the market imperfection, a trade policy can raise the nation's welfare above the level possible with free trade.
- Domestic policies, such as production subsidies and consumption taxes, can also raise national welfare when a country is large.
- The first-best policy in the case of a large country is a trade policy.
- A trade policy most directly attacks the market distortion—that is, international imperfect competition.
- If a country is a large importer, the first-best trade policy is the optimal tariff or its equivalent quota.
- If a country is a large exporter, the first-best policy is the optimal export tax or its equivalent VER.
- Domestic policies, used alone, are second-best policy options.

? Exercise 9.7.1

1. Consider the following imperfect market situation in the table below. From the following list of policy options, identify all types of trade policies *and* all types of domestic policies that could potentially raise national welfare in the presence of each imperfection. Consider only the partial equilibrium effects of each policy.

   Options: An import tariff, an import quota, a voluntary export restraint (VER), an export tax, an export subsidy, a production tax, a production subsidy, a consumption tax, and a consumption subsidy.

   Table 9.7.2: Welfare Improving Policies

	Trade Policy	Domestic Policy
A large country that imports steel		

2. Consider the domestic policy action listed along the top row of the table below. In the empty boxes, use the following notation to indicate the effect of the policy on the variables listed in the first column. Use a partial equilibrium model to determine the answers and assume that the shapes of the supply and demand curves are "normal." Assume that the policy does not begin with, or result in, prohibitive policies. Use the following notation:

+ the variable increases

– the variable decreases

0 the variable does not change

A the variable change is ambiguous (i.e., it may rise, it may fall)

Table 9.7.3: Effects of a Production Subsidy

	Production Subsidy by a Large Importing Country
Domestic Consumer Price	
Domestic Producer Price	
Domestic Consumer Welfare	
Domestic Producer Welfare	
Domestic Government Revenue	
Domestic National Welfare	
Foreign Price	
Foreign National Welfare	

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9.8: Public Goods and National Security 9.8: Public Goods and National SecurityEdit Update titlecancel

Learning Objectives

1. Learn that public goods, which have the features of being nonrival and nonexcludable in consumption, are a type of market imperfection.
2. Recognize that a trade policy can be used to correct for a public good imperfection.
3. Learn the first-best and second-best policy options to correct for a public good imperfection.

One of the oldest and most common arguments supporting protection is the "national security argument," also called the "national defense argument." This argument suggests that it is necessary to protect certain industries with a tariff to assure continued domestic production in the event of a war. Many products have been identified as being sufficiently important to warrant protection for this reason. Perhaps the most common industry identified is agriculture. Simply consider the problems that would arise if a nation did not have an adequate food supply when it was at war with the outside world. Low food stocks may induce severe hardships and even famine. A simple solution to avoid this potential problem is to maintain a sufficiently high tariff in order to keep cheap foreign goods out and, in turn, maintain production of the domestic goods.

Similar problems may arise in many other industries. Consider the potential problems for a country's national security if it could not produce an adequate amount of steel, aluminum, ships, tanks, planes, fuel, and so on in the event of a war. The number of products that could be added to this list is enormous. Indeed, at one time or another in most countries' histories, it has been argued that almost every product imaginable is important from a national security perspective and thus is deserving of protection. One of the most interesting arguments ever described is that made by the embroidery industry, which once argued for a protective tariff in the United States because embroidered patches on soldiers' uniforms are essential in maintaining the morale of the troops. Thus it was clear, to them at least, that the embroidery industry needed to be protected for national security reasons.

National Security and Public Goods

We can make better sense of the national security argument if we classify it in the context of the theory of the second best. In this case, we must note that the national security argument is actually incorporating a market imperfection into the story to justify the use of a protective tariff. The market imperfection here is a public good. National security is a public good and public goods are excluded from the standard assumptions of perfect competition. Thus, whenever a product has public good characteristics, we can say that a market imperfection is present. Traditionally, the literature in economics refers to concerns such as national security as noneconomic objectives. The effects that food production may have on the nation's sense of security, for example, were thought to fall outside the realm of traditional economic markets.

In general, public goods have the following two consumption characteristics: they are nonexcludable and they are nonrival. Nonexcludability means that once the product is produced, it is impossible to prevent people from consuming it. Nonrivalry means that many people can consume the produced product without diminishing its usefulness to others. Here are a few examples to explain the point. First, consider a nonpublic good: soda. A soda is excludable since the producer can put it into a can and require you to pay for it to enjoy its contents. A can of soda is also a rival good. That's because if you consume the can of soda, there is no way for anyone else to consume the *same* can. This implies that a can of soda is *not* a public good. On the other hand, consider oxygen in the atmosphere. (This is an odd example because oxygen in the air is not formally produced, but let's ignore that for a moment.) Atmospheric oxygen is nonexcludable because once it is there, everyone has free access to its use. It is impossible (or at least very difficult) to prevent some people from enjoying the benefits of the air. Atmospheric oxygen is also nonrival because when one person takes a breath, it does not diminish the usefulness of the atmosphere for others. Thus, if atmospheric oxygen did need to be formally produced, it would be a classic example of a pure public good.

The typical examples of public goods include national security, clean air, lighthouse services, and commercial-free television and radio broadcasts. National security is the public good we are most concerned with in international trade. It is a public good because, once provided, (1) it is difficult to exclude people within the country from the safety and security generated and (2) multiple individuals can enjoy the added safety and security without limiting that received by others.

We know from the theory of the second best that when market imperfections are present, government policies can be used to improve the national welfare. In most cases, trade policies can be used as well. It is well known in economic theory that when a

good has public good characteristics, and if private firms are free to supply this good in a free market, then the public good will *not* be adequately supplied. The main problem occurs because of free ridership. If a person believes that others may pay for a good and if its subsequent provision benefits all people—due to the two public good features—then that person may avoid paying for the good in a private marketplace. If many people don't pay, then the public good will be insufficiently provided relative to the true demands in the country. It is well known that government intervention can solve this problem. By collecting taxes from the public, and thus forcing everyone to pay some share of the cost, the public good can be provided at an adequate level. Thus national welfare can be increased with government provision of public goods.

A similar logic explains why a trade policy can be used to raise a country's welfare in the presence of a public good. It is worth pointing out, though, that the goods highlighted above, such as agricultural products and steel production, are not themselves public goods. The public good one wishes to provide in greater abundance is "national security." And it is through the production of certain types of goods locally that more security can be provided. For example, suppose it is decided that adequate national security is possible only if the nation can provide at least 90 percent of its annual food supplies during wartime. Suppose also that under free trade and laissez-faire domestic policies, the country produces only 50 percent of its annual food supply and imports the remaining 50 percent. Finally, suppose the government believes that it would be very difficult to raise domestic production rapidly in the event that imported products were ever cut off, as might occur during a war. In this case, a government may decide that its imports are too high and thus pose a threat to the country's national security.

A natural response in this instance is to put high tariffs in place to prevent imports from crowding out domestic production. Surely, a tariff exists that will reduce imports to 10 percent and subsequently cause domestic production to rise to 90 percent. We know from tariff analysis that in the case of a small country, a tariff will cause a net welfare loss for the nation in a perfectly competitive market. These same gains and losses and net welfare effects can be expected to prevail here. However, because of the presence of the public good characteristics of national security, there is more to the story. Although the tariff alone causes a net welfare loss for the economy, the effect is offset with a positive benefit to the nation in the form of greater security. If the added security adds more to national welfare than the economic losses caused by the tariff, then overall national welfare will rise. Thus protectionism can be beneficial for the country.

The national security argument for protection is perfectly valid and sound. It is perfectly logical under these conditions that protectionism can improve the nation's welfare. However, because of the theory of the second best, many economists remain opposed to the use of protectionism, even in these circumstances. The reason is that protectionism turns out to be a second-best policy option.

Recall that the first-best policy response to a market imperfection is a policy that is targeted as directly as possible at the imperfection itself. Thus, if the imperfection arises because of some production characteristic, a production subsidy or tax should be used. If the problem is in the labor market, a tax or subsidy in that market would be best, and if the market imperfection is associated with international trade, then a trade policy should be used.

In this case, one might argue that the problem is trade related, since one can say that national security is diminished because there are too many imports of, say, agricultural goods. Thus an import tariff should be used. However, this logic is wrong. The actual problem is maintaining an adequate food supply in a time of war. The problem is really a production problem because if imports were to be cut off in an emergency, the level of production would be too low. The most cost-effective way, in this situation, to maintain production at adequate levels will be a production subsidy. The production subsidy will raise domestic production of the good and can be set high enough to assure that an adequate quantity is produced each year. The subsidy will cost the government money and it will generate a net production efficiency loss. Nevertheless, the efficiency loss from a tariff, one that generates the same level of output as a production subsidy, will cause an even greater loss. This is because an import tariff generates both a production efficiency loss and a consumption efficiency loss. Thus, to achieve the same level of production of agricultural goods, a production subsidy will cost less overall than an import tariff. We say, then, that an import tariff is a second-best policy. The first-best policy option is a production subsidy.

Another Case in Which a Trade Policy Is First Best

There is one case in which a trade policy, used to protect or enhance national security, is the first-best policy option. Consider a country that produces goods that could be used by other countries to attack or harm the first country. An example would be nuclear materials. Some countries use nuclear power plants to produce electricity. Some of the products used in this production process, or the knowledge gained by operating a nuclear facility, could be used as an input in the production of more dangerous nuclear weapons. To prevent such materials from reaching countries, especially materials that may potentially threaten a country, export

bans are often put into place. The argument to justify an export ban is that preventing certain countries from obtaining materials that may be used for offensive military purposes is necessary to maintain adequate national security.

In the United States, export bans are in place to prevent the proliferation of a variety of products. Many other products require a license from the government to export the product to certain countries. This allows the government to monitor what is being exported to whom and gives them the prerogative to deny a license if it is deemed to be a national security threat. In the United States, licenses are required for goods in short supply domestically; goods related to nuclear proliferation, missile technology, and chemical and biological weapons; and other goods that might affect regional stability, crime, or terrorist activities. In addition, the United States maintains a Special Designated Nationals list, which contains names of organizations to which sales of products are restricted, and a Denied Persons list, which contains names of individuals with whom business is prohibited. In recent years the United States has maintained export bans to several countries, including Cuba, Iran, Syria, and Sudan.

In this case, the export control policy is the first-best policy to enhance national security. This is because the fundamental problem is certain domestic goods getting into the hands of certain foreign nations, groups, or individuals. The problem is a *trade problem* best corrected with a *trade policy*. Indeed, there is no effective way to control these sales, and thus to enhance national security, using a purely domestic policy.

Key Takeaways

- The preservation of national security is a common justification for the use of protection.
- The preservation of national security is a type of noneconomic objective.
- Protection can help maintain an adequate domestic supply of materials critical in the event of war, including food, steel, military equipment, and petroleum.
- Export bans can be used to prevent the proliferation of materials that may eventually prove to be threatening to a nation's security.
- Import tariffs can raise national welfare when increased production of the protected product enhances national security.
- Because national security is a public good and also an imperfection, trade protection can sometimes be beneficial for a country.
- A production subsidy can achieve the same level of production at a lower cost.
- A production subsidy is the first-best policy when increased production of a good enhances national security.
- An import tariff is a second-best policy option.
- An export ban can raise a nation's welfare when the export of a product reduces national security.
- The export ban, a trade policy, is the first-best policy option when export of a product reduces national security.

? Exercise 9.8.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The term used to describe policy intentions that are not economic in nature.
   b. This is a common justification for import protection of food, steel, shipping, and many other things thought necessary under certain circumstances.
   c. This policy is first best if a product in the hands of foreigners could threaten one's national security.
   d. Of *a production subsidy* or *an import tariff*, this policy is likely to be first best to protect a nation's agricultural production.
   e. The term describing a "good" like national security that is both nonexcludable and nonrival in consumption.

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9.9: Trade and the Environment 9.9: Trade and the EnvironmentEdit Update titlecancel

Learning Objectives

1. Learn that environmental externalities are a type of market imperfection.
2. Recognize that a trade policy can be used to correct for an environmental imperfection.
3. Learn the first-best and second-best policy options to correct for an environmental imperfection.

One contentious issue in international trade policy discussions concerns the connection between international trade and the environment. Many environmental groups claim that freer trade, as implemented through the World Trade Organization (WTO) agreements or in free trade agreements such as the North American Free Trade Agreement (NAFTA), results in negative environmental outcomes. For example, the Sierra Club argues, “Economic globalization ties the world together as never before. But it also poses serious new threats to our health and the environment. Trade agreements promote international commerce by limiting governments’ ability to act in the public interest. Already food safety, wildlife and pollution control laws have been challenged and weakened under trade rules as illegal ‘barriers to trade.’”Sierra Club, “A Fair Trade Bill of Rights,” Responsible Trade, www.sierraclub.org/trade/ftaa/rights.asp.

In contrast, the WTO, a frequent target for criticism by environmental groups, points to the WTO agreement, which states, “[WTO member] relations in the field of trade and economic endeavor should be conducted with a view to raising standards of living… while allowing for the optimal use of the world’s resources in accordance with the objective of sustainable development, seeking both to protect and preserve the environment and to enhance the means for doing so in a manner consistent with their respective needs and concerns at different levels of economic development.”World Trade Organization, “Environment Issues: Sustainable development,” http://www.wto.org/english/tratop_e/envir_e/sust_dev_e.htm.

Arguably, the stated goals of free trade–oriented groups and environmental groups are very similar, at least as highlighted in the documents produced by both sides. What differ are the methods used to achieve the objectives. For reasons to be elucidated below, the WTO has argued that environmental concerns are not directly within the purview of the WTO agreement, but despite that, environmental policies and international environmental agreements are neither prohibited by nor inconsistent with the WTO accords. In essence, the argument by some has been that the WTO agreement, and free trade agreements more generally, is intended to be about trade and is not intended to solve tangential problems related to the environment. On the other hand, environmental groups have pointed out that sometimes WTO and free trade agreement decisions have a negative effect on environmental outcomes, and thus these agreements should be revised to account for these negative effects.

Below we will consider these issues with respect to one type of environmental concern: pollution caused by consumption of an imported good. Although we will not consider many of the other contested environmental and trade issues, this one example will suffice to establish some important and generalizable conclusions.

Trade Liberalization with Environmental Pollution

Consider a small country importing gasoline with a tariff in place initially such that the domestic tariff-inclusive price is P_1. At this price, domestic supply is S_1, domestic demand (or consumption) is D_1, and the level of imports is $(D_1 - S_1)$, shown in Figure 9.9.1.

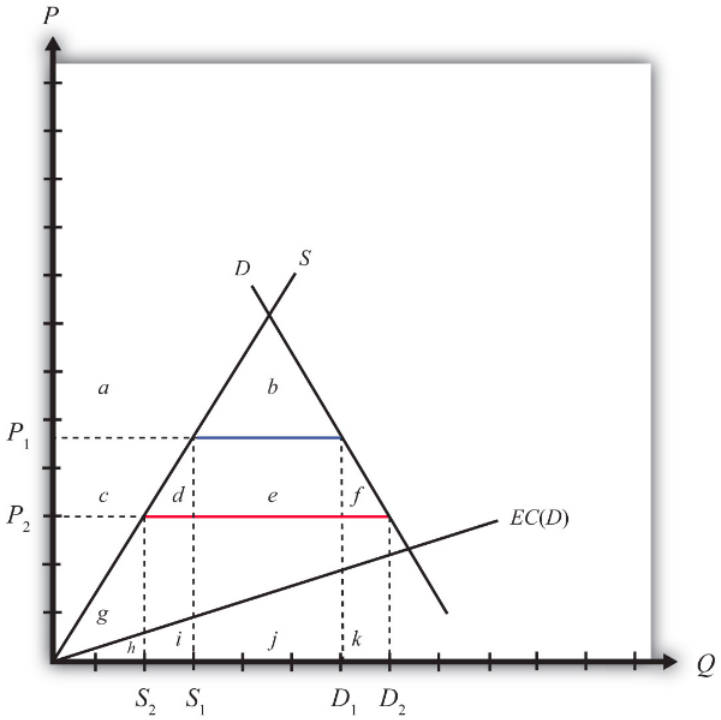


Figure 9.9.1: Trade and Environmental Costs

Suppose that domestic consumption of gasoline causes air pollution. This means that consumption has a negative external effect on all users of air—that is, there is a negative consumption externality.

Let's assume that the cost to society (in dollar terms) of the air pollution is an increasing function of domestic consumption. In other words, the greater the consumption of gasoline, the greater is the pollution, and the greater is the subsequent harm caused to people in the country. For simplicity, assume the environmental cost, $EC(D)$, is a linear function of total domestic demand, D. The height of EC at any level of demand represents the additional dollar cost of an additional gallon of gasoline consumption. This implies the total environmental cost of a consumption level—say, D_2—is the area under the EC curve between the origin and D_2.

With the initial tariff in place, domestic demand is D_1, which implies that the total societal cost of pollution is given by the area ($h + i + j$). Note that despite the cost of pollution, it does make sense to produce and consume this good if the objective is national welfare. Consumer surplus is given by the area ($a + b$) and producer surplus is ($c + g$). The sum of these two clearly exceeds the social cost of pollution, ($h + i + j$). (Note that these statements are true for Figure 9.9.1 in particular; they are not true in general. By drawing the EC curve very steeply, corresponding to a much higher cost of pollution, it might not make sense to produce and consume the good in the market equilibrium.)

Next, suppose that the country agrees to remove the tariff on imported gasoline after signing a trade liberalization agreement. The question we ask is, Can trade liberalization have such a negative effect on the environment that it makes a country worse off? The answer, as we'll see, is yes.

Suppose the tariff is removed and the price of gasoline falls to P_2. The lower price causes a reduction in production to S_2, an increase in consumption to D_2, and an increase in imports from the blue line segment ($D_1 - S_1$) to the red line segment ($D_2 - S_2$). Since domestic consumption of gasoline rises, there is also an increase in pollution.

The welfare effects of the tariff elimination are summarized in Table 9.9.1. The letters refer to the area in Figure 9.9.1.

Table 9.9.1: Welfare Effects of a Tariff Elimination with a Negative Environmental Consumption Externality

	Importing Country
Consumer Surplus	+ (*c* + *d* + *e* + *f*)
Producer Surplus	− *c*
Govt. Revenue	− *e*

	Importing Country
Pollution Effect	$-k$
National Welfare	$(d+f)-k$

Consumers of gasoline benefit by the areas ($c+d+e+f$) from the lower free trade price. Domestic producers lose (c) with a reduction in producer surplus. The government also loses tariff revenue (\)e\)). The net total efficiency gains from trade are given by the areas ($d+f$). However, the presence of the environmental consumption externality means there is an additional cost (k) caused by the pollution from higher domestic consumption of gasoline.

The national welfare effect of the tariff elimination is given by ($d+f-k$). For a particular level of efficiency gains, the total national effect will depend on the size of the pollution cost. In the graph, the curves are drawn such that area k is slightly larger than $d+f$. Thus trade liberalization can cause a reduction in national welfare. The cost of additional pollution may be greater than the efficiency improvements from free trade. However, if the environmental cost of consumption were lower, the $EC(D)$ line would be flatter and area k would become smaller. Thus for lower environmental costs, trade liberalization might raise national welfare. The net effect, positive or negative, will depend on the magnitude of the pollution costs relative to the efficiency benefits.

Trade Policy versus Domestic Policy

In general, the theory of the second best suggests that, in the presence of a market imperfection or distortion, a properly chosen trade policy might be found that will raise a small country's national welfare. However, for most imperfections, a trade policy will be a second-best policy. A better policy, a first-best policy, will always be that policy that attacks the imperfection or distortion most directly. In most instances, the first-best policy will be a domestic policy rather than a trade policy.

In this case, environmental pollution caused by the consumption of gasoline is a market imperfection because gasoline consumption has a negative external effect (via pollution) on others within the society. Economists call this a negative consumption externality. This problem can be corrected with any policy that reduces the negative effect at a cost that is less than the benefit. A tariff on imports is one such policy that could work. However, the most direct policy option, hence the first-best policy choice, is a consumption tax. Below we'll show the welfare effects of a tariff and a domestic consumption tax and compare the results to demonstrate why a consumption tax is first best while a tariff is second best.

Welfare Effects of a Tariff with Environmental Pollution

First, let's consider the effects of a tariff when consumption of the import good causes pollution. Consider a small country importing gasoline at the free trade price given by P_2 in Figure 9.9.2. (Note that this is Figure 9.9.1 redrawn.) Demand is given by D_2, supply by S_2, and imports are (D_2-S_2) (the red line). Suppose that domestic consumption of gasoline causes air pollution. Assume the environmental cost of pollution in dollar terms, $EC(D)$, is a linear function of total domestic demand, D.

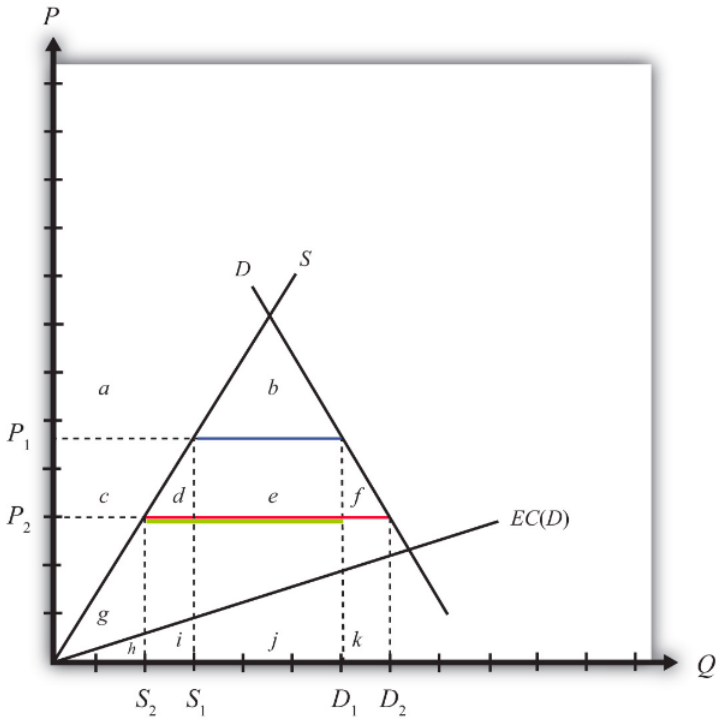


Figure 9.9.2: Tariff Effects and Environmental Costs

Next, suppose a specific tariff, $t = P_1 - P_2$, is imposed, thereby raising the domestic price to P_1. Domestic demand for gasoline falls to D_1, supply rises to S_1, and imports fall to $(D_1 - S_1)$ (the blue line). The welfare effects of the tariff are presented in Table 9.9.2. The letters refer to the areas in Figure 9.9.2.

Table 9.9.2: Welfare Effects of a Tariff with a Negative Environmental Consumption Externality

	Importing Country
Consumer Surplus	− (*c* + *d* + *e* + *f*)
Producer Surplus	+ *c*
Govt. Revenue	+ *e*
Pollution Effect	+ *k*
National Welfare	*k* − (*d* + *f*)

Consumers of gasoline lose surplus $(c + d + e + f)$ from the higher domestic price. Domestic producers gain $(+c)$ with an increase in producer surplus. The government also collects tariff revenue $(+e)$. The net total efficiency losses from trade are given by the areas $(d + f)$. However, the presence of the environmental consumption externality means there is an additional benefit caused by the reduced pollution. This benefit is represented by the area k.

The net national welfare effect of the tariff is given by $(k - d - f)$. Since the curves are drawn such that area k is slightly larger than $d + f$, a tariff results in an improvement in national welfare in this example. More generally, we can only say that a tariff may result in an increase in national welfare since it will depend on the shapes of the curves and the size of the tariff.

Welfare Effects of a Consumption Tax with Environmental Pollution

Next, suppose that a consumption tax, $t = P_1 - P_2$, is imposed instead of a tariff. Refer to Figure 9.9.2. The tax will raise the consumer's price to P_1 but will leave the producer's price at P_2. Domestic producers will not be affected by the consumption tax since continued competition in free trade with firms in the rest of the world will maintain their profit-maximizing price at the world price of P_2. The price changes will cause domestic demand for gasoline to fall to D_1, but supply will remain at S_2. Imports will fall

to ($D_1 - S_2$) (the yellow line). The welfare effects of the consumption tax are presented in Table 9.9.3. The letters refer to the area in Figure 9.9.2.

Table 9.9.1: Welfare Effects of a Domestic Consumption Tax with a Negative Environmental Consumption Externality

	Importing Country
Consumer Surplus	− (*c* + *d* + *e* + *f*)
Producer Surplus	0
Govt. Revenue	+ *c* + *d* + *e*
Pollution Effect	+ *k*
National Welfare	*k* − *f*

Consumers of gasoline lose from the higher price by the area ($c + d + e + f$). Domestic producers are unaffected because their price does not change. The government also collects tax revenue, given by ($c + d + e$), which is the product of the consumption tax ($t = P_1 - P_2$) and the level of consumption (D_1). The net total efficiency losses from trade are given by the area (f). However, the presence of the environmental consumption externality means there is an additional benefit caused by the reduced pollution. This benefit is represented by the area k.

The net national welfare effect of the tariff is given by the summation of all effects, ($k - f$). Since the curves are drawn such that the area k is larger than f, a consumption tax results in an improvement in national welfare in this example. More generally, we can only say that a consumption tax may result in an increase in national welfare since it will depend on the shapes of the curves and the size of the tax.

A Comparison: Trade Policy versus Domestic Policy

More interesting is the comparison between the welfare effects of a tariff and those of a consumption tax. Since the two policies are set at identical levels, it is easy to compare the effects. The distributional effects—that is, who wins and who loses—are slightly different in the two cases. First, the effects on consumers are the same since both policies raise the price to the same level. However, domestic producers suffer a loss in producer surplus with a tariff, whereas they are unaffected by the consumption tax. To some, this may look like a bad effect since domestic production of the polluting good is not reduced with the consumption tax. However, it is the net effect that matters. Next, the government collects more revenue with the domestic tax than with the tariff since both taxes are set at the same rate and consumption is greater than imports. Finally, the environmental effect is the same for both since consumption is reduced to the same level.

The net welfare effect of the consumption tax ($NW^C = k - f$) clearly must exceed the net welfare effect of a tariff ($NW^T = k - d - f$)—that is, $NW^C > NW^T$. The reason is that the tariff incurs two separate costs on society to receive the environmental benefit, whereas the consumption tax incurs only one cost for the same benefit. Specifically, the tariff causes a loss in both consumption and production efficiency (d and f), while the consumption tax only causes a consumption efficiency loss (f). For this reason, we say it is more efficient (i.e., less costly) to use a domestic consumption tax to correct for a negative consumption externality such as pollution than to use a trade policy, *even though* the trade policy may improve national welfare.

A Source of Controversy

For many environmental advocates, trade liberalization, or globalization more generally, clearly has the potential to cause environmental damage to many ecosystems. Concerns include pollution from industrial production, pollution from consumption, clear-cutting of tropical forests, extinction of plant and animal species, and global warming, among others. Although only one type of environmental problem is addressed above, the principles of the theory of the second best will generally apply to all these concerns.

The analysis above accepts the possibility that consumption causes pollution and that pollution is bad for society. The model shows that under these assumptions, a trade policy can potentially be used to improve environmental outcomes and can even be in society's overall interest. However, a trade policy is not the most efficient means to achieve the end. Instead, resources will be better allocated if a domestic policy, such as a consumption tax, is used instead. Since the domestic policy attacks the distortion most directly, it minimizes the economic cost. For this reason, a properly chosen consumption tax will always do better than any tariff.

With respect to other types of environmental problems, a similar conclusion can be reached. The best way to correct for most pollution and other environmental problems will be to use a domestic policy intervention such as a production tax, consumption tax, factor-use tax, or another type of domestic regulation. Trade policies, although potentially beneficial, are not the most efficient policy instruments to use.

It is worth emphasizing that the goal of most economic analysis should in many instances be aligned with the goal of environmentalists. It is the extraction and use of natural resources that contributes to environmental damage. At the same time, it is the extraction and use of natural resources that is necessary to produce the goods and services needed to raise human standards of living to acceptable levels. Thus, if we minimize the use of resources to produce a particular level of output, we can achieve both the economist's goal of maximizing efficiency and the environmentalist's goal of minimizing damage to the environment.

Understanding the WTO's Position on Trade and the Environment

In October 1999, the WTO Committee on Trade and Environment, a committee set up during the Uruguay Round to consider the linkages between these two concerns, issued its Trade and Environment report. The report argued that "there is no basis for the sweeping generalizations that are often heard in the public debate, arguing that trade is either good for the environment, or bad for the environment. The real world linkages are a little bit of both."World Trade Organization, "Trade liberalization reinforces the need for environmental cooperation," press release, October 8, 1999, http://www.wto.org/english/news_e/pres99_e/pr140_e.htm.

Some of the main findings of the report are listed here with a brief explanation of how these statements relate to the theory of the second best.

Most environmental problems result from polluting production processes, certain kinds of consumption, and the disposal of waste products—trade as such is rarely the root cause of environmental degradation, except for the pollution associated with transportation of goods.World Trade Organization, "Trade liberalization reinforces the need for environmental cooperation," press release, October 8, 1999, http://www.wto.org/english/news_e/pres99_e/pr140_e.htm.

This statement relates to the theory of the second best by highlighting that the root cause of most environmental problems is the production, consumption, and disposal processes rather than trade. The one exception is pollution caused by ships, trucks, trains, and planes transporting goods across borders, but this is a relatively minor source of global pollution. Recall that first-best solutions are those that attack the root cause of a problem most directly.

Environmental degradation occurs because producers and consumers are not always required to pay for the costs of their actions.World Trade Organization, "Trade liberalization reinforces the need for environmental cooperation," press release, October 8, 1999, http://www.wto.org/english/news_e/pres99_e/pr140_e.htm.

This statement means that environmental problems are a negative externality in either production or consumption. If producers and consumers had to pay for the environmental effects of their actions, that would mean there is a market for pollution. In a market, the costs and benefits are internalized in the decision-making process. However, in the absence of a market, producer and consumer effects occur "external" to the market, hence the term "externality."

However, this statement exaggerates one thing if it suggests that environmental degradation would not occur if consumers and producers were required to pay for their actions. In actuality, if a market for pollution existed, producers and consumers would continue to pollute up to the level where the costs of additional pollution exceeded the benefits. This undoubtedly would occur at some positive level of pollution and environmental degradation. As demonstrated in every environmental economics course, the socially optimal level of pollution is not zero.

Environmental degradation is sometimes accentuated by policy failures, including subsidies to polluting and resource-degrading activities—such as subsidies to agriculture, fishing and energy.World Trade Organization, "Trade liberalization reinforces the need for environmental cooperation," press release, October 8, 1999, http://www.wto.org/english/news_e/pres99_e/pr140_e.htm.

This statement points out that many environmental problems are made worse by government interventions designed to serve some other purpose. For example, subsidies to agricultural production, designed to support the income of farmers, can have the unintended effect of encouraging the greater use of pesticides and fertilizers, thus causing a negative environmental effect. Again, this suggests that the source of environmental problems is typically not international trade.

Trade would unambiguously raise welfare if proper environmental policies were in place.World Trade Organization, "Trade liberalization reinforces the need for environmental cooperation," press release, October 8, 1999, http://www.wto.org/english/news_e/pres99_e/pr140_e.htm.

Here, “proper environmental policies” means first-best domestic policies targeted at the environmental market failures and the elimination of other domestic policies with the unintended environmental consequences mentioned above. If these domestic policies were in place, then free trade would unambiguously be the first-best trade policy.

Trade barriers generally make for poor environmental policy.World Trade Organization, “Trade liberalization reinforces the need for environmental cooperation,” press release, October 8, 1999, http://www.wto.org/english/news_e/pres99_e/pr140_e.htm.

Why? Because of the theory of the second best. It is generally better to correct environmental externality problems using first-best domestic taxes, subsidies, or regulations than to use second-best trade policies. Thus, although trade policies *can* have favorable environmental effects, governments can achieve the same results more efficiently—that is, at a lower resource cost—by using domestic policies instead.

This is one of the strongest arguments for excluding an explicit link between environment and trade in the WTO accords and more generally in free trade area agreements. Linking the two together in a trade agreement will surely lead to the avoidance of trade liberalization in some sectors in order to secure a favorable environmental outcome, and this will mean using trade barriers as a tool for environmental policy.

So what can or should be done? First, it is important to recognize that the WTO agreement does not prohibit countries from setting their own environmental standards. What the WTO accord does require is that countries apply most-favored nation (MFN) and national treatment in their application of environmental laws. For example, the WTO agreement does not allow a country to set one environmental standard with respect to goods imported from Argentina and another for goods from Mexico. This would violate MFN. Also, the WTO agreement would not allow a country to treat imported goods differently from goods produced at home. This would violate national treatment.

In fact, most of the WTO dispute settlement rulings (if not all) identified by environmental groups as forcing countries to change (and make more lenient) their environmental laws were not decisions to force a particular environmental standard on countries. Instead, they were decisions to enforce MFN or national treatment. Countries could have complied with any of these rulings by strengthening environmental regulations just as long as they did not discriminate internationally in their application.

Lastly, countries are not prohibited by the WTO agreement from negotiating and implementing international environmental agreements. A prime example is the Kyoto Protocol. This agreement would require signatory countries to reduce their domestic carbon emissions to agreed-on levels within a specified period of time in order to mitigate an important source of global warming. The mechanism used to reduce emissions in this case would be purely domestic policies implemented simultaneously by all signatory countries. As such, this would more likely be a first-best method to correct for global warming and would dominate any type of trade policy to solve the same problem.

One Final Issue: Measurement Problems

In the previous analysis, we assumed the environmental costs of consumption are measurable in dollar terms. However, obtaining these costs is not a simple exercise since there is no market in which pollution is traded. It may be relatively easy to measure the average amount of pollutants (carbon dioxide, sulfur, etc.) caused by each gallon of gasoline consumed, but translating that into a dollar equivalent is not a simple task. Ideally, we would want to know how much people would be willing to pay to prevent the pollution caused by each gallon of consumed gasoline. Environmental economists have tried to measure these types of costs using “contingent valuation” techniques. However, these methods are still in their infancy in terms of providing an accurate and believable measure of environmental cost.

Without good information concerning environmental costs, it becomes almost impossible to set policies appropriately. Although welfare-improving tariffs and domestic policies can raise national welfare, they must be set at correct levels to achieve a welfare-enhancing effect. To obtain the optimal levels requires accurate information about both the economic costs and the benefits of price changes and the environmental effects as well. Without good information, it becomes more likely policies will not achieve the intended effect.

An alternative method to measure costs is for the government to require permits that allow one to pollute. If these permits were tradable, the market price of a permit would provide a reasonable estimate of the pollution cost to society. In essence, this creates a market for pollution. These programs have been applied to control industrial pollutants but have not been used in consumer markets. In addition, to most noneconomists, providing permits that allow pollution seems anathema. However, because these programs attempt to correct for problems related to the measurement of environmental costs, they may be even more efficient even than using domestic taxes.

In the end, we must recognize that our theoretical analysis can only suggest the possibility that trade liberalization will make a country worse off due to increases in pollution. The model shows that this is logically possible. However, the model also shows it is logically possible for trade liberalization to raise national welfare despite increases in pollution. It then becomes an empirical question of what the effect of trade liberalization will be. For this reason, many environmental groups, such as Sierra Club, have proposed that an environmental impact statement (EIS) be prepared for every trade agreement. An EIS would assess the environmental costs of the agreement and thereby make environmental concerns a criterion in the decision process. Presumably, these studies could prevent environmentally unfriendly trade agreements from being ratified.

Many proponents of freer trade have objected to this proposal. Jagdish Bhagwati, for one, in his book *In Defense of Globalization*, suggests that the ability to measure the environmental costs may be as difficult as, or perhaps more difficult than, measuring the economic effects of a trade agreement.

Key Takeaways

- Environmental problems generally correspond to negative production or consumption externalities. Thus these issues represent market imperfections.
- This section presents a model in which domestic consumption of an import good causes environmental pollution (e.g., gasoline consumption). This is the case of a negative consumption externality.
- The model is used to show that trade liberalization may cause a reduction in national welfare if the additional pollution caused by increased consumption is greater than the efficiency benefits that arise from freer trade. Thus concerns that trade liberalization may cause environmental damage are consistent with economic theory.
- However, the theory of the second best suggests that when market imperfections exist, trade policy corrections may be second-best, not first-best, policy choices.
- Both an import tariff and a domestic consumption tax will reduce domestic consumption of the import good and lead to a reduction in pollution. However, the domestic consumption tax achieves the result at a lower economic cost than the import tariff. Thus we say that the domestic consumption tax is a first-best policy, while the import tariff is a second-best policy.
- The previous result corresponds to the general theory of the second best, which says that the first-best policy will be the policy that targets a distortion or imperfection most directly. In most cases, a domestic policy will be better than a trade policy. In this example, a domestic consumption tax is clearly superior to a trade policy.

? Exercise 9.9.1

1. Consider a perfectly competitive market for steel in a small exporting country. Suppose that steel production causes local air and water pollution. Assume that the larger is steel output and the higher is the social cost of pollution; thus, steel production creates a negative externality.
   a. Explain what type of trade tax or subsidy policy could be used to reduce the negative effects of pollution. Demonstrate the welfare effects using a partial equilibrium diagram. Assume that your policy reduces social costs by R dollars. Under what condition would the policy raise national welfare?
   b. Explain what type of purely domestic policy could be used to reduce the pollution. Use a partial equilibrium diagram to demonstrate the welfare effects of this policy. Again assume that your policy reduces social costs by R dollars.
   c. Explain why the purely domestic policy may be superior to the trade policy.

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9.10: Economic Integration- Free Trade Areas, Trade Creation, and Trade Diversion
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Learning Objectives

1. Distinguish the different types of economic integration.
2. Learn the effects of trade creation and trade diversion.
3. Understand how free trade area formation can make a country worse off in terms of the theory of the second best.

For a variety of reasons, it often makes sense for nations to coordinate their economic policies. Coordination can generate benefits that are not possible otherwise. A clear example of this is shown in the discussion of trade wars among large countries in Chapter 7: Trade Policy Effects with Perfectly Competitive Markets, Section 7.9: Retaliation and Trade Wars. There it is shown that if countries cooperate and set zero tariffs against each other, then both countries are likely to benefit relative to the case when both countries attempt to secure short-term advantages by setting optimal tariffs. This is just one advantage of cooperation. Benefits may also accrue to countries that liberalize labor and capital movements across borders, that coordinate fiscal policies and resource allocation toward agriculture and other sectors, and that coordinate their monetary policies.

Any type of arrangement in which countries agree to coordinate their trade, fiscal, or monetary policies is referred to as **economic integration**. There are many different degrees of integration.

Preferential Trade Agreement

A preferential trade agreement (PTA) is perhaps the weakest form of economic integration. In a PTA, countries would offer tariff reductions, though perhaps not eliminations, to a set of partner countries in some product categories. Higher tariffs, perhaps nondiscriminatory tariffs, would remain in all other product categories. This type of trade agreement is not allowed among World Trade Organization (WTO) members, who are obligated to grant most-favored nation (MFN) status to all other WTO members. Under the MFN rule, countries agree not to discriminate against other WTO member countries. Thus, if a country's low tariff on bicycle imports, for example, is 5 percent, then it must charge 5 percent on imports from all other WTO members. Discrimination or preferential treatment for some countries is not allowed. The country is free to charge a higher tariff on imports from non-WTO members, however. In 1998, the United States proposed legislation to eliminate tariffs on imports from the nations in sub-Saharan Africa. This action represents a unilateral preferential trade agreement since tariffs would be reduced in one direction but not the other. (Note that a PTA is also used more generally to describe all types of economic integration since they all incorporate some degree of "preferred" treatment.)

Free Trade Area

A **free trade area (FTA)** occurs when a group of countries agrees to eliminate tariffs among themselves but maintain their own external tariff on imports from the rest of the world. The North American Free Trade Agreement (NAFTA) is an example of an FTA. When NAFTA is fully implemented, tariffs of automobile imports between the United States and Mexico will be zero. However, Mexico may continue to set a different tariff than the United States on automobile imports from non-NAFTA countries. Because of the different external tariffs, FTAs generally develop elaborate "rules of origin." These rules are designed to prevent goods from being imported into the FTA member country with the lowest tariff and then transshipped to the country with higher tariffs. Of the thousands of pages of text that make up NAFTA, most of them describe rules of origin.

Customs Union

A customs union occurs when a group of countries agrees to eliminate tariffs among themselves and set a common external tariff on imports from the rest of the world. The European Union (EU) represents such an arrangement. A customs union avoids the problem of developing complicated rules of origin but introduces the problem of policy coordination. With a customs union, all member countries must be able to agree on tariff rates across many different import industries.

Common Market

A common market establishes free trade in goods and services, sets common external tariffs among members, and also allows for the free mobility of capital and labor across countries. The EU was established as a common market by the Treaty of Rome in

1957, although it took a long time for the transition to take place. Today, EU citizens have a common passport, can work in any EU member country, and can invest throughout the union without restriction.

Economic Union

An economic union typically will maintain free trade in goods and services, set common external tariffs among members, allow the free mobility of capital and labor, and also relegate some fiscal spending responsibilities to a supranational agency. The EU's Common Agriculture Policy (CAP) is an example of a type of fiscal coordination indicative of an economic union.

Monetary Union

A monetary union establishes a common currency among a group of countries. This involves the formation of a central monetary authority that will determine monetary policy for the entire group. The Maastricht treaty, signed by EU members in 1992, proposed the implementation of a single European currency (the Euro) by 1999.

Perhaps the best example of an economic and monetary union is the United States. Each U.S. state has its own government that sets policies and laws for its own residents. However, each state cedes control, to some extent, over foreign policy, agricultural policy, welfare policy, and monetary policy to the federal government. Goods, services, labor, and capital can all move freely, without restrictions among the U.S. states, and the nation sets a common external trade policy.

Multilateralism versus Regionalism

In the post–World War II period, many nations pursued the objective of trade liberalization. One device used to achieve this was the General Agreement on Tariffs and Trade (GATT) and its successor, the WTO. Although the GATT began with less than 50 member countries, the WTO now claims 153 members as of 2010. Since GATT and WTO agreements commit all member nations to reduce trade barriers simultaneously, the agreements are sometimes referred to as a *multilateral* approach to trade liberalization.

An alternative method used by many countries to achieve trade liberalization includes the formation of preferential trade arrangements, free trade areas, customs unions, and common markets. Since many of these agreements involve geographically contiguous countries, these methods are sometimes referred to as a *regional* approach to trade liberalization.

The key question of interest concerning the formation of preferential trade arrangements is whether these arrangements are a good thing. If so, under what conditions? If not, why not?

One reason supporters of free trade may support regional trade arrangements is because they are seen to represent movements toward free trade. Indeed, Section 24 of the original GATT allows signatory countries to form free trade agreements and customs unions despite the fact that preferential agreements violate the principle of nondiscrimination. When a free trade area or customs union is formed between two or more WTO member countries, they agree to lower their tariffs to zero between each other but will maintain their tariffs against other WTO countries. Thus the free trade area is a discriminatory policy. Presumably, the reason these agreements are tolerated within the WTO is because they represent significant commitments to free trade, which is another fundamental goal of the WTO.

However, there is also some concern among economists that regional trade agreements may make it more difficult, rather than easier, to achieve the ultimate objective of global free trade.

The fear is that although regional trade agreements will liberalize trade among their member countries, the arrangements may also increase incentives to raise protectionist trade barriers against countries outside the area. The logic here is that the larger the regional trade area relative to the size of the world market, the larger will be that region's market power in trade. The more market power, the higher would be the region's optimal tariffs and export taxes. Thus the regional approach to trade liberalization could lead to the formation of large "trade blocs" that trade freely among members but choke off trade with the rest of the world. For this reason, some economists have argued that the multilateral approach to trade liberalization, represented by the trade liberalization agreements in successive WTO rounds, is more likely to achieve global free trade than the regional or preferential approach.

Much has been written on this subject recently. Here we have merely scratched the surface.

In what follows, we present the economic argument regarding trade diversion and trade creation. These concepts are used to distinguish between the effects of free trade area or customs union formation that may be beneficial and those that are detrimental. As mentioned, preferential trade arrangements are often supported because they represent a movement in the direction of free trade. If free trade is economically the most efficient policy, it would seem to follow that any movement toward free trade should be beneficial in terms of economic efficiency. It turns out that this conclusion is wrong. Even if free trade is most efficient, it is not

true that a step in that direction necessarily raises economic efficiency. Whether a preferential trade arrangement raises a country's welfare and raises economic efficiency depends on the extent to which the arrangement causes trade diversion versus trade creation.

Trade Creation and Trade Diversion

In this section, we present an analysis of trade diversion and trade creation. The analysis uses a partial equilibrium framework, which means that we consider the effects of preferential trade liberalization with respect to a representative industry. Later in the section we consider how the results from the representative industry cases can be extended to consider trade liberalization that covers all trade sectors.

We assume in each case that there are three countries in the world: Countries A, B, and C. Each country has supply and demand for a homogeneous good in the representative industry. Countries A and B will form a free trade area. (Note that trade diversion and creation can occur regardless of whether a preferential trade agreement, a free trade area, or a customs union is formed. For convenience, we'll refer to the arrangement as a free trade area [FTA].) The attention in this analysis will be on Country A, one of the two FTA members. We'll assume that Country A is a small country in international markets, which means that it takes international prices as given. Countries B and C are assumed to be large countries (or regions). Thus Country A can export or import as much of a product as desired with Countries B and C at whatever price prevails in those markets.

We assume that if Country A were trading freely with either B or C, it would wish to import the product in question. However, Country A initially is assumed *not* to be trading freely. Instead, the country will have an MFN-specific tariff (i.e., the same tariff against both countries) applied on imports from both Countries B and C.

In each case below, we will first describe an initial tariff-ridden equilibrium. Then, we will calculate the price and welfare effects that would occur in this market if Countries A and B form an FTA. When the FTA is formed, Country A maintains the same tariff against Country C, the non-FTA country.

Trade Diversion

In general, a **trade diversion** means that a free trade area diverts trade away from a more-efficient supplier outside the FTA and toward a less-efficient supplier within the FTA. In some cases, trade diversion will reduce a country's national welfare, but in some cases national welfare could improve despite the trade diversion. We present both cases below.

Figure 9.10.1 depicts the case in which trade diversion is harmful to a country that joins an FTA. The graph shows the supply and demand curves for Country A. P_B and P_C represent the free trade supply prices of the good from Countries B and C, respectively. Note that Country C is assumed to be capable of supplying the product at a lower price than Country B. (Note that in order for this to be possible, Country B must have tariffs or other trade restrictions on imports from Country C, or else all of B's market would be supplied by C.)

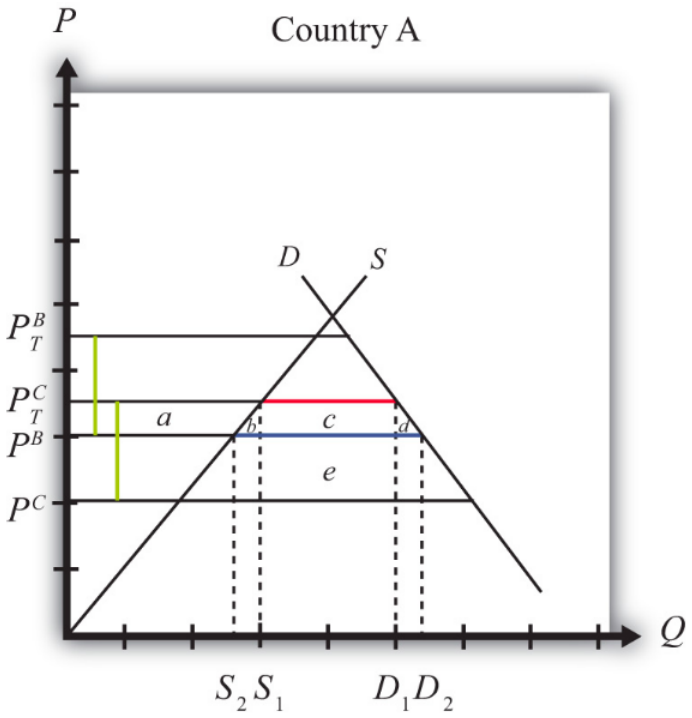


Figure 9.10.1: Harmful Trade Diversion

We assume that A has a specific tariff $t^B = t^C = t^*$ set on imports from both Countries B and C. The tariff raises the domestic supply prices to P_T^B and P_T^C, respectively. The size of the tariff is denoted by the green dotted lines in Figure 9.10.1, which show that $t^* = P_T^B - P^B = P_T^C - P^C$.

Since, with the tariff, the product is cheaper from Country C, Country A will import the product from Country C and will not trade initially with Country B. Imports are given by the red line, or by the distance $D_1 - S_1$. Initial tariff revenue is given by the area ($c + e$), the tariff rate multiplied by the quantity imported.

Next, assume Countries A and B form an FTA and A eliminates the tariff on imports from Country B. Now, $t^B = 0$, but t^C remains at t^*. The domestic prices on goods from Countries B and C are now P^B and P_T^C, respectively. Since $P^B < P_T^C$, Country A would import all the product from Country B after the FTA and would import nothing from Country C. At the lower domestic price, P^B, imports would rise to $D_2 - S_2$, denoted by the blue line. Also, since the nondistorted (i.e., free trade) price in Country C is less than the price in Country B, trade is said to be diverted from a more-efficient supplier to a less-efficient supplier.

The welfare effects are summarized in Table 9.10.1.

Table 9.10.1: Welfare Effects of Free Trade Area Formation- Trade Diversion Cases

	Country A
Consumer Surplus	+ (*a* + *b* + *c* + *d*)
Producer Surplus	− *a*
Govt. Revenue	− (*c* + *e*)
National Welfare	+ (*b* + *d*) − *e*

Free trade area effects on Country A's consumers. Consumers of the product in the importing country benefit from the free trade area. The reduction in the domestic price of both the imported goods and the domestic substitutes raises consumer surplus in the market. Refer to Table 9.10.1 and Figure 9.10.1 to see how the magnitude of the change in consumer surplus is represented.

Free trade area effects on Country A's producers. Producers in the importing country suffer losses as a result of the free trade area. The decrease in the price of their product on the domestic market reduces producer surplus in the industry. The price decrease also induces a decrease in the output of existing firms (and perhaps some firms will shut down), a decrease in employment, and a

decrease in profit, payments, or both to fixed costs. Refer to Table 9.10.1 and Figure 9.10.1 to see how the magnitude of the change in producer surplus is represented.

Free trade area effects on Country A's government. The government loses all the tariff revenue that had been collected on imports of the product. This reduces government revenue, which may in turn reduce government spending or transfers or raise government debt. Who loses depends on how the adjustment is made. Refer to Table 9.10.1 and Figure 9.10.1 to see how the magnitude of the tariff revenue is represented.

Free trade area effects on Country A's national welfare. The aggregate welfare effect for the country is found by summing the gains and losses to consumers, producers, and the government. The net effect consists of three components: a positive production efficiency gain (b), a positive consumption efficiency gain (d), and a negative tariff revenue loss (e). Notice that not all the tariff revenue loss ($c + e$) is represented in the loss to the nation. That's because some of the total losses (area c) are, in effect, transferred to consumers. Refer to Table 9.10.1 and Figure 9.10.1 to see how the magnitude of the change in national welfare is represented.

Because there are both positive and negative elements, the net national welfare effect can be either positive or negative. Figure 9.10.1 depicts the case in which the FTA causes a reduction in national welfare. Visually, it seems obvious that area e is larger than the sum of a and b. Thus, under these conditions, the FTA with trade diversion would cause national welfare to fall.

If conditions were different, however, the national welfare change could be positive. Consider Figure 9.10.2. This diagram differs from Figure 9.10.1 only in that the free trade supply price offered by Country B, P^B, is lower and closer to Country C's free trade supply price, P^C. The description earlier concerning the pre- and post-FTA equilibria remains the same, and trade diversion still occurs. The welfare effects remain the same in direction but differ in magnitude. Notice that the consumer surplus gain is now larger because the drop in the domestic price is larger. Also notice that the net national welfare effect, ($b + d - e$), visually appears positive. This shows that in some cases, formation of an FTA that causes a trade diversion may have a positive net national welfare effect. Thus a trade diversion may be, but is not necessarily, welfare reducing.

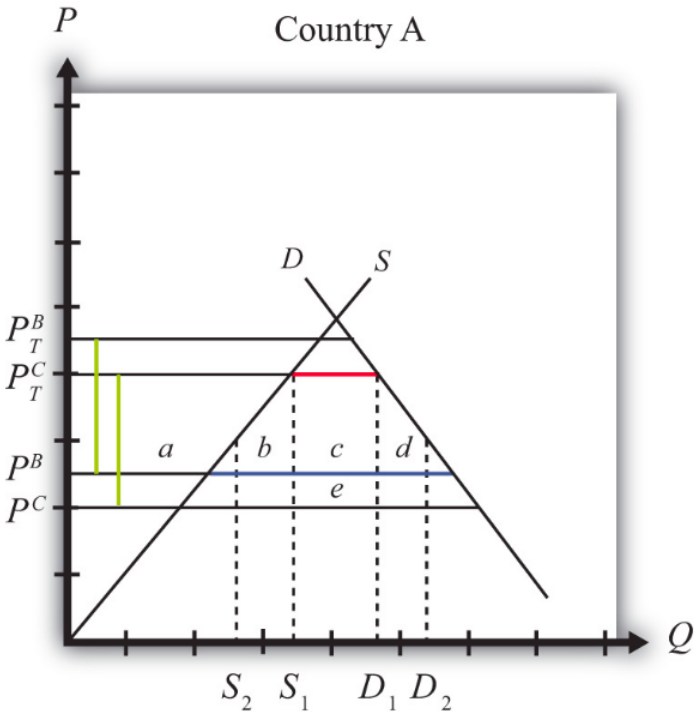


Figure 9.10.2: Beneficial Trade Diversion

Generally speaking, the larger the difference between the nondistorted prices in the FTA partner country and in the rest of the world, the more likely it is that trade diversion will reduce national welfare.

Trade Creation

In general, **trade creation** means that a free trade area creates trade that would not have existed otherwise. As a result, supply occurs from a more-efficient producer of the product. In all cases, trade creation will raise a country's national welfare.

Figure 9.10.3 depicts a case of trade creation. The graph shows the supply and demand curves for Country A. P^B and P^C represent the free trade supply prices of the good from Countries B and C, respectively. Note that Country C is assumed to be capable of supplying the product at a lower price than Country B. (Note that in order for this to be possible, Country B must have tariffs or other trade restrictions on imports from Country C, or else all of B's market would be supplied by C.)

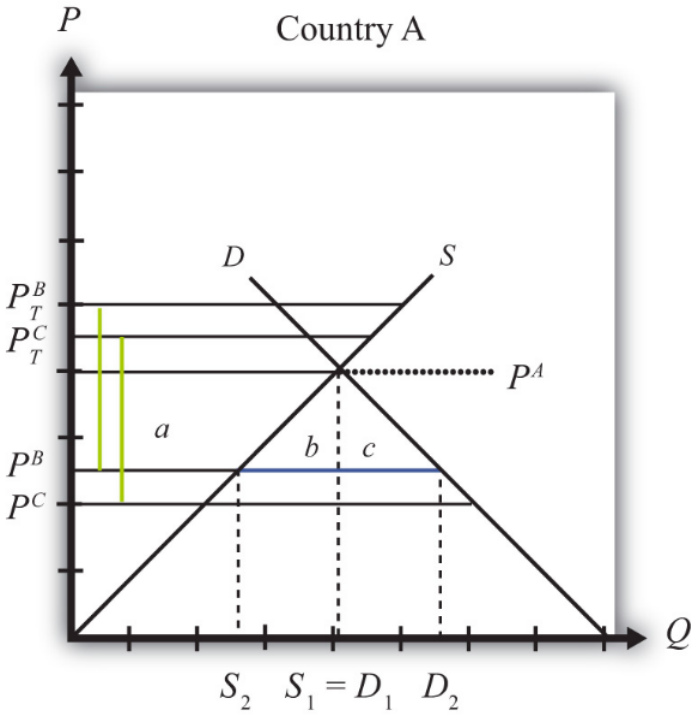


Figure 9.10.3: Trade Creation

We assume that A has a specific tariff, $t^B = t^C = t^*$, set on imports from both Countries B and C. The tariff raises the domestic supply prices to P_T^B and P_T^C, respectively. The size of the tariff is denoted by the green dotted lines in Figure 9.10.3 which show that $t^* = P_T^B - P^B = P_T^C - P^C$.

Since, with the tariffs, the autarky price in Country A, labeled P^A in Figure 9.10.3, is less than the tariff-ridden prices P_T^B and P_T^C, the product will not be imported. Instead, Country A will supply its own domestic demand at $S_1 = D_1$. In this case, the original tariffs are prohibitive.

Next, assume Countries A and B form an FTA and A eliminates the tariff on imports from Country B. Now $t_B = 0$, but t^C remains at t^*. The domestic prices on goods from Countries B and C are now P^B and P_T^C, respectively. Since $P^B < P^A$, Country A would now import the product from Country B after the FTA. At the lower domestic price P^B, imports would rise to the blue line distance, or $D_2 - S_2$. Since trade now occurs with the FTA and it did not occur before, trade is said to be *created*.

The welfare effects are summarized in Table 9.10.2.

Table 9.10.2: Welfare Effects of Free Trade Area Formation- Trade Diversion Cases

	Country A
Consumer Surplus	+ (*a* + *b* + *c*)
Producer Surplus	− *a*
Govt. Revenue	0
National Welfare	+ (*b* + *c*)

Free trade area effects on Country A's consumers. Consumers of the product in the importing country benefit from the free trade area. The reduction in the domestic price of both imported goods and the domestic substitutes raises consumer surplus in the market. Refer to Table 9.10.2 and Figure 9.10.3 to see how the magnitude of the change in consumer surplus is represented.

Free trade area effects on Country A's producers. Producers in the importing country suffer losses as a result of the free trade area. The decrease in the price of their product in the domestic market reduces producer surplus in the industry. The price decrease also induces a decrease in output of existing firms (and perhaps some firms will shut down), a decrease in employment, and a decrease in profit, payments, or both to fixed costs. Refer to Table 9.10.2 and Figure 9.10.3 to see how the magnitude of the change in producer surplus is represented.

Free trade area effects on Country A's government. Since initial tariffs were prohibitive and the product was not originally imported, there was no initial tariff revenue. Thus the FTA induces no loss of revenue.

Free trade area effects on Country A's national welfare. The aggregate welfare effect for the country is found by summing the gains and losses to consumers and producers. The net effect consists of two positive components: a positive production efficiency gain (b) and a positive consumption efficiency gain (c). This means that if trade creation arises when an FTA is formed, it must result in net national welfare gains. Refer to Table 9.10.2 and Figure 9.10.3to see how the magnitude of the change in national welfare is represented.

Aggregate Welfare Effects of a Free Trade Area

The analysis above considers the welfare effects on participants in one particular market in one country that is entering into a free trade area. However, when a free trade area is formed, presumably many markets and multiple countries are affected, not just one. Thus, to analyze the aggregate effects of an FTA, one would need to sum up the effects across markets and across countries.

The simple way to do that is to imagine that a country entering an FTA may have some import markets in which trade creation would occur and other markets in which trade diversion would occur. The markets with trade creation would definitely generate national welfare gains, while the markets with trade diversion *may* generate national welfare losses. It is common for economists to make the following statement: "If the positive effects of trade creation are larger than the negative effects of trade diversion, then the FTA will improve national welfare." A more succinct statement, though also somewhat less accurate, is that "if an FTA causes more trade creation than trade diversion, then the FTA is welfare improving."

However, the converse statement is also possible—that is, "if an FTA causes more trade diversion than trade creation, then the FTA may be *welfare reducing* for a country." This case is actually quite interesting since it suggests that a movement to free trade by a group of countries may actually reduce the national welfare of the countries involved. This means that a movement in the direction of a more-efficient free trade policy may not raise economic efficiency. Although this result may seem counterintuitive, it can easily be reconciled in terms of the theory of the second best.

Free Trade Areas and the Theory of the Second Best

One might ask, if free trade is economically the most efficient policy, how can it be that a movement to free trade by a group of countries can reduce economic efficiency? The answer is quite simple once we put the story of FTA formation into the context of the theory of the second best. Recall that the theory of the second best suggested that when there are distortions or imperfections in a market, then the addition of another distortion (like a trade policy) could actually raise welfare or economic efficiency. In the case of an FTA, the policy change is the removal of trade barriers rather than the addition of a new trade policy. However, the second-best theory works much the same in reverse.

Before a country enters an FTA, it has policy-imposed distortions already in place in the form of tariff barriers applied on imports of goods. This means that the initial equilibrium can be characterized as a second-best equilibrium. When the FTA is formed, some of these distortions are removed—that is, the tariffs applied to one's FTA partners. However, other distortions remain—that is, tariffs applied against the nonmember countries. If the partial tariff removal substantially raises the negative effects caused by the remaining tariff barriers with the non-FTA countries, then the efficiency improvements caused by free trade within the FTA could be outweighed by the negative welfare effects caused by the remaining barriers outside the FTA, and national welfare could fall.

This is, in essence, what happens in the case of trade diversion. Trade diversion occurs when an FTA shifts imports from a more-efficient supplier to a less-efficient supplier, which by itself causes a reduction in national welfare. Although the economy also benefits through the elimination of the domestic distortions, if these benefits are smaller than the supplier efficiency loss, then national welfare falls. In general, the only way to assure that trade liberalization will lead to efficiency improvements is if a country removes its trade barriers against all countries.

Key Takeaways

- Countries can integrate by reducing barriers to trade under multilateral arrangements like the WTO or by entering into regional arrangements, including preferential trade agreements, free trade agreements, customs unions, common markets, or monetary unions.
- The formation of a free trade area can lead to trade creation or trade diversion.
- Trade creation involves new trade that would not exist without the FTA and is always beneficial for the countries in terms of national welfare.
- Trade diversion involves the shifting of trade away from one country toward one's free trade partner and is sometimes detrimental to the countries in terms of national welfare.
- Losses caused by trade diversion can be understood in terms of the theory of the second best; because one market distortion remains when another is removed, welfare can fall.

Exercise 9.10.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. An arrangement in which a group of countries agrees to eliminate tariffs among themselves but maintain their own external tariff on imports from the rest of the world.
   b. The term used to describe a change in the pattern of trade in response to trade liberalization in which a country begins to import from a less-efficient supplier.
   c. The term used to describe a change in the pattern of trade in response to trade liberalization in which a country begins to import from a more-efficient supplier.

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CHAPTER OVERVIEW

10: Political Economy and International Trade

Trade policy analysis is often conducted from the implicit vantage point of a benevolent dictator poised to choose the best policies for a country. However, decisions about which policies to apply are rarely made by a sovereign but instead are usually made via a democratic political process. Whenever we consider how the political process affects economic decision making, we call it political economy.

The political economy aspects of trade policymaking are studied briefly in this chapter. Most important is how the concentrations and dispersion of the costs and benefits of trade policies tend to affect the decisions.

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10.1: Chapter Overview 10.1: Chapter OverviewEdit Update titlecancel

Learning Objectives

1. Understand the motivations of a government in determining the policies that affect international trade.

In most economic models, it is assumed that consumers maximize utility, firms maximize profit, and governments maximize national welfare. Although one can reasonably object to any one of these assumptions, perhaps the one least likely to hold is the assumption about a government's behavior. Governments are rarely comprised of a solitary decision maker whose primary interest is the maximum well-being of the nation's constituents. Such a person, if he or she existed, could be labeled a "benevolent dictator." Although historically some nations have been ruled almost single-handedly by dictators, most dictators could hardly be called benevolent.

The assumption that governments behave as if they had a benevolent dictator may have developed out of the philosophical traditions of utilitarianism. Utilitarianism, whose roots date to writings by Jeremy Bentham in the early 1800s, suggests that the objective of society should be to produce the greatest good for the greatest number. The objective of individuals is to obtain utility (happiness, satisfaction, well-being, etc.). In economic analysis, we presume that individuals obtain all their utility from the consumption of goods and services, and this motivates the behavioral assumption that consumers maximize utility. The assumption that firms maximize profit is based on the same logic. Profit affects the income of firm owners. The greater one's income, the greater will be one's consumption possibilities and thus the higher will be one's utility. Thus profit is merely a means to an end, the end being greater utility. It is not unreasonable, then, that if the objective of individuals and firms is maximum utility, then the objective of a government might be to maximize utility for everyone.

But even if governments do not seek to maximize national welfare, it is still a valid exercise to investigate which policies would lead to maximum utility. Indeed, most of the analysis of trade policies does just this. Policy analysis identifies the differential welfare effects of various policies and points out which of these will lead to the greatest overall utility or welfare.

If one prescribes policies that also maximize national welfare, then one is making the value judgment that maximum national welfare is the appropriate goal for a government. If one presumes that governments do indeed seek to maximize national welfare, then the task is to explain why the choices that governments make are explainable as the outcome of a national welfare maximization exercise. An alternative approach is to consider other reasons for the choices made by governments. This is essentially the task of political economy models.

Political economy is a term that reflects the interaction between the economic system and the political system. Many traditional models of the economy make simplifying assumptions about the behavior of governments. Keeping the model simple is one reason for the assumption of a benevolent dictator. Political economy models attempt to explain more carefully the decision-making process of governments. Today, most governments can be best described as representative democracies. This means that government officials are elected, through some voting procedure, to "represent" the interests of their constituents in making government decisions.

The key issue in political economy and trade models is to explain how political features in democratic economies affect the choice of a trade policy. Among the key questions are the following:

1. Why do countries choose protection so often, especially given that economists have been emphasizing the advantages of free trade for three hundred or more years? In other words, if free trade is as good as economists say, then why do nations choose to protect?
2. In discussions of trade policies, why is so much attention seemingly given to a policy's effects on businesses or firms and so little attention given to the effects on consumers?
3. Why do political discussions, even today, have a mercantilist spirit, wherein exports are hailed as beneficial, while imports are treated as harmful to the country?

Key Takeaways

- Economic modelers often seem to assume that governments will choose policies to maximize the nation's welfare.
- Instead, most government policies arise from complex decision making in a representative democracy.
- "Political economy" is a term used to describe the process of government decisions on economic policies.

Exercise 10.1.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The name for the philosophical ideas suggesting that the purpose of society is to create the greatest good for the greatest number.
   b. The name for a solitary leader of a country whose intention is to maximize the well-being of the nation’s constituents.
   c. The term used to describe the interaction of the political system and the economic system.
   d. The term used to describe a contention that exports are good and imports are bad for a country.

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10.2: Some Features of a Democratic Society 10.2: Some Features of a Democratic SocietyEdit Update titlecancel

Learning Objectives

1. Understand how and why lobbying is used to influence the policy decisions of a government.

A government represents the interests of its citizens. As Abraham Lincoln said in the Gettysburg Address, a democratic government is meant to be *by* the people and *for* the people. Thus, in a **representative democracy**, government officials are entrusted to take actions that are in the interests of their constituents. Periodic elections allow citizens to vote for individuals they believe will best fulfill their interests. If elected officials do not fulfill the interests of their constituents, then those constituents eventually have a chance to vote for someone else. Thus, if elected officials are perceived as good representatives of their constituents' interests, they are likely to be reelected. If they follow their own individual agenda, and if that agenda does not match the general interests of their constituents, then they may lose a subsequent bid for reelection.

Citizens in democratic societies are traditionally granted the right to free speech. It is generally accepted that people should be allowed to voice their opinions about anything in front of others. In particular, people should be free to voice their opinions about government policies and actions without fear of reprisal. Criticisms of, as well as recommendations for, government policy actions must be allowed if a truly representative government is to operate effectively.

The Nature of Lobbying

We can define **lobbying** as the activity wherein individual citizens voice their opinions to the government officials about government policy actions. It is essentially an information transmission process. By writing letters and speaking with officials, individuals inform the government about their preferences for various policy options under consideration. We can distinguish two types of lobbying: casual lobbying and professional lobbying.

Casual lobbying occurs when a person uses his leisure time to petition or inform government officials of his point of view. Examples of casual lobbying are when people express their opinions at a town meeting or when they write letters to their Congress members. In these cases, there is no opportunity cost for the economy in terms of lost output, although there is a cost to the individual because of the loss of leisure time. Casual lobbying, then, poses few economic costs except to the individual engaging in the activity.

Professional lobbying occurs when an individual or company is hired by someone to advocate a point of view before the government. An example is a law firm hired by the steel industry to help win an antidumping petition. In this case, the law firm will present arguments to government officials to try to affect a policy outcome. The law firm's fee will come from the extra revenue expected by the steel industry if it wins the petition. Since, in this case, the law firm is paid to provide lobbying services, there is an opportunity cost represented by the output that could have been produced had the lawyers engaged in an alternative productive activity. When lawyers spend time lobbying, they can't spend time writing software programs, designing buildings, building refrigerators, and so on. (This poses the question, What would lawyers do if they weren't lawyering?) The lawyers' actions with this type of lobbying are essentially redistributive in nature, since the lawyers' incomes will derive from the losses that will accrue to others in the event that the lobbying effort is successful. If the lobbying effort is not successful, the lawyers will still be paid, only this time the losses will accrue to the firm that hired the lawyers. For this reason, lobbying is often called **rent seeking** because the fees paid to the lobbyists come from a pool of funds (rents) that arise when the lobbying activity is successful. Another name given to professional lobbying in the economics literature is a **directly unproductive profit-seeking (DUP) activity** .

Lobbying is necessary for the democratic system to work. Somehow information about preferences and desires must be transmitted from citizens to the government officials who make policy decisions. Since everyone is free to petition the government, lobbying is the way in which government officials can learn about the desires of their constituents. Those who care most about an issue will be more likely to voice their opinions. The extent of the lobbying efforts may also inform the government about the intensity of the preferences as well.

Key Takeaways

- In a representative democracy, citizens have the right to both elect their representatives and discuss policy options with their elected representatives.
- Lobbying is the process of providing information to elected officials to influence the policies that are implemented.
- A directly unproductive profit-seeking (DUP) activity is any action that by itself does not directly produce final goods and services consumed by a country's consumers.

Exercise 10.2.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The term for a democratic system in which government agents are entrusted to take actions in the best interests of the voting public.
   b. The term used to describe activities to petition the government for particular policies.
   c. This type of lobbying does not incur an opportunity cost of forgone production.
   d. This type of lobbying does incur an opportunity cost of forgone production.
   e. The term used to describe the extra revenues earned because of successful lobbying efforts.
   f. The term describing the purposeful effort to direct money away from others and toward oneself.
   g. Economic activities defined by the acronym DUP.

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10.3: The Economic Effects of Protection: An Example 10.3: The Economic Effects of Protection: An ExampleEdit Update titlecancel

Learning Objectives

1. Depict numerical values for the welfare effects of a tariff by a small country.

Consider the market for blue jeans in a small importing country, depicted in Figure 10.3.1. Suppose a sudden increase in the world supply of jeans causes the world market price to fall from $35 to $30. The price decrease causes an increase in domestic demand from nine to ten million pairs of jeans, a decrease in domestic supply from eight to six million pairs, and an increase in imports from one to four million.

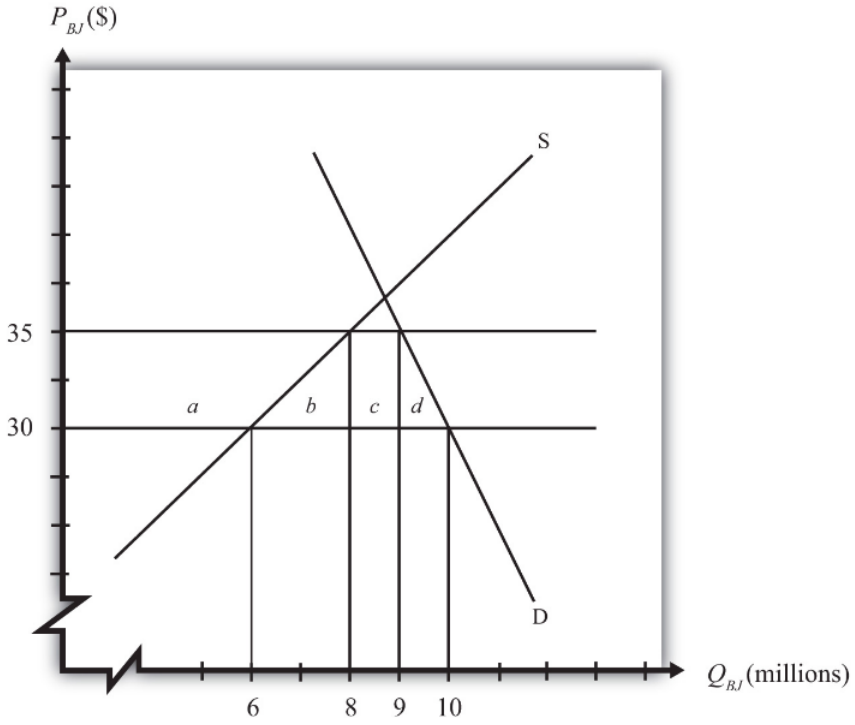


Figure 10.3.1: A Market for Blue Jeans

Because of these market changes, suppose that the import-competing industry uses its trade union to organize a petition to the government for temporary protection. Let's imagine that the industry calls for a $5 tariff so as to reverse the effects of the import surge. Note that this type of action is allowable to World Trade Organization (WTO) member countries under the "escape clause" or "safeguards clause."

We can use the measures of producer surplus and consumer surplus to calculate the effects of a $5 tariff. These effects are summarized in Table 10.3.1. The dollar values are calculated from the respective areas on the graph in Figure 10.3.1.

Table 10.3.1: Welfare Effects of an Import Tariff

	Area on Graph	$ Value
Consumer Surplus	− (a + b + c + d)	− $47.5 million
Producer Surplus	+ a	+ $35 million
Govt. Revenue	+ c	+ $5 million
National Welfare	− (b + d)	− $7.5 million

Notice that consumers lose more than the gains that accrue to the domestic producers and the government combined. This is why national welfare is shown to decrease by $7.5 million.

In order to assess the political ramifications of this potential policy, we will make some additional assumptions. In most markets, the number of individuals that makes up the demand side of the market is much larger than the number of firms that makes up the domestic import-competing industry. Suppose, then, that the consumers in this market are made up of millions of individual households, each of which purchases, at most, one pair of jeans. Suppose the domestic blue jeans industry is made up of thirty-five separate firms.

Key Takeaways

- With quantities, prices, and the tariff rate specified, actual values for the changes in consumer and producer surplus and government revenue can be determined.

Exercise 10.3.1

1. Suppose the supply and demand curves for bottles of Coke are given by,

$$S = 10P - 7$$

$$D = 13–5P$$

where P is the price of Coke per bottle, D is the quantity of Coke demand (in millions of bottles), and S is the quantity of Coke supply (in millions of bottles). Suppose the free trade price of Coke is $1.00 and that a tariff of $0.20 is being considered by the government. If the country is a small importer calculate the following:

   a. The value of the increase in producer surplus expected due to the tariff.
   b. The value of the decrease in consumer surplus expected due to the tariff.
   c. The value of the tariff revenue expected due to the tariff.
   d. The value of the change in national welfare expected due to the tariff.

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10.4: The Consumers' Lobbying Decision 10.4: The Consumers' Lobbying DecisionEdit Update titlecancel

Learning Objectives

1. Learn the lobbying implications of the widely dispersed costs of protection to consumers.

If the $5 tariff is implemented, it will raise the price from $30 to $35. Consumption will fall from ten million to nine million pairs of jeans. Because of our simplifying assumption of one household per pair of jeans, one million households will decide not to purchase jeans because of the higher price. They will use the $35 to buy something else they think is more valuable than jeans. The other nine million households will pay the extra $5. This means that, at most, a household has to pay an extra $5 for the same pair of jeans. In terms of consumer surplus loss, nine million consumers lose $5 each for a total of $45 million (area $a + b + c$), while the remaining one million lose a total of $2.5 million (area d).

We can now ask whether a household would be willing to lobby the government to oppose the blue jeans tariff because of the extra cost they would incur. The likely answer is no. For most households, such a small price increase would hardly be noticed. Most consumers do not purchase blue jeans frequently. Also, blue jeans with different styles and brand names typically differ considerably in price. Consumers, who rarely keep track of events affecting particular markets, are unlikely to know that a tariff has even been implemented on the product considered or discussed.

If a person did know of an impending tariff, then presumably $5 is the maximum a household would be willing to pay toward a lobbying effort, since that is the most one can gain if a tariff is prevented. One might argue that if even a fraction of the $5 could be collected from some portion of the ten million consumer households, millions of dollars could be raised to contribute to an opposition lobbying effort. However, collecting small contributions from such a large group would be very difficult to do effectively.

Consider the problems one would face in spearheading a consumer lobbying effort to oppose the blue jeans tariff in this example. A seemingly reasonable plan would be to collect a small amount of money from each household hurt by the tariff and use those funds to pay for a professional lobbying campaign directed at the key decision makers. The first problem faced is how to identify which households are likely to be affected by the tariff. Perhaps many of these households purchased blue jeans last year, but many others may be new to the market in the upcoming year. Finding the right people to solicit money from would be a difficult task.

Even if you could identify them, you would have to find a way to persuade them that they ought to contribute. Time spent talking to each household has an opportunity cost to the household member since that person could be doing something else. Suppose that a person values her time at the hourly wage rate that she earns at her job. If she makes $20 per hour, then you'll have less than fifteen minutes to convince her to contribute to the lobbying effort since fifteen minutes is worth the $5 you are trying to save for her. The point here is that even learning about the problem is costly for the household. For small savings, a lobbying group will have to convince its contributors very quickly.

Suppose we knew the names and addresses of the ten million affected households. Perhaps we could send a letter to each of them with a stamped return envelope asking to return it with a $2 or $3 contribution to the lobbying effort. With this plan, even purchasing the stamps to mail the envelopes would cost $3,400,000. One would need to get over half of the households to send in $3 each just to cover the cost of the mailing. Recipients of the letters will reasonably question the trustworthiness of the solicitation. Will the money really be put to good use? The chances of getting any more than a small return from this kind of solicitation is highly unlikely.

If contributions can be collected, the lobbying group will face another problem that arises with large groups: free ridership. **Free riding** occurs when someone enjoys the benefits of something without paying for it. The lobbying effort, if successful, will benefit all blue jeans consumers regardless of whether they contributed to the lobbying campaign. In economic terms, we say that the lobbying effort is a public good because individual households cannot be excluded from the benefits of successful lobbying. One of the key problems with public good provision is that individuals may be inclined to free ride—that is, to obtain the benefit without having contributed to its provision. Those who do not contribute also get the added benefit of the full $5 surplus if the lobbying campaign is successful.

The main point of this discussion, though, is that despite the fact that $47.5 million dollars will be lost to consumers of blue jeans if the $5 tariff is implemented, it is very unlikely that this group will be able to form a lobbying campaign to oppose the tariff. Since

each household will lose $5 at most, it is extremely unlikely for any reasonable person to spend sufficient time to mount a successful lobbying campaign. Even if one person or group decided to spearhead the effort and collect contributions from others, the difficulties they would face would likely be insurmountable. In the end, government decision makers would probably hear very little in the way of opposition to a proposed tariff.

Many of the arguments are discussed in detail in Mancur Olson's well-known book *The Logic of Collective Action*. One of the book's key points is that large groups are much less effective than small groups in applying effective lobbying pressure on legislators.

Key Takeaways

- Although the loss of consumer surplus is the largest welfare effect of a tariff, because the number of consumers affected is also very large, the effect on each consumer is relatively small.
- Because a large number of consumers are affected to a small degree, it is difficult to identify precisely which consumers are affected by the tariff.
- Because the per-consumer cost of the tariff is low, most individual lobbying efforts to protest the tariff will cost the individual more than the cost of the tariff.
- Large groups are much less effective than small groups in applying effective lobbying pressure on legislators.

? Exercise 10.4.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The term used to describe when a person receives a benefit, especially a public good, without contributing a fair share to pay for it.
   b. Of *concentrated* or *dispersed*, this is how to describe the typical losses that accrue to consumers because of an import tariff.
   c. The amount of money lost by each consumer of coffee due to a $0.25 tariff if $35 million is lost in consumer surplus in a market of seventy million consumers.
   d. Of *small* or *large*, this sized group is more likely to form an effective lobby.

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10.5: The Producers' Lobbying Decision 10.5: The Producers' Lobbying DecisionEdit Update titlecancel

Learning Objectives

1. Learn the lobbying implications of the concentrated benefits of protection to producer interests.

On the producers' side, let's assume that there are thirty-five separate, and equally sized, firms. If a $5 tariff is implemented, producers as a group would gain $35 million in producer surplus. That means each firm stands to gain $1 million. Domestic producers would also supply two million additional pairs of jeans, and that would require expansion of the industry labor force. Clearly, the tariff would be beneficial to the firm owners and to industry workers. The potential to expand production, add workers, and increase profits by $1 million per firm will provide a strong motivation to participate in a lobbying effort. In the case of the firms, however, organization of a lobbying effort will be much easier than the opposing effort by consumers.

First of all, the $1 million surplus accruing to each firm is pure gravy. Payments to workers and other factors are not a part of the $1 million additional surplus; thus it is money over and above the marginal costs of additional production. For this reason, profit received in this manner is often referred to as "economic rents." Since the rents are concentrated in a small number of firms, with $1 million going to each, each firm will have a strong incentive to participate in a lobbying campaign. But who's going to spearhead the effort?

Organization of a lobbying campaign will probably be easier for firms than for consumers. First, the industry may have an industry association that maintains continual links with policymakers in state and federal governments. The workers in the industry might also belong to a trade union, which would also have interests in supporting a lobbying effort. Or a few of the industry leaders could take it upon themselves to begin the effort (although that is assumed away in the example). Second, as a smaller group, it is easy to identify the likely beneficiaries from the tariff and to solicit contributions. The lobbying group should easily be able to collect millions of dollars to support an extensive lobbying effort. A mere contribution of $50,000 per firm would generate $1.75 million that could be used to hire a professional lobbying team. Even if the chances of a successful outcome are small, it may still be practical for the firms to contribute to a lobbying effort. The return on that $50,000 "investment" would be $1 million if successful. That's a 2,000 percent rate of return—much higher than any brick-and-mortar investment project that might be considered. Free riding would also be less likely to occur since with only thirty-five firms to keep track of, contributors would probably learn who is not participating. Nonparticipation would establish a poor reputation for a firm and could have unpleasant consequences in its future industry association dealings.

With a well-financed lobbying effort, it would not be difficult to make decision makers aware that there is resounding support for the tariff within the industry community. Newspaper and television ads could be purchased to raise public awareness. Interested parties could be flown to the capitol to speak with key decision makers. In this way, the chances of obtaining the tariff may be increased substantially.

The Mancur Olson result applies in reverse to small groups. Small groups are much more effective than large groups in applying effective lobbying pressure on legislators.

Key Takeaways

- Although the increase in producer surplus is a small welfare effect in the example, because the number of producers affected is relatively small, the effect of the tariff on each producer is relatively large.
- Because a small number of producers are affected to a sizeable degree, it is easy to identify who is positively affected by the tariff.
- Because the per-producer benefit of the tariff is high, firm lobbying efforts to promote the tariff will likely be a worthwhile investment.
- Small groups are much more effective than large groups in applying effective lobbying pressure on legislators.

Exercise 10.5.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"

a. Of *concentrated* or *dispersed*, this is how to describe the typical benefits that accrue to producers because of an import tariff.
b. The amount of money gained by each producer of coffee due to a $0.25 tariff if $20 million is gained in producer surplus in a market of twenty producing firms.
c. The rate of return on a $50,000 lobbying expense if that lobbying results in a $0.30 tariff on coffee and nets the firm an additional $3,000,000 in profit.
d. Of *consumer groups* or *producer groups*, this group is more likely to form an effective lobby.

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10.6: The Government's Decision 10.6: The Government's DecisionEdit Update titlecancel

Learning Objectives

1. Learn how the lobbying and tariff revenue implications of a tariff affect the decision of the government.

How the government decides whether to offer the $5 tariff, and who decides, will depend on the procedural rules of the democratic country in question. The tariff might be determined as a part of an administered procedure, such as a safeguards action or an antidumping action. Or the tariff may be determined as a part of a bill to be voted on by the legislature and approved, or not, by the executive. Rather than speaking about a particular type of government action, however, we shall consider the motivations of the government more generically.

The first thing the government may notice when being petitioned to consider raising the tariff is that government revenues will rise by $5 million. Relative to many government budgets, this is a small amount, and so it may have very little influence on policymakers' decision. However, it will help reduce a budget deficit or add to the monies available for spending on government programs. Thus it could have a small influence.

In a democratic society, governments are called on to take actions that are in the interests of their constituents. If government officials, in this example, merely listen to their constituents, one thing should be obvious. The arguments of the industry seeking protection will surely resonate quite loudly, while the arguments of the consumers who should be opposed to the tariff will hardly even be heard. If a government official bases his or her decision solely on the "loudness" of the constituents' voices, then clearly he or she would vote for the tariff. This is despite the fact that the overall cost of the tariff to consumers outweighs the benefits to the industry and the government combined.

Notice that the decision to favor the tariff need not be based on anything underhanded or illegal on the part of the industry lobbyists. Bribes need not be given to secure votes. Nor does the industry lobby need to provide false or misleading information. Indeed, the lobby group could provide flawlessly accurate information and still win the support of the officials. Here's why.

It would be natural for the industry lobby group to emphasize a number of things. First, jobs would be saved (or created) as a result of the tariff. If a number can be attached, it will be. For example, suppose the industry supported 25,000 jobs in the initial equilibrium, when eight million pairs of jeans were produced by the domestic industry. That averages to 320 jeans produced per worker. Thus, when the industry cuts production by two million units, it amounts to 6,250 jobs. The lobby group could then frequently state the "fact" that the tariff will create 6,250 jobs. Second, the lobby would emphasize how the tariff would restore the vitality of the industry. If a surge of imports contributed to the problem, then the lobby would undoubtedly blame foreign firms for taking jobs away from hardworking domestic citizens. Finally, the lobby would emphasize the positive government budget effects as a result of the tariff revenue. All of this information clearly would be quite true.

If the lobby mentioned the higher prices that would result from the tariff, surely it would argue it is a small price to pay to save so many jobs. The lobby might even convince consumers of blue jeans that it is worth paying extra for jeans because it will save domestic jobs. After all, perhaps their own jobs will one day be in jeopardy due to imports. Plus, it is such a small price to pay: at only $5 extra, no one will even notice!

For a politician facing potential reelection, there is another reason to support the industry over the consumers, even with full information about the effects. Support of the industry will probably generate more future votes. Here's why.

First, since industry members—management and workers—have a bigger stake in the outcome, they will be more likely to remember the politician's support (or lack of support) on this issue at election time. Second, the politician can use his support for the industry in his political ads. Consider this political ad if he supports the industry: "I passed legislation that created over six thousand jobs!" Compare it with this truthful ad if he doesn't support the industry: "By opposing protectionist legislation, I saved you five bucks on blue jeans!" Which one do you think sounds better?

Key Takeaways

- If representatives in a democracy base policy choices on the interests of their constituents and if industry lobbyists are more organized and "vocal" in their demands than consumers, then governments will more likely choose policies like tariffs.

Exercise 10.6.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. Of *consumer voices* or *producer voices*, these are more likely to be heard by government officials in a representative democracy.
   b. Of *consumer interests* or *producer interests*, governments in representative democracies are more likely to implement policies favoring these.

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10.7: The Lobbying Problem in a Democracy 10.7: The Lobbying Problem in a DemocracyEdit Update titlecancel

Learning Objectives

1. Recognize some of the problems and pitfalls of policy choice in a representative democracy.

There is a real problem with the lobbying process in democratic societies. Even though lobbying is a legitimate process of information transfer between constituents and government decision makers, it also produces some obvious disparities. Whenever policy actions generate concentrated benefits and dispersed costs, the incentives and abilities to lobby are significantly different across groups. Potential beneficiaries can often use the advantage of small group size and large potential windfalls to wield disproportionate influence on decision makers. Potential losers, whose numbers are large and whose expected costs per person are quite small, have almost no ability to lobby the government effectively. Thus, in a democratic society in which lobbying can influence decisions, decisions are likely to be biased in the favor of those policies that generate concentrated benefits and dispersed losses.

Unfortunately, and perhaps coincidentally, most policy actions taken produce concentrated benefits and dispersed losses. In the case of trade policies, most protectionist actions will cause concentrated benefits to accrue to firms, whereas losses will be dispersed among millions of consumers. This means that protectionist policies are more likely to win political support, especially when lobbying can directly affect legislated actions. Protectionism can easily occur even though the sum total effects of the policy may be negative.

In many countries, a protectionist tendency is reflected in the type of trade policy procedures that are available by law. Escape clause, antisubsidy, and antidumping policies are examples of laws designed to protect firms and industries in particular situations. In evaluating these types of petitions in the United States, there is *no* requirement that effects on consumers be considered in reaching a decision. Clearly, these laws are designed to protect the concentrated interests of producing firms. It would not be surprising, and indeed it seems likely, that the concentrated interests of businesses affected the ways in which the laws were originally written. The absence of a consumer lobby would also explain why consumer effects are never considered in these actions.

Key Takeaways

- Democratic governments are more likely to choose policies that generate concentrated benefits and dispersed losses, regardless of whether the sum total effects are positive or negative.

Exercise 10.7.1

1. Suppose a small country implements a tariff on chicken imports. In the table below indicate whether each group is a winner or loser and whether the effects on that group are concentrated or dispersed.

Table 10.7.1: Political Economy Effects of a Tariff

Name of Group	Winners or Losers	Concentrated or Dispersed
Chicken Producers		
Chicken Consumers		
Taxpayers or Recipients of Government Benefits		

2. Suppose a small country implements an export subsidy on soybeans. In the table below indicate whether each group is a winner or loser and whether the effects on that group are concentrated or dispersed.

Table 10.7.2: Political Economy Effects of an Export Subsidy

Name of Group	Winners or Losers	Concentrated or Dispersed
Soybean Producers		

Name of Group	Winners or Losers	Concentrated or Dispersed
Soybean Consumers		
Taxpayers or Recipients of Government Benefits		

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CHAPTER OVERVIEW

11: Evaluating the Controversy between Free Trade and Protectionism

Perhaps the most important policy issue of an international trade course is to answer the question “Should a country pursue free trade or some type of selected protection?” Academics, philosophers, policy analysts, and legislators have addressed this question for hundreds of years. And unfortunately, there is still no definitive answer.

The reason is that both free trade and selected protection have both positive and negative aspects. No one policy choice is clearly superior. Nonetheless, economists who have studied trade theory and policy tend to support free trade more so than just about any other contentious economic policy under public consideration. The reasons for this near consensus are complex and poorly understood by the general public. This chapter explains the economic case for free trade through the lens of trade theory and argues that even though free trade may not be “optimal,” it is nonetheless the most pragmatic policy option a country can follow.

11.1: Introduction
11.2: Economic Efficiency Effects of Free Trade
11.3: Free Trade and the Distribution of Income
11.4: The Case for Selected Protection
11.5: The Economic Case against Selected Protection
11.6: Free Trade as the "Pragmatically Optimal" Policy Choice

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11.1: Introduction 11.1: IntroductionEdit Update titlecancel

Learning Objectives

1. Understand the basis for the modern support for free trade among economists.

For hundreds of years, at least since Adam Smith's publication of *The Wealth of Nations*, the majority of economists have been strong supporters of free trade among nations. Paul Krugman once wrote that if there were an economist's creed, it would surely contain the affirmation, "I advocate free trade."See Paul Krugman, "Is Free Trade Passe?" *Journal of Economic Perspectives* 1, no. 2 (1987): 131–44.

The original arguments for free trade began to supplant mercantilist views in the early to mid-eighteenth century. Many of these original ideas were based on simple exchange or production models that suggested that free trade would be in everyone's best interests and surely in the national interest. During the nineteenth and twentieth centuries, however, a series of objections were raised suggesting that free trade was not in everyone's interest and perhaps was not even in the national interest. The most prominent of these arguments included the infant industry argument, the terms of trade argument, arguments concerning income redistribution, and more recently, strategic trade policy arguments. Although each of these arguments might be thought of as weakening the case for free trade, instead, each argument brought forth a series of counterarguments that have acted to reassert the position of free trade as a favored policy despite these objections. The most important of these counterarguments include the potential for retaliation, the theory of the second best, the likelihood of incomplete or imperfect information, and the presence of lobbying in a democratic system.

What remains today is a modern, sophisticated argument in support of free trade among nations. It is an argument that recognizes that there are numerous exceptions to the notion that free trade is in everyone's best interests. The modern case for free trade does not contend, however, that these exceptions are invalid or illogical. Rather, it argues that each exception supporting government intervention in the form of a trade policy brings with it additional implementation problems that are likely to make the policy impractical.

Before presenting the modern argument, however, it is worth deflecting some of the criticisms that are sometimes leveled against the economic theory of free trade. For example, the modern argument for free trade is not based on a simplistic view that everyone benefits from free trade. Indeed, trade theory, and experience in the real world, teaches us that free trade, or trade liberalization, is likely to generate losers as well as winners.

The modern argument for free trade is not based on unrealistic assumptions that lead to unrealistic conclusions. Although it is true that many assumptions contained within any given trade model do not accurately reflect many realistic features of the world, the modern argument for free trade is not based on the results from any *one* model. Instead, the argument is based on a collection of results from numerous trade models, which are interpreted in reference to realistic situations. If one considers the collection of all trade models jointly, it is much more difficult to contend that they miss realistic features of the world. Trade theory (as a collection of models) does consider imperfectly competitive markets, dynamic effects of trade, externalities in production and consumption, imperfect information, joint production, and many other realistic features. Although many of these features are absent in any one model, they are not absent from the joint collection of models, and it is this "extended model" that establishes the argument for free trade.Ideally, we would create a supermodel of the world economy that simultaneously incorporates all realistic features of the world and avoids what are often called "simplifying assumptions." Unfortunately, this is not a realistic possibility. As anyone who has studied models of the economy knows, even models that are very simple in structure can be extremely difficult to comprehend, much less solve. As a result, we are forced to "interpret" the results of simple models as we apply them to the complex real world.

Key Takeaways

- The modern support for free trade by most economists is based on a collection of results from a collection of models that incorporate many realistic features of the world into the analysis.

Exercise 11.1.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"

a. The statement suggested by Paul Krugman as being an element of the economist's creed—if ever there were such a thing.
b. This is who will benefit from free trade according to a simplistic view held by some free trade advocates.
c. This is what causes unrealistic conclusions in trade theory according to some free trade opponents.
d. The conclusions of *one* model of international trade or *many* models of international trade are best used to make trade policy prescriptions.

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11.2: Economic Efficiency Effects of Free Trade 11.2: Economic Efficiency Effects of Free TradeEdit Update titlecancel

Learning Objectives

1. Learn the major source of support for free trade across a variety of trade models.

The main source of support for free trade lies in the positive production and consumption efficiency effects. In every model of trade, there is an improvement in aggregate production and consumption efficiency when an economy moves from autarky to free trade. This is equivalent to saying that there is an increase in national welfare. This result was demonstrated in the Ricardian model, the immobile factor model, the specific factor model, the Heckscher-Ohlin model, the simple economies-of-scale model, and the monopolistic competition model. The result can also be shown if there are differences in demand between countries. Each of these models shows that a country is likely to have greater national output and superior choices available in consumption as a result of free trade.

Production Efficiency

Improvements in production efficiency mean that countries can produce more goods and services with the same amount of resources. In other words, productivity increases for the given resource endowments available for use in production.

In order to achieve production efficiency improvements, resources must be shifted between industries within the economy. This means that some industries must expand while others contract. Exactly which industries expand and contract will depend on the underlying stimulus or basis for trade. Different trade models emphasize different stimuli for trade. For example, the Ricardian model emphasizes technological differences between countries as the basis for trade, the factor proportions model emphasizes differences in endowments, and so on. In the real world, it is likely that each of these stimuli plays some role in inducing the trade patterns that are observed.

Thus as trade opens, either the country specializes in the products in which it has a comparative technological advantage, or production is shifted to industries that use the country's relatively abundant factors most intensively, or production is shifted to products in which the country has relatively less demand compared with the rest of the world, or production shifts to products that exhibit economies of scale in production.

If production shifts occur for any of these reasons, or for some combination of these reasons, then trade models suggest that total production would rise. This would be reflected empirically in an increase in the country's gross domestic product (GDP). This means that free trade would cause an increase in the level of the country's national output and income.

Consumption Efficiency

Consumption efficiency improvements arise for an individual when changes in the relative prices of goods and services allow the consumer to achieve a higher level of utility. Since the change in prices alters the choices a consumer has, we can say that consumption efficiency improvements imply that more satisfying choices become available. When multiple varieties of goods are available in a product category, as in the monopolistic competition model, then consumption efficiency improvements can mean that the consumer is able to consume greater varieties or is able to purchase a variety that is closer to his ideal.

Although improvements in consumption efficiency are easy to describe for an individual consumer, it is much more difficult to describe consumption efficiency conceptually for the aggregate economy. Nevertheless, when aggregate indifference curves are used to describe the gains from trade, it is possible to portray an aggregate consumption efficiency improvement. One must be careful to interpret this properly, though. The use of an aggregate indifference curve requires the assumptions that (1) all consumers have identical preferences and (2) there is no redistribution of income as a result of the changes in the economy. We have seen, however, that in most trade models income redistribution will occur as an economy moves to free trade, and it may be impossible to redistribute afterward. It is also likely that individuals have different preferences for goods, which also weakens the results using aggregate indifference curves.

Key Takeaways

- The main sources of support for free trade are the positive production and consumption efficiency effects that arise in numerous models when countries trade freely.

- Production efficiency improvements mean that countries produce more goods and services with the same amount of resources.
- Consumption efficiency improvements mean that countries consume a more satisfying mix of goods and services.

Exercise 11.2.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The term often used as a synonym for an improvement in economic efficiency.
   b. The type of efficiency improvement in which productivity rises for the given resource endowments available for use in production.
   c. The type of efficiency improvement relating to consumer choice adjustments in response to a policy change.
   d. The enhancement of *this* is what many economic models show will arise by moving to free trade.

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11.3: Free Trade and the Distribution of Income 11.3: Free Trade and the Distribution of IncomeEdit Update titlecancel

Learning Objectives

1. Recognize that a movement to free trade will cause a redistribution of income within the country.
2. Understand how compensation can relieve the problems caused by income redistribution.

A valid criticism of the case for free trade involves the issue of income distribution. Although most trade models suggest that aggregate economic efficiency is raised with free trade, these same models do not indicate that every individual in the economy will share in the benefits. Indeed, most trade models demonstrate that movements to free trade will cause a redistribution of income between individuals within the economy. In other words, some individuals will gain from free trade while others will lose. This was seen in the immobile factor model, the specific factor model, the Heckscher-Ohlin model, and the partial equilibrium analysis of trade liberalization.

There have been two general responses by economists concerning the income distribution issue. Some have argued that the objective of economics is solely to determine the most efficient policy choices. Introductory textbooks often suggest that the objective of the economics discipline is to determine how to allocate scarce resources toward production and consumption. Economists describe an allocation as “optimal” when it achieves the maximum level of aggregate economic efficiency. Put in these terms, economic analysis is “positive” in nature. Positive economics refers to studies that seek to answer questions pertaining to how things work in the economy and the subsequent effects. Positive economic analysis does not intend to explain what “should” be done. Issues pertaining to income distribution are commonly thought of as “normative” in nature, in that the concern is often over what the distribution “should” be. If we apply this reasoning to international trade, then, issues such as the appropriate income distribution are beyond the boundaries of the discipline and should be left to policymakers, government officials, or perhaps philosophers to determine.

Perhaps a more common response by economists concerning the income distribution issue is to invoke the compensation principle. A substantial amount of work by economists has been done to show that because free trade causes an increase in economic efficiency, it is generally possible to redistribute income from the winners to the losers such that, in the end, every individual gains from trade. The basic reason this is possible is that because of the improvement in aggregate efficiency, the sum of the gains to the winners exceeds the sum of the losses to the losers. This implies that it is theoretically possible for the potential winners from free trade to bribe the losers and leave everyone better off as a result of free trade. This allows economists to argue that free trade, coupled with an appropriate compensation package, is preferable to some degree of protectionism.

One major practical problem with compensation, however, is the difficulty of implementing a workable compensation package. In order to achieve complete compensation, one must be able to identify not only who the likely winners and losers will be but also how much they will win and lose and when in time the gains and losses will accrue. Although this is relatively simple to do in the context of a single trade model, such as the Heckscher-Ohlin model, it would be virtually impossible to do in practice given the complexity of the real world. The real world consists of tens of thousands of different industries producing millions of products using thousands of different factors of production. The sources of trade are manifold, including differences in technology, endowments, and demands, as well as the presence of economies of scale. Each source of trade, in turn, stimulates a different pattern of income redistribution when trade liberalization occurs. In addition, the pattern of redistribution over time is likely to be affected by the degree of mobility of factors between industries as the adjustment to free trade occurs. This was seen in the context of simple trade models, from the immobile factor model to the specific factor model to the Heckscher-Ohlin model.

Even in the context of simple trade models, a workable compensation mechanism is difficult to specify. An obvious solution would seem to be for the government to use taxes and subsidies to facilitate compensation. For example, the government could place taxes on those who would gain from free trade (or trade liberalization) and provide subsidies to those who would lose. However, if this were implemented in the context of many trade models, then the taxes and subsidies would change the production and consumption choices made in the economy and would act to reduce or eliminate the efficiency gains from free trade. The government taxes and subsidies, in this case, represent a policy-imposed distortion that, by itself, reduces aggregate economic efficiency. If the compensation package reduces efficiency more than the movement to free trade enhances efficiency, then it is possible for the nation to be worse off in free trade when combined with a tax/subsidy redistribution scheme.Dixit and Norman (1980) showed that under some conditions it is possible to specify a tax and subsidy policy that would guarantee an increase in aggregate economic

efficiency with free trade. See A. Dixit and V. Norman, *Theory of International Trade: A Dual General Equilibrium Approach* (Cambridge: Cambridge University Press, 1980). The simple way to eliminate this problem, conceptually, is to suggest that the redistribution take place as a "lump-sum" redistribution. A **lump-sum redistribution** is one that takes place after the free trade equilibrium is reached—that is, after all production and consumption decisions are made but before the actual consumption takes place. Then, as if in the middle of the night when all are asleep, goods are taken away from those who have gained from free trade and left at the doors of those who had lost. Lump-sum redistributions are analogous to Robin Hood stealing from the rich and giving to the poor. As long as this redistribution takes place after the consumption choices have been made and without anyone expecting a redistribution to occur, then the aggregate efficiency improvements from free trade are still realized. Of course, although lump-sum redistributions are a clever conceptual or theoretical way to "have your cake and eat it too," it is not practical or workable in the real world.

This implies that although compensation can solve the problem of income redistribution at the theoretical level, it is unlikely that it will ever solve the problem in the real world. Although some of the major gains and losses from free trade may be identifiable and quantifiable, it is unlikely that analysts would ever be able to identify all who would gain and lose in order to provide compensation and assure that everyone benefits. This means that free trade is extremely likely to cause uncompensated losses to some individuals in the economy. To the extent that these individuals expect these losses and can measure their expected value (accurately or not), then there will also likely be continued resistance to free trade and trade liberalization. This resistance is perfectly valid. After all, trade liberalization involves a government action that will cause injury to some individuals for which they do not expect to be adequately compensated. Furthermore, the economic efficiency argument will not go very far to appease these groups. Would you accept the argument that your expected losses are justifiable because others will gain more than you lose?

One final argument concerning the compensation issue is that compensation to the losers may not even be justifiable. This argument begins by noting that those who would lose from free trade are the same groups who had gained from protectionism. Past protectionist actions represent the implementation of government policies that had generated benefits to certain selected groups in the economy. When trade liberalization occurs, then, rather than suggesting that some individuals lose, perhaps it is more accurate to argue that the special benefits are being eliminated for those groups. On the other hand, those groups that benefit from free trade are the same ones that had suffered losses under the previous regime of protectionism. Thus their gains from trade can be interpreted as the elimination of previous losses. Furthermore, since the previous protectionist actions were likely to have been long lasting, one could even argue that the losers from protection (who would gain from free trade) deserve to be compensated for the sum total of their past losses. This would imply that upon moving to free trade, a redistribution ought to be made not from the winners in trade to the losers but from the losers in trade to the winners. Only in this way could one make up for the transgressions of the past. As before, though, identifying who lost and who gained and by how much would be virtually impossible to achieve, thus making this compensation scheme equally unworkable.

Key Takeaways

- One major problem with movements to free trade is the redistribution of income described in many trade models. This means that although some individuals will benefit from free trade, many others will lose.
- One way to deflect the redistribution concern is to argue that economic analysis provides the positive results of trade policies and is not intended to answer the normative questions of what should be done.
- Another way to deflect the concern about income redistribution is to support compensation from the winners to the losers to assure that all parties benefit from free trade.
- Because compensation requires an enormous amount of information about who wins and loses from trade, how much they win and lose, and when they win and lose, it is impractical to impossible to completely compensate the losers from free trade in a real-world setting.

? Exercise 11.3.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. A principle that, if applied in practice, could eliminate the negative impacts of income redistribution that may arise with free trade.
   b. This is what many trade models show will happen to national income because of trade liberalization.
   c. This type of compensation can avoid affecting consumption and production decisions.
   d. The compensation using these two government policies is likely to affect production and consumption decisions.

e. The name of the mythical character best associated with lump-sum compensation.
f. Of *a little* or *a lot*, this is how much information the government needs to make compensation effective.

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11.4: The Case for Selected Protection 11.4: The Case for Selected ProtectionEdit Update titlecancel

Learning Objectives

1. Identify the cases in which the implementation of selected protectionism, targeted at particular industries with particular goals in mind, could raise national welfare.

An argument for **selected protection** arises in the presence of imperfectly competitive markets, market distortions, or both. In these cases, it is often possible to show that an appropriately targeted trade policy (selected protection) can raise aggregate economic efficiency. In other words, free trade need not always be the best policy choice when the objective is to maximize national welfare. Numerous examples found in the trade literature demonstrate that selected protectionism applied under certain circumstances can raise national welfare. These results are in contrast with the standard trade models, which show that free trade is the best policy to maximize economic efficiency. The reason for the conflict is that the standard trade models, in most cases, explicitly assume that markets are perfectly competitive and implicitly assume there are no market distortions.

This general criticism of the standard case for free trade begins by noting that the real world is replete with examples of market imperfections and distortions. These include the presence of externalities both static and dynamic, both positive and negative, and in both production and consumption; markets in which production takes place with monopolistic or oligopolistic firms making positive profits; markets that do not clear, as when unemployment arises; the presence of public goods; the presence of imperfect or asymmetric information; the presence of distorting government policies and regulations; and the presence of national market power in international markets. When these features are included in trade models, it is relatively easy to identify trade policies that can sufficiently correct the market imperfection or distortion so as to raise aggregate efficiency.

For example, an optimal tariff or optimal quota set by a country that is large in an international import market can allow the nation to take advantage of its monopsony power in trade and cause an increase in national welfare. Similarly, an optimal export tax or voluntary export restraint (VER) set by a large country in an international export market will allow it to take advantage of its monopoly power in trade and generate an increase in welfare. This argument for protection is known as the “terms of trade argument.”

A tariff applied to protect an import-competing industry from a surge in foreign imports may reduce or eliminate the impending unemployment in the industry. If the cost of unemployment to the affected workers is greater than the standard net national welfare effect of the tariff, then the tariff may improve national welfare.

A tariff used to restrict imports of goods from more-efficient foreign firms may sufficiently stimulate learning effects within an industry to cause an increase in productivity that, in time, may allow the domestic firms to compete with foreign firms—even without continued protection. These learning effects—in organizational methods, in management techniques, in cost-cutting procedures—might in turn spill over to other sectors in the economy, stimulating efficiency improvements in many other industries. All together, the infant industry protection may cause a substantial increase in the growth of the gross domestic product (GDP) relative to what might have occurred otherwise and thus act to improve national welfare.

A tariff used to stimulate domestic production of a high-technology good might spill over to the research and development division and cause more timely innovations in next-generation products. If these firms turn into industry leaders in these next-generation products, then they will enjoy the near-monopoly profits that accrue to the original innovators. As long as these long-term profits outweigh the short-term costs of protection, national welfare may rise.

An import tariff applied against a foreign monopoly supplying the domestic market can effectively shift profits from the foreign firm to the domestic government. Despite the resulting increase in the domestic price, national welfare may still rise. Also, export subsidies provided to domestic firms that are competing with foreign firms in an oligopoly market may raise domestic firms’ profits by more than the cost of the subsidy, especially if profits can be shifted away from the foreign firms. These two cases are examples of a strategic trade policy.

If pollution, a negative production externality, caused by a domestic import-competing industry is less than the pollution caused by firms in the rest of the world, then a tariff that restricts imports may sufficiently raise production by the domestic firm relative to foreign firms and cause a reduction in world pollution. If the benefits that accrue due to reduced worldwide pollution are greater than the standard cost of protection, then the tariff will raise world welfare.

Alternatively, if pollution is caused by a domestic export industry, then an export tax would reduce domestic production along with the domestic pollution that the production causes. Although the export tax may act to raise production and pollution in the rest of the world, as long as the domestic benefits from the pollution reduction outweigh the costs of the export tax, domestic national welfare may rise.

If certain domestically produced high-technology goods could wind up in the hands of countries that are our potential enemies, and if these goods would allow those countries to use the products in a way that undermines our national security, then the government could be justified to impose an export prohibition on those goods to those countries. In this case, if free trade were allowed in these products, it could reduce the provision of a public good, namely, national security. As long as the improvement in national security outweighs the cost of the export prohibition, national welfare would rise.

These are just some of the examples (many more are conceivable) in which the implementation of selected protectionism, targeted at particular industries with particular goals in mind, could act to raise national welfare, or aggregate economic efficiency. Each of these arguments is perfectly valid conceptually. Each case arises because of an assumption that some type of market imperfection or market distortion is present in the economy. In each case, national welfare is enhanced because the trade policy reduces or eliminates the negative effects caused by the presence of the imperfection or distortion and because the reduction in these effects can outweigh the standard efficiency losses caused by the trade policy.

It would seem from these examples that a compelling case can certainly be made in support of selected protectionism. Indeed, Paul Krugman (1987) wrote that "the case for free trade is currently more in doubt than at any time since the 1817 publication of [David] Ricardo's *Principles of Political Economy*."See Paul Krugman, "Is Free Trade Passe?" *Journal of Economic Perspectives* 1, no. 2 (1987): 131–44. Many of the arguments showing the potential for welfare-improving trade policies described above have been known for more than a century. The infant industry argument can be traced in the literature as far back as a century before Adam Smith argued against it in *The Wealth of Nations* (1776). The argument was later supported by writers such as Friedrich List in *The National System of Political Economy* (1841)See Friedrich List, *The National System of Political Economy*, McMaster University Archive for the History of Economic Thought, socserv2.socsci.mcmaster.ca:80/~econ/ugcm/3ll3/list/index.html. and John Stuart Mill in his *Principles of Political Economy* (1848).See John Stuart Mill, *Principles of Political Economy*, McMaster University Archive for the History of Economic Thought, socserv2.socsci.mcmaster.ca:80/~econ/ugcm/3ll3/mill/index.html. The terms of trade argument was established by Robert Torrens in 1844 in *The Budget: On Commercial and Colonial Policy*.See Robert Torrens, *The Budget: On Commercial and Colonial Policy* (London: Smith, Elder, 1844). Frank Graham, in his 1923 article "Some Aspects of Protection Further Considered," noted the possibility that free trade would reduce welfare if there were variable returns to scale in production.See Frank Graham, "Some Aspects of Protection Further Considered," *The Quarterly Journal of Economics* 37, no. 2 (February 1923): 199–227. During the 1950s and 1960s, market distortions such as factor-market imperfections and externality effects were introduced and studied in the context of trade models. The strategic trade policy arguments are some of the more recent formalizations showing how market imperfections can lead to welfare-improving trade policies. Despite this long history, economists have generally continued to believe that free trade is the best policy choice. The main reason for this almost unswerving support for free trade is because as arguments supporting selected protectionism were developed, equally if not more compelling counterarguments were also developed.

Key Takeaways

- In the presence of market imperfections or distortions, selected protection can often raise a country's national welfare.
- Because real-world markets are replete with market imperfections and distortions, free trade is not the optimal policy to improve national welfare.

? Exercise 11.4.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is "a tax on imports," then the correct question is "What is a tariff?"
   a. The term used to describe market conditions that open up the possibility for welfare-improving trade policies.
   b. The term used to describe a market equilibrium in which market imperfections or distortions are present.
   c. Of *very many* or *very few*, this is the amount of market imperfections likely to be present in modern national economies.
   d. Of *true* or *false*, a tariff can raise a nation's welfare when it is a large importing country.
   e. Of *true* or *false*, a tariff can raise national welfare in the presence of an infant industry.
   f. Of *true* or *false*, a tariff can raise national welfare if all markets are perfectly competitive and if there are no market imperfections or distortions.

2. Identify a trade policy that can potentially raise national welfare in each of the following situations.
    a. When a foreign monopoly supplies the domestic market with no import-competing producers.
    b. When a domestic negative production externality is caused by a domestic industry that exports a portion of its production to the rest of the world.
    c. When a positive production externality is caused by a domestic industry that competes with imports.
    d. When a domestic negative consumption externality is caused by domestic consumers in a market in which the country exports a portion of its production to the rest of the world.
    e. When a country is large in an export market.

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11.5: The Economic Case against Selected Protection 11.5: The Economic Case against Selected ProtectionEdit Update titlecancel

Learning Objectives

1. Learn the valid counterarguments to the use of selected protection when market imperfections or distortions are present.

The economic case against selected protectionism does not argue that the reasons for protection are conceptually or theoretically invalid. Indeed, there is general acceptance among economists that free trade is probably not the best policy in terms of maximizing economic efficiency in the real world. Instead, the counterarguments to selected protectionism are based on four broad themes:

1. potential reactions by others in response to one country's protection,
2. the likely presence of superior policies to raise economic efficiency relative to a trade policy,
3. information deficiencies that can inhibit the implementation of appropriate policies, and
4. problems associated with lobbying within democratic political systems. We shall consider each of these issues in turn.

The Potential for Retaliation

One of the problems with using some types of selected protection arises because of the possibility of retaliation by other countries using similar policies. For example, it was shown that whenever a large country in the international market applies a policy that restricts exports or imports (optimally), its national welfare will rise. This is the terms of trade argument supporting protection. However, it was also shown that the use of an optimal trade policy in this context always reduces national welfare for the country's trade partners. Thus the use of an optimal tariff, export tax, import quota, or voluntary export restraint (VER) is a "beggar-thy-neighbor" policy—one country benefits only by harming others. For this reason, it seems reasonable, if not likely, that the countries negatively affected by the use of such policies, if they are also large in international markets, would retaliate by setting optimal trade policies restricting their exports and imports to the rest of the world. In this way, the retaliating country could generate benefits for itself in some markets to compensate for its losses in others.

However, the final outcome after retaliation occurs is very likely to be a reduction in national welfare for both countries.Harry Johnson (1953) showed the possibility that one country might still improve its national welfare even after a trade war (i.e., optimal protection followed by optimal retaliation); however, this seems an unlikely outcome in real-world cases. Besides, even if one country did gain, it would still do so at the expense of its trade partners, which remains an unsavory result. See Harry G. Johnson, "Optimum Tariffs and Retaliation," *Review of Economic Studies* 21, no. 2 (1953): 142–53. This occurs because each trade policy action results in a decline in world economic efficiency. The aggregate losses that accrue to one country as a result of the other's trade policy will always exceed the benefits that accrue to the policy-setting country. When every large country sets optimal trade policies to improve its terms of trade, the subsequent reduction in world efficiency dominates any benefits that accrue due to its unilateral actions.

What this implies is that although a trade policy can be used to improve a nation's terms of trade and raise national welfare, it is unlikely to raise welfare if other large countries retaliate and pursue the same policies. Furthermore, retaliation seems a likely response because maintenance of a free trade policy in light of your trade partner's protection would only result in national aggregate efficiency losses.Indeed, Robert Torrens, the originator of the terms of trade argument, was convinced that a large country should maintain protective barriers to trade when its trade partners maintained similar policies. The case for unilateral free trade even when one's trade partners use protective tariffs is only valid when a country is small in international markets.

Perhaps the best empirical support for this result is the experience of the world during the Great Depression of the 1930s. After the United States imposed the Smoot-Hawley Tariff Act of 1930, raising its tariffs to an average of 60 percent, approximately sixty countries retaliated with similar increases in their own tariff barriers. As a result, world trade in the 1930s fell to one-quarter of the level attained in the 1920s. Most economists agree that these tariff walls contributed to the length and severity of the economic depression. That experience also stimulated the design of the reciprocal trade liberalization efforts embodied in the General Agreement on Tariffs and Trade (GATT).

The issue of retaliation also arises in the context of strategic trade policies. In these cases, a trade policy can be used to shift profits from foreign firms to the domestic economy and raise domestic national welfare. The policies work in the presence of monopolistic or oligopolistic markets by raising the international market share for one's own firms. The benefits to the policy-setting country arise only by reducing the profits of foreign firms and subsequently reducing those countries' national welfare.One exception arises

in the model by J. Eaton and G. Grossman, "Optimal Trade and Industrial Policy under Oligopoly," *Quarterly Journal of Economics* 101, no. 2 (1986): 383–406. Thus one country's gains are other country's losses, and strategic trade policies can rightfully be called beggar-thy-neighbor policies. Since foreign firms would lose from our country's policies, as before, it is reasonable to expect retaliation by the foreign governments. However, because these policies essentially just reallocate resources among profit-making firms internationally, it is unlikely for a strategic trade policy to cause an improvement in world economic efficiency. This implies that if the foreign country did indeed retaliate, the likely result would be reductions in national welfare for both countries.

Retaliations would only result in losses for both countries when the original trade policy does not raise world economic efficiency. However, some of the justifications for protection that arise in the presence of market imperfections or distortions may actually raise world economic efficiency because the policy acts to eliminate some of the inefficiencies caused by the distortions. In these cases, retaliation would not pose the same problems. There are other problems, though.

The Theory of the Second Best

One of the more compelling counterarguments to potentially welfare-improving trade policies relies on the theory of the second best. This theory shows that when private markets have market imperfections or distortions present, it is possible to add another (carefully designed) distortion, such as a trade policy, and improve economic efficiency both domestically and worldwide. The reason for this outcome is that the second distortion can correct the inefficiencies of the first distortion by more than the inefficiencies caused by the imposed policy. In economist's jargon, the original distorted economy is at a second-best equilibrium. In this case, the optimal trade policy derived for an undistorted economy (most likely free trade) no longer remains optimal. In other words, policies that would reduce national welfare in the absence of distortions can now improve welfare when there are other distortions present.

This argument, then, begins by accepting that trade policies (protection) can be welfare improving. The problem with using trade policies, however, is that in most instances they are a second-best policy choice. In other words, there will likely be another policy —a domestic policy—that could improve national welfare at a lower cost than any trade policy. The domestic policy that dominates would be called a first-best policy. The general rule used to identify first-best policies is to use that policy that "most directly" attacks the market imperfection or distortion. It turns out that these are generally domestic production, consumption, or factor taxes or subsidies rather than trade policies. The only exceptions occur when a country is large in international markets or when trade goods affect the provision of a public good such as national security.

Thus the counterargument to selected protection based on the theory of the second best is that first-best rather than second-best policies should be chosen to correct market imperfections or distortions.

Since trade policies are generally second best while purely domestic policies are generally first best, governments should not use trade policies to correct market imperfections or distortions. Note that this argument does not contend that distortions or imperfections do not exist, nor does it assume that trade policies could not improve economic efficiency in their presence. Instead, the argument contends that governments should use the most efficient (least costly) method to reduce inefficiencies caused by the distortions or imperfections, and this is unlikely to be a trade policy.

Note that this counterargument to protection is also effective when the issue is income distribution. Recall that one reason countries may use trade policies is to achieve a more satisfying income distribution (or to avoid an unsatisfactory distribution). However, it is unlikely that trade policies would be the most effective method to eliminate the problem of an unsatisfactory income distribution. Instead, there will likely be a purely domestic policy that could improve income distribution more efficiently.

In the cases where a trade policy is first best, as when a country is large in international markets, this argument does not act as a counterargument to protection. However, retaliation remains a valid counterargument in many of these instances.

Information Deficiencies

The next counterargument against selected protectionism concerns the likely informational constraints faced by governments. In order to effectively provide infant industry protection, or to eliminate negative externality effects, stimulate positive externality effects, or shift foreign profits to the domestic economy, the government would need substantial information about the firms in the market, their likely cost structures, supply and demand elasticities indicating the effects on supply and demand as a result of price changes, the likely response by foreign governments, and much more. Bear in mind that although it was shown that selected protection *could* generate an increase in national welfare, it does not follow that any protection would *necessarily* improve national welfare. The information requirements arise at each stage of the government's decision-making process.

First, the government would need to identify which industries possess the appropriate characteristics. For example, in the case of infant industries, the government would need to identify which industries possess the positive learning externalities needed to make the protection work. Presumably, some industries would generate these effects, while others would not. In the case of potential unemployment in a market, the government would need to identify in which industries facing a surge of imports the factor immobility was relatively high. In the case of a strategic trade policy, the government would have to identify which industries are oligopolistic and exhibit the potential to shift foreign profits toward the domestic economy.

Second, the government would need to determine the appropriate trade policy to use in each situation and set the tariff or subsidy at the appropriate level. Although this is fairly straightforward in a simple theoretical model, it may be virtually impossible to do correctly in a real-world situation. Consider the case of an infant industry. If the government identified an industry with dynamic intertemporal learning effects, it would then need to measure how the level of production would influence the size of the learning effects in all periods in the future. It would also need to know how various tariff levels would affect the level of domestic production. To answer this requires information about domestic and foreign supply and demand elasticities. Of course, estimates of past elasticities may not work well, especially if technological advances or preference changes occur in the future. All of this information is needed to determine the appropriate level of protection to grant as well as a timetable for tariff reduction. If the tariff is set too low or for too short a time, the firms might not be sufficiently protected to induce adequate production levels and stimulate the required learning effects. If the tariff is set too high or for too long a period, then the firms might become lazy. Efficiency improvements might not be made and the learning effects might be slow in coming. In this case, the production and consumption efficiency losses from the tariff could outweigh the benefits accruing due to learning.

This same information deficiency problem arises in every example of selected protection. Of course, the government would not need pinpoint accuracy to assure a positive welfare outcome. As demonstrated in the case of optimal tariffs, there would be a range of tariff levels that would raise national welfare above the level attained in free trade. A similar range of welfare-improving protection levels would also hold in all the other cases of selected protection.

However, there is one other informational constraint that is even ignored in most economic analyses of trade policies. This problem arises when there are multiple distortions or imperfections present in the economy simultaneously (exactly what we would expect to see in the real world). Most trade policy analyses incorporate one economic distortion into a model and then analyze what the optimal trade policy would be in that context. Implicitly, this assumes either that there are no other distortions in the economy or that the market in which the trade policy is being considered is too small to have any external effects on other markets. The first assumption is clearly not satisfied in the world, while the second is probably not valid for many large industries.

The following example suggests the nature of the informational problem. Suppose there are two industries that are linked together because their products are substitutable in consumption to some degree. Suppose one of these industries exhibits a positive dynamic learning externality and is having difficulty competing with foreign imports (i.e., it is an infant industry). Assume the other industry heavily pollutes the domestic water and air (i.e., it exhibits a negative production externality). Now suppose the government decides to protect the infant industry with an import tariff. This action would, of course, stimulate domestic production of the good and also stimulate the positive learning effects for the economy. However, the domestic price of this good would rise, reducing domestic consumption. These higher prices would force consumers to substitute other products in consumption. Since the other industry's products are assumed to be substitutable, demand for that industry's goods will rise. The increase in demand would stimulate production of that good and, because of its negative externality, cause more pollution to the domestic environment. If the negative effects to the economy from additional pollution are greater than the positive learning effects, then the infant industry protection could reduce rather than improve national welfare.

The point of this example, however, is to demonstrate that in the presence of multiple distortions or imperfections in interconnected markets (i.e., in a general equilibrium model), the determination of optimal policies requires that one consider the intermarket effects. The optimal infant industry tariff must take into account the effects of the tariff on the polluting industry. Similarly, if the government wants to set an optimal environmental policy, it would need to account for the effects of the policy on the industry with the learning externality.

This simple example suggests a much more serious informational problem for the government. If the real economy has numerous market imperfections and distortions spread out among numerous industries that are interconnected through factor or goods market competition, then to determine the true optimal set of policies that would correct or reduce all the imperfections and distortions simultaneously would require the solution to a dynamic general equilibrium model that accurately describes the real economy not only today but also in all periods in the future. This type of model, or its solution, is simply not achievable today with any high degree of accuracy. Given the complexity, it seems unlikely that we would ever be capable of producing such a model.

The implication of this informational problem is that trade policy will always be like a shot in the dark. There is absolutely no way of knowing with a high degree of accuracy whether any policy will improve economic efficiency. This represents a serious blow to the case for government intervention in the form of trade policies. If the intention of government is to set trade policies that will improve economic efficiency, then since it is impossible to know whether any policy would actually achieve that goal, it seems prudent to avoid the use of any such policy. Of course, the goal of government may not be to enhance economic efficiency, and that brings us to the last counterargument against selected protection.

Political Economy Issues: The Problem with Democratic Processes

In democratic societies, government representatives and officials are meant to carry out the wishes of the general public. As a result, decisions by the government are influenced by the people they represent. Indeed, one of the reasons “free speech” is so important in democratic societies is to assure that individuals can make their attitudes toward government policies known without fear of reproach. Individuals must be free to inform the government of which policies they approve and of which they disapprove if the government is truly to be a representative of the people. The process by which individuals inform the government of their preferred policies is generally known as lobbying.

In a sense, one could argue that lobbying can help eliminate some of the informational deficiencies faced by governments. After all, much of the information the government needs to make optimal policies is likely to be better known by its constituent firms and consumers. Lobbying offers a process through which information can be passed from those directly involved in production and consumption activities to the officials who determine policies. However, this process may turn out to be more of a problem than a solution.

One of the results of trade theory is that the implementation of trade policies will likely affect income distribution. In other words, all trade policies will generate income benefits to some groups of individuals and income losses to other groups. Another outcome, though, is that the benefits of protection would likely be concentrated—that is, the benefits would accrue to a relatively small group. The losses from protection, however, would likely be dispersed among a large group of individuals.

This outcome was seen clearly in the partial equilibrium analysis of a tariff. When a tariff is implemented, the beneficiaries would be the import-competing firms, which would face less competition for their product, and the government, which collects tariff revenue. The losses would accrue to the thousands or millions of consumers of the product in the domestic economy.

For example, consider a tariff on textile imports being considered by the government of a small, perfectly competitive economy. Theory shows that the sum of the benefits to the government and the firms will be exceeded by the losses to consumers. In other words, national welfare would fall. Suppose the beneficiaries of protection are one hundred domestic textile firms that would each earn an additional $1 million in profit as a result of the tariff. Suppose the government would earn $50 million in additional tariff revenue. Thus the total benefits from the tariff would be $150 million. Suppose consumers as a group would lose $200 million, implying a net loss to the economy of $50 million. However, suppose there are one hundred million consumers of the products. That implies that each individual consumer would lose only $2.

Now, if the government bases its decision for protection on input from its constituents, then it is very likely that protection will be granted even though it is not in the nation’s best interest. The reason is that textile firms would have an enormous incentive to lobby government officials in support of the policy. If each firm expects an extra $1 million, it would make sense for the firms to hire a lobbying firm to help make their case before the government. The arguments to be used, of course, are (1) the industry will decline and be forced to lay off workers without protection, thus protection will create jobs; (2) the government will earn additional revenues that can be used for important social programs; and (3) the tax is on foreigners and is unlikely to affect domestic consumers (number 3 isn’t correct, of course, but the argument is often used anyway). Consumers, on the other hand, have very little individual incentive to oppose the tariff. Even writing a letter to your representative is unlikely to be worth the $2 potential gain. Plus, consumers would probably hear (if they hear anything at all) that the policy will create some jobs and may not affect the domestic price much anyway (after all, the tax is on foreigners).

The implication of this problem is that the lobbying process may not accurately relate to the government the relative costs and benefits that will arise due to the implementation of a trade policy. As a result, the government would likely implement policies that are in the special interests of those groups who stand to accrue the concentrated benefits from protection, even though the policy may generate net losses to the economy as a whole. Thus by maintaining a policy of free trade, an economy could avoid national efficiency losses that could arise with lobbying in a democratic system.

Key Takeaways

- Selected protection may fail to raise national welfare when foreign country retaliations occur. This is a potential problem when many countries are large in international markets.
- Selected protection with a trade policy is typically second best. A purely domestic policy to correct the market imperfection is often the better, or first-best, policy.
- Selected protection requires detailed information in order to set the policy at a level that will assure an improvement in national welfare. Because the necessary information is often lacking, getting selected protection right may be impossible.
- Selected protection can be captured by special interests in the lobbying process in representative democracies, thereby making it less likely that maximum national welfare will be achieved.

Exercise 11.5.1

1. **Jeopardy Questions**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The term used to describe a potentially welfare-reducing reaction to beggar-thy-neighbor trade policies.
   b. The term used to describe the lowest-cost policy action that corrects for market distortions or imperfections.
   c. The often overlooked deficiencies that affect the ability of government to set effective policies.
   d. The term used to describe the process by which individuals inform the government of their preferred policies.
   e. Economists applying the theory of the second best would argue that free trade is appropriate in spite of market imperfections because *these types of policies* are usually first best.

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11.6: Free Trade as the "Pragmatically Optimal" Policy Choice 11.6: Free Trade as the "Pragmatically Optimal" Policy ChoiceEdit Update titlecancel

Learning Objectives

1. Understand the modern argument for free trade as a “pragmatically optimal” policy choice.

In summary, the economic argument in support of free trade is a sophisticated argument that is based on the interpretation of results from the full collection of trade theories developed over the past two or three centuries. These theories, taken as a group, do not show that free trade is the best policy for every individual in all situations. Instead, the theories show that there are valid arguments supporting both free trade and protectionism. To choose between the two requires a careful assessment of the pros and cons of each policy regime.

The argument for free trade presented here accepts the notion that free trade may not always be optimal in terms of maximizing economic efficiency. The argument also accepts that free trade may not generate the most preferred distribution of income. In theory, there are numerous cases in which selected protectionism can improve aggregate welfare or could establish a more equal distribution of income. Nevertheless, despite these theoretical possibilities, it remains unclear and perhaps unlikely that selected protectionism could achieve the intended results. First, in many instances, a trade policy is not the best way to achieve the intended improvement in economic efficiency, nor is it likely to be the most efficient way to achieve a more satisfactory distribution of income. Instead, purely domestic tax and subsidy policies dominate. Second, even when a trade policy is the best policy choice, the possibility of retaliations and the likelihood of informational deficiencies or distortions caused by the lobbying process are sufficiently large as to make the intended outcomes unknowable.

In addition, the process of information collection, lobbying, and policy implementation is a costly economic activity. Labor and capital resources are allocated by interest groups attempting to affect policies favorable to them. The government also must expend resources to gather information, to implement and administer policies, and to monitor the effectiveness of these policies. In the United States, the following agencies and groups devote at least some of their time to trade policy implementation: the Office of the United States Trade Representative, the International Trade Commission, the Department of Commerce, the Federal Trade Commission, the Department of Justice, the Congress, and the president, among others. One must wonder whether the cost of this bureaucracy, together with the cost to the private sector to influence the decisions of the government, is worth it, especially when the outcomes are virtually unknowable.

Thus the conclusion reached by many economists is that while free trade may not be “technically optimal,” it remains “pragmatically optimal.” That is, given our informational deficiencies and the other problems inherent in any system of selected protectionism, free trade remains the policy most likely to produce the highest level of economic efficiency attainable.

Key Takeaways

- While free trade may not be “technically optimal,” it remains “pragmatically optimal”—that is, free trade remains the policy most likely to produce the highest level of economic efficiency that is practically attainable.

Exercise \(\PageIndex{1}\)

1. **Jeopardy Question**. As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
   a. The term used to describe a policy that is relatively easy to implement and has strong positive characteristics but may not be best in all conceivable circumstances.

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absolute advantage | A country has an absolute advantage in the production of a good if it can produce the good at a lower labor cost and if labor productivity in the good is higher than in another country.

Antidumping laws | Laws that provide protection to domestic import-competing firms that can show that foreign imported products are being "dumped" in the domestic market.

Antisubsidy laws | Laws that provide protection to domestic import-competing firms that can show that foreign imported products are being directly subsidized by the foreign government.

autarky | The situation in which a country does not trade with the rest of the world.

capital constraint | A relationship showing that the sum of the capital used in all industries cannot exceed total capital endowment in the economy.

capital endowment | The total amount of capital resources available to work in an economy during some period of time.

capital-labor ratio | The ratio of the quantity of capital to the quantity of labor used in a production process.

comparative advantage | A country has a comparative advantage when it can produce a good at a lower opportunity cost than another country; alternatively, when the relative productivities between goods compared with another country are the highest.

Domestic factor mobility | When productive factors like labor, capital, land, natural resources, and so on can be reallocated across sectors within a domestic economy.

economic efficiency | The extent to which economic resources are transformed into products generating utility to consumers. Efficiency improves whenever greater output occurs per unit of input or when more satisfying consumption bundles are obtained.

Economies of scale | The feature of many production processes in which the per-unit cost of producing a product falls as the scale of production rises.

Endogenous variables | A variable whose value is determined as an outcome of, or solution to, the model. In the Ricardian model, the allocation of workers to production, the quantities of the goods produced, and the terms of trade are endogenous.

Exogenous variables | A variable whose value is determined external to the model and whose value is known to the agents in the model. In the Ricardian model, the unit labor requirements and the labor endowment are exogenous.

Factor mobility | The ability to move factors of production—labor, capital, or land—out of one production process and into another.

free and costless mobility | Factors that can be moved by their owners to another production process without impediment and without incurring any adjustment costs.

Heckscher-Ohlin (H-O) theorem | A theorem that predicts the pattern of trade in the H-O model. It states that the capital-abundant country will export the capital-intensive good and the labor-abundant country will export the labor-intensive good.

homogeneous | Goods, or production factors, that are identical and thus perfectly substitutable in consumption, or production.

immobile factor model | A standard Ricardian model with one variation in its assumptions, namely, that labor, the sole factor of production, is immobile between industries within a country.

income redistribution | Occurs when some individuals gain income while others lose or when individuals gain and lose income shares of total income.

increasing returns to scale | The feature of many production processes in which the productivity of a product increases as the scale of production rises.

intraindustry trade | Trade between countries that occurs within the same industry; for example, when a country exports and imports automobiles.

labor abundant | A country is labor abundant relative to another country if it has a higher labor endowment per capital endowment than the other country.

labor constraint | A relationship showing that the sum of the labor used in all industries cannot exceed total labor endowment in the economy.

labor endowment | The total amount of labor resources available to work in an economy during some period of time.

labor intensive | An industry is labor intensive relative to another industry if it has a higher labor-capital ratio in the production process.

Labor productivity | The quantity of a good that can be produced per unit of labor input. It is the reciprocal of the unit labor requirement.

magnification effect for prices | A relationship in the H-O model that specifies the magnitude of factor price changes in response to changes in the output prices. It is used to identify the real wage and real rent effects of output price changes.

magnification effect for quantities | A relationship in the H-O model that specifies the magnitude of output changes in response to changes in the factor endowments.

Monopolistic competition | A market structure that is a cross between the two extremes of perfect competition and monopoly.

monopoly | An individual or firm that is the sole seller of a product in a market.

monopsony | An individual or firm that is the sole buyer of a product in a market.

Most-favored nation (MFN) | The nondiscriminatory treatment toward identical or highly substitutable goods coming from two different countries.

mutually voluntary exchange | A trade of one item for another chosen willingly (i.e., without coercion) by both individuals in a market.

National treatment | The nondiscriminatory treatment of identical or highly substitutable domestically produced goods with foreign goods once the foreign products have cleared customs.

Opportunity cost | The value or quantity of something that must be given up to obtain something else. In the Ricardian model, opportunity cost is the amount of a good that must be given up to produce one more unit of another good.

production possibility frontier (PPF) | The set of all output combinations that could be produced in a country when all the labor inputs are fully employed. In the Ricardian model, the PPF is linear.

real wage | The quantity of a good that can be purchased per unit of work. Real wage is a measure of the purchasing power of a wage and is an effective measure of well-being.

Rybczynski theorem | A theorem that specifies how changes in endowments affect production levels in the H-O model. It states that an increase in a country's endowment of a factor will cause an increase in the output of the good that uses that factor intensively and a decrease in the output of the other good.

Safeguard laws | Laws that provide protection to domestic import-competing firms that suffer a surge of imports.

Stolper-Samuelson theorem | A theorem that specifies how changes in output prices affect factor prices in the H-O model. It states that an increase in the price of a good will cause an increase in the price of the factor used intensively in that industry and a decrease in the price of the other factor.

tariff-rate quota | a low tariff set on a fixed quota of imports and a high tariff set on any imports that occur over that quota.

terms of trade | The amount of one good traded per unit of another in a mutually voluntary exchange. Often expressed as a ratio of prices and measured as a ratio of units; for example, pounds of cheese per gallon of wine.

unit labor requirements | The quantity of labor needed to produce one unit of a good.

value of the marginal product | The increment in revenue that a firm will obtain by adding another unit of labor to its production process.

World Trade Organization (WTO) | An international agency whose purpose is to monitor and enforce the Uruguay Round trade liberalization agreements and to promote continuing liberalizing initiatives with continuing rounds of negotiation.

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