

**Tashkent State University of Economics**

**Department of International business**

*Course lectures on International Trade*

**Prepared by I. I. Norqulov**

**Approved by**

**Tashkent 2005**

## Contents

<b>Technology of teaching students (International Trade)</b>	<b>3</b>
<b>Literature review on International Trade</b>	<b>4</b>
<b>Lecture 1. International Trade History and Current trade Issues</b>	<b>7</b>
<b>Lecture 2. Classic theories of International Trade</b>	<b>26</b>
<b>Lecture 3. Economies of Scale and International Trade</b>	<b>85</b>
<b>Lecture 4. Monopolistic Competition</b>	<b>92</b>
<b>Lecture 5. Trade Policy Effects with Perfectly Competitive Markets</b>	<b>100</b>
<b>Lecture 6. Domestic Policies – Overview</b>	<b>138</b>
<b>Lecture 7. The Theory of the Second-Best</b>	<b>158</b>
<b>Lecture 8. Political Economy and Trade – Overview</b>	<b>197</b>
<b>Lecture 9. Economic Integration: Overview</b>	<b>214</b>
<b>Lecture 10. Controversy between Free Trade and Protectionism</b>	<b>234</b>
<b>Slide materials</b>	
<b>Topics recommended for graduation or diploma works</b>	

## **Technology of teaching students (International Trade)**

The course of International Trade is designed for the 4<sup>th</sup> year students of International Business Faculty. Taking in account that students have already studied such subjects as International Trade, International Economic Relations International Marketing, Management and Mathematics for Economists, most of the issues in this course should be familiar to the students.

The course will be organized on the interactive basis. Practice of most of the leading Universities of the world has shown that active involvement of students in both lectures and tutorials gives better results than the method where mostly Lecturers speak most of the time.

In order to do so the handouts for the next lectures will be distributed to the students in advance. It will help students be prepared for the class. Before the class students will know main aspects of the topic. During the lecture, which is organized on the interactive basis, students will elaborate their knowledge of the topic. During the tutorials topics will be discussed in a similar way.

Students should feel free to interrupt the Lecturer during lectures to ask and give their own view on the issue and argue.

Besides there will be used some computer programs to explain to students some charts and graphs.

## Literature review on International Trade

1. *Advanced International Trade: Theory and Evidence* by Robert C. Feenstra (Hardcover - December 2, 2003)

### Book Description

*Advanced International Trade* is the first major graduate textbook in international trade in a generation. Trade is a cornerstone concept in economics, taught in all departments both in the United States and abroad. The past twenty years have seen a number of new theoretical approaches that are essential to any graduate international trade course, and will be of interest in development economics and other fields. Here, Robert Feenstra steps beyond theory to consider empirical evidence as well. He covers all the basic material including the Ricardian and Heckscher-Ohlin models, extension to many goods and factors, and the role of tariffs, quotas, and other trade policies; recent material including imperfect competition, outsourcing, political economy, multinationals, and endogenous growth; and new material including the gravity equation and the organization of the firm in international trade.

Throughout the book, special emphasis is placed on integrating the theoretical models with empirical evidence, and this is supplemented by theoretical and empirical exercises that appear with each chapter. *Advanced International Trade* is intended to bring readers to the forefront of knowledge in international trade and prepare them to undertake their own research. Both graduate students and faculty will find a wealth of topics that have previously only been covered in journal articles, and are dealt with here in a common and simple notation. In addition to known results, the book includes some particularly important unpublished results by various authors. Two appendices describe empirical methods applicable to research problems in international trade, methods that draw on (i) index numbers and (ii) discrete choice models. Thoroughly up-to-date and marked by clear, straightforward prose, this book will be used widely--and enthusiastically.

2. *Lectures on International Trade* - 2nd Edition by Jagdish N. Bhagwati, et al (Paperback - July 10, 1998)

### Book Description

The greatest strength of this thoroughly revised and expanded edition of *Lectures on International Trade* is its rigorous algebraic and geometric treatment of the various models and results of trade theory. The authors, who now include Arvind Panagariya, offer both policy insights and

empirical applications. They have added nine entirely new chapters as well as new sections to several existing chapters (e.g., a greatly expanded treatment of the growing theory of preferential trade agreements). The new chapters are on: the specific-factors model the "higher-dimensional" trade theory and empirical verification of the Heckscher-Ohlin-Vanek theory duality in trade theory algebra of the Heckscher-Ohlin and specific-factors models the theories of international trade in the presence of scale economies nontariff instruments of trade policy, chiefly AD, VERs, and VIEs trade policy under oligopoly and monopolistic competition trade policy reform application of the new literature on endogenous growth to trade theory and policy

3. *International Economics: Theory and Policy* (6th Edition) by Paul R. Krugman, Maurice Obstfeld (Hardcover - July 26, 2002)

#### Book description

For anybody - but especially students - interested in exploring the subject of international economics, this is the book to start with. It is illuminating (as it is always the case with Krugman's writings) on otherwise technical concepts as comparative advantage, trade policy and exchange rate determinants, but it is also entertaining, with its "reality checks". The first part of the book deals with the "real" economy, the second part with monetary international economics. It will save you a lot of time to begin your study of the field with this book. If you have had previous experiences with international economics but either forgot most about it or had trouble making sense of the whole thing you will probably get a good grasp of the subject after reading this manual. The bibliography is accurate and rich, the exercises won't give you a headache. Readers with some background in economics are most likely to take full advantage from the book. For the others, well, some introductory economics will be necessary. Once you've read this book, you can continue more safely your studies/readings on international economics.

4. *International Trade: Theory and Evidence* by James R Markusen, et al (Hardcover - November 1, 1994)

#### Book Description

A comprehensive, balanced text, *International Trade: Theory and Evidence* is the perfect book for International Trade courses at the undergraduate level. It is appropriate either as part of a two-term International sequence (trade and finance) or in advanced courses in Trade that follow a one-term International Economics course. It can also be used as a background text for beginning graduate courses. Intermediate Microeconomics is an assumed pre-requisite for students using this text.

## **Introduction to the course of International Trade**

International economics is growing in importance as a field of study because of the rapid integration of international economic markets. More and more, businesses, governments and consumers realize that their lives are increasingly affected, not just by what goes on in their own town, state or country, but by what are happening around the world.

Consumers can buy goods from all over the world in their local shops. Local businesses must compete with these foreign goods. However, these same businesses also have new opportunities to expand their markets by selling in a multitude of other countries. The advance of telecommunications is rapidly reducing the cost of providing services internationally and the World Wide Web will likely change the nature of many products and services as it expands markets even further than today.

Markets are going global, and everyone knows it.

This means that it is increasingly important to understand the implications of a global marketplace on consumers, businesses and governments.

**International trade** is a field in economics which applies *microeconomic* models to help understand the international economy. Its content includes tools that are introduced in microeconomics courses, including supply and demand analysis, firm and consumer behavior, perfectly competitive, oligopolistic and monopolistic market structures, and the effects of market distortions. The typical course describes economic relationships between consumers, firms, factor owners, and the government.

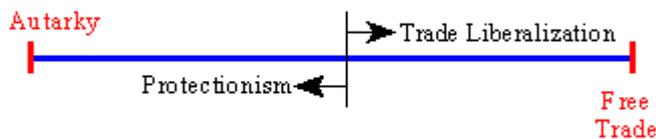
The objective of an international trade course is to understand the effects on individuals and businesses of international trade itself, of changes in trade policies and of changes in economic conditions. The course will develop arguments which support a free trade policy as well as arguments which support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

## Lecture 1. International Trade History and Current trade Issues

### 1.1 Some Trade Terminology

In trade policy discussions terms such as protectionism, free trade, and trade liberalization are used repeatedly. It is worthwhile to define these terms at the beginning. One other term is commonly used in the analysis of trade models, namely national autarky, or just autarky.

Two extreme states or conditions could potentially be created by national policies. At one extreme, a government could pursue a "laissez faire" policy with respect to trade and thus impose no regulation whatsoever that would impede (or encourage) the free voluntary exchange of goods between nations. We define this condition as free trade. At the other extreme, a government could impose such restrictive regulations on trade as to eliminate all incentive for international trade. We define this condition in which no international trade occurs as national autarky. Autarky represents a state of isolationism. (See Figure).



Probably, a pure state of free trade or autarky has never existed in the real world. All nations impose some form of trade policies. And probably no government has ever had such complete control over economic activity as to eliminate cross-border trade entirely. The real world instead consists of countries that fall somewhere between these two extremes. Some countries, such as Singapore and Hong Kong, are considered to be highly free trade oriented. Others, like North Korea and Cuba, have long been viewed as relatively closed economies and thus closer to the state of autarky. The rest of the world lies somewhere in between.

Most policy discussions are not about whether governments should pursue one of these two extremes. Instead discussions focus on which direction a country should move along the trade spectrum. Since every country today is somewhere in the middle, discussions focus on whether policies should move the nation in the direction of free trade or in the direction of autarky. A movement in the direction of autarky occurs

whenever a new trade policy is implemented since it further restricts the free flow of goods and services between countries. Since new trade policies invariably benefit domestic industries by reducing international competition, it is referred to as protectionism. A movement in the direction of free trade occurs when regulations on trade are removed. Since the elimination of trade policies will generally increase the amount of international trade, it is referred to as trade liberalization. Trade policy discussions typically focus then on whether the country should increase protectionism or whether it should pursue trade liberalization.

Note that, according to this definition of protectionism, even policies that encourage trade, such as export subsidies, are considered protectionist since they change the trades from what would have been made in the absence of government intervention. This implies that protectionism is much more complex than can be represented along one dimension since protection can both increase and decrease trade flows. Nevertheless, the representation of the trade spectrum will be useful in a number of ways.

## **1.2 Trade Policy Tools**

Trade policies come in many varieties. Generally they consist of either taxes or subsidies, quantitative restrictions or encouragements, on either imported or exported goods, services and assets. In this section we describe many of the policies that countries have implemented or have proposed implementing. For each policy we present examples of their use in the US or in other countries. The purpose of this section is not to explain the likely effects of each policy, but rather to define and describe the use of each policy.

- Import Tariffs
- Import Quotas
- Voluntary Export Restraints (VERs)
- Export Taxes
- Export Subsidies
- Voluntary Import Expansions (VIEs)
- Other Trade Policies

### *Import Tariffs*

An import tariff is a tax collected on imported goods. Generally speaking, a tariff is any tax or fee collected by a government. Sometimes

tariff is used in a non-trade context, as in railroad tariffs. However, the term is much more commonly applied to a tax on imported goods.

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 US government levies a 5.1 cent specific tariff on every wristwatch imported into the US. Thus, if 1000 watches are imported, the US government collects \$51 in tariff revenue. In this case, \$51 is collected whether the watch is a \$40 Swatch or a \$5000 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 US currently levies a 2.5% ad valorem tariff on imported automobiles. Thus if \$100,000 worth of autos are imported, the US government collects \$2,500 in tariff revenue. In this case, \$2500 is collected whether two \$50,000 BMWs are imported or ten \$10,000 Hyundais.

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 US face the 5.1 cent specific tariff as well as a 6.25% ad valorem tariff on the case and the strap and a 5.3% 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. One exception to this occurred in 1971 when President Nixon, in a last-ditch effort to save the Bretton-Woods system of fixed exchange rates, imposed a 10% ad valorem tariff on all imported goods from IMF member countries. But, incidents such as this are uncommon.

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

## *Import Quotas*

Import quotas are limitations on the quantity of goods that can be imported into the country during a specified period of time. An import quota is typically set below the free trade level of imports. In this case it is called a *binding quota*. If a quota is set at or above the free trade level of imports then it is referred to as a *non-binding quota*. Goods that are illegal within a country effectively have a quota set equal to zero. Thus many countries have a zero quota on narcotics and other illicit drugs.

There are two basic types of quotas: absolute quotas and tariff-rate quotas. Absolute quotas limit the quantity of imports to a specified level during a specified period of time. Sometimes these quotas are set globally and thus affect all imports while sometimes they are set only against specified countries. Absolute quotas are generally administered on a first-come first-served basis. For this reason, many quotas are filled shortly after the opening of the quota period. Tariff-rate quotas allow a specified quantity of goods to be imported at a reduced tariff rate during the specified quota period.

In the US in 1996, milk, cream, brooms, ethyl alcohol, anchovies, tuna, olives and durum wheat were subject to tariff-rate quotas. Other quotas exist on peanuts, cotton, sugar and syrup.

In the US most quotas are administered the US Customs Service. The exceptions include dairy products, administered by the Department of Agriculture and watches and watch movements, administered by the Departments of the Interior and the Commerce Department.

## *Voluntary Export Restraints (VERs)*

A voluntary export restraint 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 are typically implemented upon the insistence of the importing nations.

Typically VERs arise when the import-competing industries seek protection from a surge of imports from particular exporting countries. VERs are then offered by the exporter to appease the importing country and to avoid the effects of possible trade restraints on the part of the importer. Thus VERs are rarely completely voluntary.

Also, VERs are typically implemented on a bilateral basis, that is, on exports from one exporter to one importing country. VERs have been used since the 1930s at least, and have been applied to products ranging from textiles and footwear to steel, machine tools and automobiles. They became a popular form of protection during the 1980s, perhaps in part because they did not violate countries' agreements under the GATT. As a result of the Uruguay round of the GATT, completed in 1994, WTO members agreed not to implement any new VERs and to phase out any existing VERs over a four year period. Exceptions can be granted for one sector in each importing country.

### *Export Taxes*

An export tax is a tax collected on exported goods. As with tariffs, export taxes can be set on a specific or an ad valorem basis. In the US, export taxes are unconstitutional since the US constitution contains a clause prohibiting their use. This was imposed due to the concerns of Southern cotton producers who exported much of their product to England and France.

However, many other countries employ export taxes. For example, Indonesia applies taxes on palm oil exports; Madagascar applies them on vanilla, coffee, pepper and cloves; Russia uses export taxes on petroleum, while Brazil imposed a 40% export tax on sugar in 1996. In December 1995 the EU imposed a \$32 per ton export tax on wheat.

### *Export Subsidies*

Export subsidies are payments made by the government to encourage the export of specified products. As with taxes, subsidies can be levied on a specific or ad valorem basis. The most common product groups where export subsidies are applied are agricultural and dairy products.

Most countries have income support programs for their nation's farmers. These are often motivated by national security or self-sufficiency considerations. Farmers' incomes are maintained by restricting domestic supply, raising domestic demand, or a combination of the two. One common method is the imposition of price floors on specified commodities. When there is excess supply at the floor price, however, the government must stand ready to purchase the excess. These purchases are often stored for future distribution when there is a shortfall of supply at the floor price. Sometimes the amount the government must purchase exceeds the

available storage capacity. In this case, the government must either build more storage facilities, at some cost, or devise an alternative method to dispose of the surplus inventory. It is in these situations, or to avoid these situations, that export subsidies are sometimes used. By encouraging exports, the government will reduce the domestic supply and eliminate the need for the government to purchase the excess.

One of the main export subsidy programs in the US is called the Export Enhancement Program (EEP). Its stated purpose is to help US farmers compete with farm products from other subsidizing countries, especially the European Union, in targeted countries. The EEP's major objectives are to challenge unfair trade practices, to expand U.S. agricultural exports, and to encourage other countries exporting agricultural commodities to undertake serious negotiations on agricultural trade problems. As a result of Uruguay round commitments, the US has established annual export subsidy quantity ceilings by commodity and maximum budgetary expenditures. Commodities eligible under EEP initiatives are wheat, wheat flour, semolina, rice, frozen poultry, frozen pork, barley, barley malt, table eggs, and vegetable oil.

In recent years the US government has made annual outlays of over \$1 billion in its agricultural Export Enhancement Program (EEP) and its Dairy Export Incentive Program (DEIP). The EU has spent over \$4 billion annually to encourage exports of its agricultural and dairy products.

#### *Voluntary Import Expansions (VIEs)*

A Voluntary Import Expansion (VIE) is an agreement to increase the quantity of imports of a product over a specified period of time. In the late 1980s, VIEs were suggested by the US as a way of expanding US exports into Japanese markets. Under the assumption that Japan maintained barriers to trade that restricted the entry of US exports, Japan was asked to increase its volume of imports on specified products including semiconductors, automobiles, auto parts, medical equipment and flat glass. The intention was that VIEs would force a pattern of trade that more closely replicated the free trade level.

### **Other Trade Policy Tools**

#### *Government Procurement Policies*

A Government Procurement Policy requires that a specified percentage of purchases by the federal or state governments be made from domestic firms rather than foreign firms.

### *Health and Safety Standards*

The U.S. generally has more regulations than other countries governing the use of some goods, such as pharmaceuticals. These regulations can have an effect upon trade patterns even though the policies are not designed based on their effects on trade.

### *Red-Tape Barriers*

Red-tape barriers refer to costly administrative procedures required for the importation of foreign goods. Red-tape barriers can take many forms. France once required that videocassette recorders enter the country through one small port facility in the south of France. Because the port capacity was limited, it effectively restricted the number of VCRs that could enter the country. A red-tape barrier may arise if multiple licenses must be obtained from a variety of government sources before importation of a product is allowed.

## **1.2.1 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 non-tariff barriers became more prominent.

The table below provides a list of average tariff rates in selected countries around the world. These rates were all taken from the WTO's trade policy review summaries. More details about the trade policies of these countries can be found at the WTO's website at: [http://www.wto.org/english/tratop\\_e/tp\\_r\\_e/tp\\_rep\\_e.htm](http://www.wto.org/english/tratop_e/tp_r_e/tp_rep_e.htm).

Generally speaking, average tariff rates are less than 20% 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%, and often less than 5%. On average, less developed countries maintain higher tariff barriers, but, for many countries that have recently joined the WTO, tariffs have recently been reduced substantially to gain entry.

<b>Average Tariff Rates</b>	
Japan (2000)	6.5%
European Union (2002)	
Industrial Goods	6.4%
Agriculture	16.1%
Norway (2000)	8.1%
Canada (2000)	7.1%
Brazil (2000)	13.7%
Mexico (2002)	16.5%
Chile (1997)	11.0%
El Salvador (1996)	10.1%
Cyprus (1997)	
Overall	16.4%
with EU	7.2%
Agriculture	37.6%
Morocco (1996)	23.5%
Bahrain (2000)	7.7%
Malawi (2002)	14.0%
India (2002)	32.0%
Pakistan (2002)	20.4%
Zambia (1996)	13.6%
Malaysia (2001)	9.2%

### *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.

Most of the tariffs above are calculated as a simple average. To calculate this rate, one simply adds up all of 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 import categories in which 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 weights 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 but virtually no imports, then the trade-weighted average tariff would indicate a low level of protection. The standard way of calculating this tariff rate is to divide total tariff revenue by the total value of imports. Since this data is regularly reported by many countries this is a common way to report average tariffs. To illustrate the difference, Canada is listed above with a simple average tariff of 7.1%. However, Canada's trade-weighted average, in contrast, is a mere 0.9%.

However, the trade-weighted average tariff is not without flaws. As an 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. Note also that, in this case, the simple average tariff would register 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.<sup>(1)</sup>

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 which, 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 non-tariff barriers can have a much greater effect upon trade flows than tariffs themselves.

### *The Ideal Measure of Protectionism*

Ideally, what we would like to measure is the degree to which a government's policies (both domestic and trade policies) affects the flow of goods and services (on both the import and export side) between itself and the rest of the world. Thus, we might imagine an index of protectionism (IP) defined as follows:

$$IP = \frac{\sum_{i=1}^N (EX_i + IM_i) \mid \text{current trade policies}}{\sum_{i=1}^N (EX_i + IM_i) \mid \text{non-restrictive trade policies}}$$

Where the numerator represents the sum of all exports and imports across all N trade categories given the current set of trade policies, while the denominator represents the sum of all exports and imports that would obtain if the government employed a set of domestic policies that had no impact on trade of goods and services with the rest of the world. If  $IP = 1$ , it would indicate that current government policies are completely non-restrictive and the economy could be characterized as being in a pure state of "free trade." If  $IP = 0$ , then government policies would be so restrictive as to force the economy into a state of isolation or autarky.

If we could calculate and compare the index across many countries, then we could say that countries with a smaller value were more protectionist than countries with a higher value. We could also monitor changes in the index over time for a particular country. Increases in the index value would indicate trade liberalization, while decreases in the index would indicate growing protectionism.

The problem with this index, however, is that although it is easy to define, it would be virtually impossible to measure. At least I know of no way of doing so without making extreme leaps of faith. Nevertheless, the index definition is useful as a way of indicating how far from ideal are any traditional measures of protection such as average tariff rates.

### **1.3 Examples from US Trade Policy**

Article 1, section 8 of the US Constitution states clearly and succinctly: " the Congress shall have the power ... to regulate commerce with foreign nations ..." This means that decisions about trade policy must be made by the US Senate and House of Representatives, and not by the US President.

This clause is rather interesting today because one of the key agencies involved in US trade negotiations is the US Trade Representative's office. This office administers the Section 301 trade cases, has negotiated free trade agreements such as NAFTA, and has negotiated trade liberalization agreements such as the Uruguay round under the GATT. All this from an Executive branch agency which acts as an agent for the President. It would seem, then, that the President does indeed make trade policy. Is this a violation of the constitution? Actually no.

The only reason an Executive branch agency, like USTR, can make trade policy is because the US Congress has granted this agency the authority to do so. This issue was in the news recently when the Clinton administration attempted, unsuccessfully (as of Feb 1998), to acquire *fast-track* negotiating authority for new free trade agreements with other

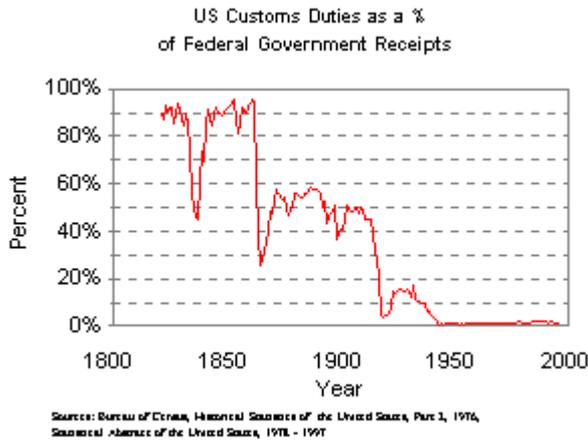
---

### **Endnotes:**

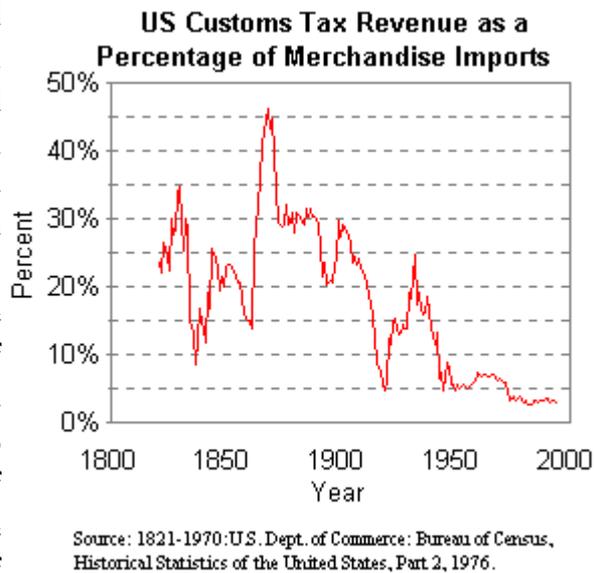
1. It is often claimed that average tariffs in the US were raised to almost 60% by the Smoot-Hawley tariff act of 1930. This figure, although correct, represents the average tariff on dutiable imports only. Thus, the figure somewhat overstates the true degree of protection. In comparison, the trade-weighted average tariff in subsequent years rose only as high as 24.8% in 1932, after which tariff rates fell.

Fast track authority would not only give the President and his agents negotiating powers; it would also require the US Congress to vote on any trade agreement presented by the President without amendment. This means that Congress must vote "yea" or "nay" to the entire agreement and cannot make changes to it before the vote. The purpose of fast track authority is to give more credibility to the President and his agents in negotiations with other countries, and hence raise the likelihood that an agreement can be reached.

Probably one reason that the framers of the US Constitution reserved trade policy formation for the US Congress was because at the time of US independence and for well over a century after that, tariff revenue was the primary source of funds for the federal government. It must have been thought unwise for the purse strings of the government to be controlled by the President.



The adjoining diagram shows US customs duties as a percentage of federal government revenue from 1821 to 1996. Notice that in the early 1800s tariff revenue comprised more than 90% of the federal government budget. This fell during and after the US Civil War in 1860 as alternative sources of funds became necessary to finance the war. Another major decline occurred in the early part of the 1900s shortly after the Constitution was amended to allow the collection of personal income taxes. In the 1990s, more than 70% of federal government revenue came from payroll taxes which consists of both personal income taxes and social security taxes. In contrast, less than 1.5% of revenue came from customs duties. Of course, due to the size of the US federal budget, that still amounts to over \$18 billion in tariff revenue.



### 1.3.1 US Tariff Policy: Historical Notes

The adjoining diagram depicts average trade-weighted tariff rates in the US between 1821 and 1995. This rate is calculated by dividing the value of tariff revenue by the total value of imports in each successive year. The graph displays a few important points.

First of all, notice that average tariff rates have fluctuated, sometimes significantly, during the past 175 years. In part this reflects shifting attitudes regarding the appropriateness of free trade versus protectionist policies. Tariff rates also were usually raised when the country was at war since additional tariff revenue would be needed to finance wartime expenses. This is why, for example, there is a dramatic increase in tariff rates in the 1860s during the US civil war. Tariffs were also likely to be raised during depressions. This accounts for the sharp increase in tariffs in the early 1930s at the onset of the Great Depression.

Because tariff revenue was a primary source of funds for the federal government in the 1800s, tariff rates were, on average, much higher than they are today. After the US passed the 13<sup>th</sup> Amendment, allowing the government to levy income taxes, tariff revenue began to contribute less and less to federal government revenue. This allowed tariff revenue to fall, rather than rise, during US involvement in World War I in the late 1910s.

When the Great Depression hit the US in 1929, the US responded with a dramatic increase in tariff rates with the passage of the Smoot-Hawley Tariff Act of 1930. The intent was to protect US businesses from foreign competition and help reduce the growing unemployment rate. However, more than 60 US trade partners swiftly retaliated with higher tariffs of their own. The final effect was to reduce world trade in the 1930s to less than one fourth the level of trade that had occurred in the 1920s. Most economists now believe, and it quickly became obvious to many politicians at the time, that the higher tariffs may well have contributed to the depth and length of the Great Depression.

In 1934, the US Congress passed a bill which began a steady movement in the direction of trade liberalization. The Reciprocal Trade Agreements Act (RTAA) of 1934 authorized the President of the US to negotiate bilateral tariff reduction agreements with other countries. The prevailing view was that trade liberalization was necessary to help stimulate economic growth. However, no one country was willing to liberalize unilaterally, since that would allow more foreign products into its

domestic market but would not open foreign markets to its exports. If two countries negotiated on a bilateral basis, though, then each country could offer concessions of tariff reductions in certain product categories in exchange for similar tariff concessions on other products by its trade partner. Between 1934 and 1945, the US president negotiated over 32 bilateral trade liberalization agreements with other countries.

### *The General Agreement on Tariffs and Trade (GATT)*

The General Agreement on Tariffs and Trade arose out of the discussions that took place in Bretton Woods, New Hampshire, in the US during 1944. The conference was convened to plan the institutions that would regulate international economic relations in the post World War II period. Three main economic institutions were planned: the International Monetary Fund (IMF), the International Bank for Reconstruction and Development (IBRD, the World Bank), and the International Trade Organization (ITO).

The IMF was designed to help nations that might suffer from balance of payments problems. Balance of payments problems can be severely destabilizing in a country with a system of fixed exchange rates, as was set up in the post war period. For more information about the IMF go to <http://www.imf.org/>

The World Bank was designed to facilitate the provision of loans to countries requiring reconstruction after the war and to alleviate poverty in less developed countries. For more information about the World Bank please go to <http://www.worldbank.org/>

Although a charter was written for the ITO, the US Congress failed to ratify it and thus it never came into being. However, the GATT was signed by many allied nations in 1947 and it did achieve its goal of advancing trade liberalization.

The GATT had two main guiding principles: multilateralism and non-discrimination.

Multilateralism is embodied in the seven tariff reduction rounds which occurred between 1948 and 1994. In each of these "rounds", all GATT member came together to negotiate mutually agreeable trade liberalization packages. In a sense, the objective was to achieve trade policy changes that could generate consensus among all participants. It was believed that this

was a superior process to one in which countries made bilateral deals which might discriminate against other members.

Non-discrimination is embodied in the most-favored nation (MFN) principle. MFN is somewhat of a misnomer. It does not mean that one country receives more favorable treatment than others. Rather, it means that a country must offer the best tariff rate that it has in a product category to all countries that are GATT signatories (members). In other words, if the lowest tariff rate the US charges on auto imports is 2.5%, then it must charge 2.5% on imports of autos from all other GATT members. In this way it does not discriminate against any country, and each country is said to receive MFN privileges.

As a result of the passage of the latest trade liberalization round - the Uruguay round - in 1994, the World Trade Organization (WTO) was established. The WTO mission is to monitor and enforce the original GATT as well as a set of additional agreements that were negotiated under the Uruguay round. Whereas the original GATT dealt almost exclusively with trade in goods, the WTO also oversees agreements on trade in services (GATS), intellectual property rights (TRIPS), international investments (TRIMS), and trade in textiles and clothing (ATC), among its other responsibilities. For more information about the WTO please go to <http://www.wto.org/>

### *Exceptions to GATT Rules*

The GATT, as originally written, and as it persists today, contains a number of clauses which represent exceptions to its main guiding principles. For the most part, these exceptions allow certain types of trade policy actions which contradict the main guiding principles of the GATT. Most likely, these exceptions were included in the original GATT because some of the original members, like the US, already had domestic laws which allowed these actions.

The exceptions were written into the GATT as separate clauses or articles, some of which are summarized below.

Article 6 allows GATT members to implement antidumping and countervailing duty legislation.

Antidumping (AD) laws allow a country to raise tariffs on certain products when other countries sell their products at "less than reasonable

value" in the importing country, and when the imports cause injury to import-competing firms. Countervailing duty (CVD) laws allow a country to place a countervailing duty (i.e. a tariff on imports) to counter the effects of a foreign government subsidy on an imported product when the imports cause injury to domestic import-competing firms.

Article 19 is often referred to as the "escape clause" or the "safeguards clause." This clause allows countries to raise a tariff, temporarily, when a surge of imports causes injury to import-competing domestic firms.

Finally Article 24 of the GATT allows for the formation of free trade areas and customs unions. The idea, over which there is some controversy, is that movements by a subset of countries to liberalize trade between or among themselves is consistent with the goals of the GATT and thus should be allowed.

#### **1.4. Reasons for the evolution of Trade**

The first theory section of this course contains explanations or reasons that trade takes place between countries. There are five basic reasons why trade may take place between countries, summarized below. A variety of models are described which offer a reason for trade, and the expected effects of trade on prices, profits, incomes and individual welfare.

##### 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. The basis for trade in the Ricardian Model of Comparative Advantage is differences in technology.

##### Differences in Resource Endowments

Advantageous trade can occur between countries if the countries differ in their endowments of resources. Resource endowments refers 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 the Pure Exchange model and the Heckscher-Ohlin Model is differences in resource endowments.

##### 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. The Chinese are likely to demand more rice than Americans, even if facing 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.

#### 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."

#### Existence of Government Policies

Government tax and subsidy programs 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.

### **1.5 A Pure Exchange Economy**

The simplest example of advantageous trade arising from differences in resources endowments can be shown with a pure exchange model. In this model we ignore the production process and assume that individuals are endowed with a stock of consumption goods.

#### **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.

One day these two farmers go out for a walk. Farmer Smith carries 10 oranges with him in case he becomes hungry. Farmer Jones carries 10 apples. Suppose these farmers meet. After a short conversation, they discover that the other farmer sustains his family with a different commodity, and the farmers begin to discuss the possibility of a trade.

The first 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 exchange for how many oranges? It is typical to express the terms of trade as a ratio. Thus, if one apple exchanges for four oranges, we can write the terms of trade as follows:

$$ToT = \frac{1apple}{4oranges} = \frac{1}{4} \text{ apple/orange}$$

where ToT refers to terms of trade. It is immaterial whether the ratio is written apples over oranges or oranges over apples.

The terms of trade is equivalent to the ratio of prices between two goods. Suppose  $P_A$  is the price of apples (measured in \$/apple) and  $P_O$  is the price of oranges (measured in \$/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 \$'s cancel, and thus the price of oranges over the price of apples has units of apples per orange. We can refer to this price ratio as the price of oranges in terms of apples, i.e. 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  $P_A/P_O$  has units of oranges per apple.

[This model, and many others we will consider, are actually barter economies. This means that there is no money being exchanged between the agents. Instead one good is exchanged for another good. However, since we are accustomed to evaluating values in money terms, we will often write important expressions, like the terms of trade, in terms of their money equivalents as we have done above.]

### Questions

1. Give a definition for an autarky economy;
2. Why do you think most of the developed economies are in relatively free trade system?
3. What is the difference between Import tariffs and import quotas?
4. Why do you think that governments need to use trade policy tools?
5. Can you bring the list of trade policy tools?
6. What is protectionism and how do we measure the level of protectionism?

References:

*Paul R. Krugman and Maurice Obstfeld, International Economics: Theory and Policy, Fifth edition, Addison-Wesley Publishing Company, 2000.*

*James R. Markusen, James R. Melvin, William H. Kaempfer and Keith E. Maskus, International Trade: Theory and Evidence, International edition, New York: MCGraw-Hill, 1995.*

## Lecture 2. Classic theories of International Trade

### 2.1 Theory of Comparative Advantage – Overview

#### 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 amongst economists that once when an economics skeptic asked Paul Samuelson (a Nobel laureate in economics) to provide a meaningful and non-trivial result from the economics discipline, Samuelson quickly responded with, "comparative advantage."

The sources of the misunderstandings are easy to identify. First, the principle of comparative advantage is clearly counter-intuitive. Many results from the formal model are contrary to simple logic. Secondly, the theory is easy to confuse 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. Using 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)

The idea here is simple and intuitive. If our country can produce some set of goods at 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 19<sup>th</sup> century. Although the model describing the theory is commonly referred to as the "Ricardian model", the original description of the idea can be found in an *Essay on the External Corn Trade* by Robert Torrens in 1815. David Ricardo formalized the idea using a compelling, yet simple, numerical example in his 1817 book titled, *On the Principles of Political Economy and Taxation*. The idea appeared again in James Mill's *Elements of Political Economy* in 1821. Finally, the concept became a key feature of international political economy upon the publication of *Principles of Political Economy* by John Stuart Mill in 1848.

### **2.1.1 Ricardian Model Highlights**

Trade occurs due to differences in production technology.

The Ricardian model is constructed such that the only difference between countries is in their production technologies. All other features are assumed identical across countries. Since trade would occur and be advantageous, the model highlights one of the main reasons why countries trade; namely, differences in technology.

Trade is advantageous for everyone in both countries.

Although most models of trade suggest that some people would benefit and some lose from free trade, the Ricardian model shows that everyone could benefit from trade. This can be shown using an aggregate representation of welfare (national indifference curves) or by calculating the change in real wages to workers. However, one of the reasons for this outcome is the simplifying assumption that there is only one factor of production.

Even a technologically inferior country can benefit from free trade.

This interesting result was first shown by Ricardo using a simple numerical example. The analysis highlights the importance of producing a country's comparative advantage good rather than its absolute advantage good.

A developed country can compete against some low foreign wage industries.

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

### 2.1.2 Ricardian Model Assumptions

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.

A) 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.

B) Firms choose output to maximize profit. The rule used by perfectly competitive firms is to choose that output level which equalizes the price with the marginal cost. That is, set  $P = MC$ .

C) Output is homogeneous across all firms. This means that goods are identical in all of 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.

D) 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.

E) Perfect information. All firms have the necessary info to maximize profit, to identify the positive profit and negative profit industries, etc.

### Two Countries

The case of two countries is used to simplify the model analysis. Let one country be the US, the other France\*.

Note, anything related exclusively to France\* in the model will be marked with an asterisk (or in some places we'll distinguish countries by color). 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 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 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 / Demand

In 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 we will use the aggregate utility specification defined below to depict an equilibrium in the model.

When needed 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. 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. This implies that the country consumes wine to 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 to cheese in the same proportion.

### General Equilibrium

The Ricardian model is a general equilibrium model. This means that a complete circular flow of money in exchange for goods and services is described by the model. Thus, the sale of goods and services generates revenue to the firms which 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 below represent industry production not firm production. The industry consists of many small firms in light of the assumption of perfect competition.

#### *Production of Cheese*

<p>US</p> $Q_c = \frac{L_c \text{ [hrs]}}{a_{Lc} \left[ \frac{\text{hrs}}{\text{lb}} \right]}$	<p>France</p> $Q_c^* = \frac{L_c^*}{a_{Lc}^*}$
--	--

where

$Q_c$  = quantity of cheese produced in the U.S.

$L_c$  = amount of labor applied to cheese production in the U.S.

$a_{LC}$  = unit-labor requirement in cheese production in the U.S. ( hours of labor necessary to produce one unit of cheese)

and where all starred variables are defined in the same way but refer to the process in France.

#### *Production of Wine*

US	France
----	--------

$$Q_w = \frac{L_w \text{ [hrs]}}{a_{Lw} \left[ \frac{\text{hrs}}{\text{gal}} \right]} \quad Q_w^* = \frac{L_w^*}{a_{Lw}^*}$$

where

$Q_w$  = quantity of wine produced in the U.S.

$L_w$  = amount of labor applied to wine production in the U.S.

$a_{Lw}$  = unit-labor requirement in wine production in the U.S. ( hours of labor necessary to produce one unit of wine)

and where 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.

US	France
$L_c + L_w = L$	$L_c^* + L_w^* = L^*$

where  $L$  is the labor endowment in the US. That is, the total number of hours the work force is willing to provide. Again all starred variables refer to France.

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 above.

### 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.

### 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 were included, it can be shown that the key results of the model may still obtain.

### 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 in which the agents within the model have no control over.

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.

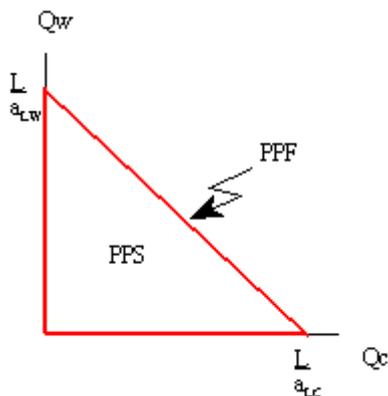
In the Ricardian model the variables (  $L_c$ ,  $L_w$ ,  $Q_c$ ,  $Q_w$  ) are endogenous. Likewise the corresponding starred variables are endogenous in the other country.

### **2.1.3 The Ricardian Model PPF**

Using the two production functions and the labor constraint we can describe the production possibility frontier (or 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  $L$ ) which 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, i.e 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,  $x$  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 a diagram with  $Q_C$  on the horizontal axis and  $Q_W$  on the vertical axis. The equation is easily plotted by following three steps.

Step 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 US could produce if it devoted all of its labor force ( $L$ ) to the production of wine.

Step 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 US could produce if it devoted all of its labor force ( $L$ ) to the production of cheese.

Step 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 US 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 under-employment of labor resources. In fact all production possibilities regardless of whether full employment is fulfilled is referred to as the production possibility set (PPS). The PPS is represented by all of the points within and on the border of the red triangle in the diagram

## **2.2 Definitions: Absolute and Comparative Advantage**

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. Each of these are defined formally below using the notation of the Ricardian model. The concepts are presented in the following order.

Labor Productivity  
Absolute Advantage  
Opportunity Costs  
Comparative Advantage

### 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 US. Similarly  $\frac{1}{a_{Lw}}$  represents the labor productivity of wine production in the US.

### Absolute Advantage

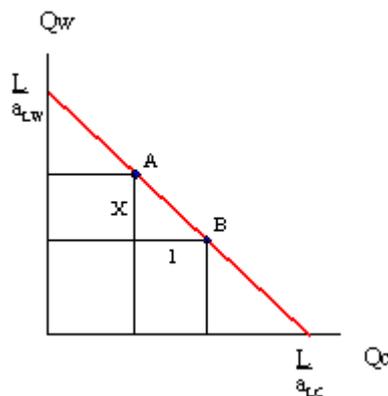
A country has an absolute advantage in the production of a good relative to another country if it can produce the good at lower cost or with higher productivity. Absolute advantage compares industry productivities across countries. In this model we would say the U.S. has an **absolute advantage** in 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 U.S. 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 US. The second expression means that labor productivity in cheese in the US is greater than in France. Thus the US 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 US 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,  $-\left(\frac{a_{Lc}}{a_{Lw}}\right)$ , corresponds to the opportunity cost of production in the economy.

To see this more clearly consider points A and B on the adjoining PPF diagram. 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

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

formula

. Thus the slope of the line between

A and B is the opportunity cost which from above is given as  $\frac{-a_{Lc}}{a_{Lw}}$ . We can more clearly see why the slope of the PPF represents the opportunity cost by noting the units of this expression.

$$\frac{-a_{Lc}}{a_{Lw}} \left[ \frac{\frac{\text{hrs}}{\text{lb}}}{\frac{\text{hrs}}{\text{gal}}} = \frac{\text{gal}}{\text{lb}} \right]$$

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

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 U.S. 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 US 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 US PPF is flatter than the slope of France's PPF.

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

$$\frac{a_{LC}}{a_{LW}} < \frac{a_{LC}^*}{a_{LW}^*} \quad \rightarrow \quad \frac{a_{LW}^*}{a_{LC}^*} < \frac{a_{LW}}{a_{LC}}$$

This means that France can produce wine at a lower opportunity cost than the US. In other words France has a comparative advantage in wine production. This also means that if the US 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  $a_{LC} = 10$ ,  $a_{LW} = 2$ ,  $a_{LC}^* = 20$ ,  $a_{LW}^* = 5$ . In this case  $a_{LC} (10) < a_{LC}^* (20)$  and  $a_{LW} (2) < a_{LW}^* (5)$  so the US 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 US.

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

The comparative advantage good in the US then is that good in which the US enjoys the greatest productivity advantage, wine. France's comparative advantage good however, is that good in which it has the least productivity disadvantage in production, namely cheese.

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.

### 2.3 A Ricardian Numerical Example

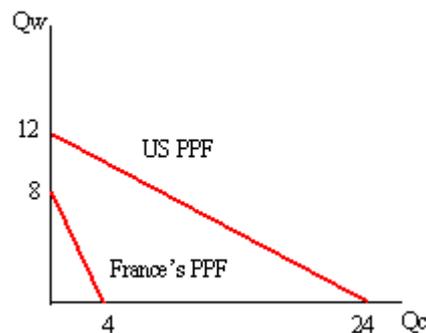
The simplest way to demonstrate that countries can gain from trade in the Ricardian model is by use of a numerical example. This is how Ricardo presented his argument originally. The example demonstrates that both countries will gain from trade if they specialize in their comparative advantage good and trade some of it for the other good. We set up the example so that one country (the US) 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 had 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 the following table.

US	$a_{LC} = 1$	$a_{LW} = 2$	$L = 24$
Fra	$a_{LC}^* = 6$	$a_{LW}^* = 3$	$L^* = 24$

By assumption the U.S. has the absolute advantage in cheese production and wine production since  $a_{LC}(1) < a_{LC}^*(6)$  and  $a_{LW}(2) < a_{LW}^*(3)$ .

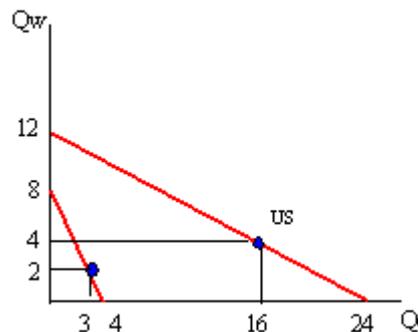
The US also has the comparative advantage in cheese production since  $\frac{a_{LC}}{a_{LW}} \left( \frac{1}{2} \right) < \frac{a_{LC}^*}{a_{LW}^*} \left( \frac{6}{3} \right)$ . The cost of producing cheese in the U.S. is  $\frac{1}{2}$  gallon per pound of cheese. In France, it is 2 gallon per pound.



France, however, has the comparative advantage in wine production since  $\frac{a_{LW}^*}{a_{LC}^*} \left( \frac{3}{6} \right) < \frac{a_{LW}}{a_{LC}} \left( \frac{2}{1} \right)$ . The cost of producing wine in France is  $\frac{1}{2}$  pound of cheese per gallon of wine while in the U.S., it is 2 pounds per gallon.

The production possibility frontiers for both countries are plotted on the adjoining figure. Notice that the US PPF lies outside France's PPF. Since both countries are assumed to be the same size in the example, this indicates the US 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 US PPF is flatter than France's this means that the opportunity cost of cheese production is lower in the US and thus indicates that the US has the comparative advantage in cheese production.



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.

Autarky Production/Consumption		
	Cheese (lbs)	Wine (gals)
US	16	4
France	3	2
World	19	6
Total		

For the purpose of this example we will simply make-up a plausible production/consumption point under autarky. Essentially we assume that consumer demands are such as to generate the chosen production point. The Table below shows the autarky

production/consumption levels for the two countries. It also shows total world production for each of the goods.

### Autarky Production/Consumption Points

In this diagram we depict the autarky production and consumption points for the US and France. Each point lies on the interior section of the country's production possibility frontier.

Ricardo argued that trade gains could arise if countries first specialize in their comparative advantage good and then trade with the other country. Specialization in the example means that the US produces only cheese and

no wine, while France produces only wine and no cheese. These quantities are shown in the following Table. Also shown are the world totals for each of the goods.

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 19 to 24 pounds. Wine output rises from 6 to 8 gallons. What's more, the output increases occur without an increase in the quantity of labor used to produce them. In autarky it took 48 worker-hours to produce 19 pounds of cheese and 6 gallons of wine. With specialization, the same 48 worker-hours produce 24 cheese and 8 wine. This means that there is an increase in world productivity - more output per unit of labor. Often times this productivity improvement is

<b>Production with Specialization in the Comparative Advantage Good</b>		
	Cheese (lbs)	Wine (gals)
US	24	0
France	0	8
World	24	8
Total		

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 they had in autarky.

The surplus in world production amounts to 5 extra pounds of cheese and 2 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 3 extra pounds of cheese to France and 2 extra pounds to the US. Since the US consumed 16 cheese and 4 wine in autarky, they would now have 18 cheese and 5 wine after specialization and trade. France, which began with 3 cheese and 2 wine in autarky, would now have 6 cheese and 3 wine. Consumption and production after trade for the two countries is shown in the Table.

<b>Consumption and Production after Trade</b>
---

	Cheese (lbs)		Wine (gals)	
	Consumption	Production	Consumption	Production
US	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 US is consuming 5 gallons of wine and producing none so it must import the 5 gallons from France. France is consuming 6 pounds of cheese with no cheese production so it must import the 6 pounds from the US. The terms of trade is  $ToT = 5 \text{ gal}/6 \text{ lbs}$  or  $5/6 \text{ gal/lb}$ .

### Conclusions

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 from this example is that a country which is technologically inferior to another in the production of all goods can nevertheless benefit from trade with that country.

### 2.4 The Heckscher-Ohlin (Factor Proportions) 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 (or HOS) model. In the 1950s and 60s 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 (or 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 is used in production. Thus, machine tools, conveyers, trucks, forklifts, computers, office buildings, office supplies, and much more, is 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, i.e., 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 their 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; that of 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 used varies considerably. For example, steel production generally involves large amounts of expensive machines and equipment spread over perhaps hundreds of acres of land, but

also uses relatively few workers. 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, then 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, or endowments, of capital and labor available for use in the production process. Thus, some countries like the US are well-endowed with physical capital relative to its labor force. In contrast many less developed countries have very little 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 abundance between countries. Thus if, for example, the US has a larger ratio of aggregate capital per unit of labor than France's ratio, we would say that the US 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 US.

The H-O model assumes that the only difference between countries is these differences in the relative endowments of factors of production. It is ultimately shown that trade will occur, trade will be nationally advantageous, and trade will have characterizable effects upon 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 because it enables us to see precisely how differences in resource endowments is 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 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. Applications 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 capital-abundant country is one that is well-endowed with capital relative to the other country. This gives the country a propensity for producing the good which uses relatively more capital in the production process, i.e., the capital-intensive good. As a result, if these two countries were not trading initially, i.e., 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 labor-abundant country 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 price of both goods are equalized in the two markets.

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

What's more the country's abundant factor benefits, regardless in which industry it is employed. Thus, capital owners in the US would benefit from trade even if their capital is used in the declining import-competing sector. Similarly, workers would lose in the US 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, in the import-competing industry suffering from falling prices, will want to reduce production to cut their 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 experiences a decline in their wages.

#### **2.4.1 Heckscher-Ohlin Model Assumptions**

Perfect Competition prevails in all markets.

Two countries

The case of two countries is used to simplify the model analysis. Let one country be the US, the other France\*. Note, 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 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,

$$L_c + L_s \leq L$$

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,

$$K_c + K_s \leq K$$

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 differences 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 US is **capital abundant** relative to France if:

$$\frac{K}{L} > \frac{K^*}{L^*}$$

where K is the capital endowment, L the labor endowment in the US. K\* is the capital endowment, L\* the labor endowment in France.

Note that if the US 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 US.

### Demand

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

When necessary we will assume that aggregate preferences can be represented by a homothetic utility function of the form  $U(C_S, C_C) = C_S C_C$  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 which equalize supply and demand in all markets simultaneously.

### 2.4.2 Heckscher-Ohlin Model Assumptions – Production

The production functions below represent industry production not firm production. The industry consists of many small firms in light of the assumption of perfect competition.

#### Production of Clothing

US $Q_C = f(L_C, K_C)$	France $Q_C^* = f(L_C^*, K_C^*)$
---------------------------	-------------------------------------

where

$Q_C$  = quantity of clothing produced in the US measured in racks.

$L_C$  = amount of labor applied to clothing production in the US measured in labor-hours.

$K_C$  = amount of capital applied to clothing production in the US measured in capital-hours.

$f( )$  = the clothing production function which transforms labor and capital inputs into clothing output.

and where all starred variables are defined in the same way but refer to the production process in France.

#### Production of Steel

US $Q_S = g(L_S, K_S)$	France $Q_S^* = g(L_S^*, K_S^*)$
---------------------------	-------------------------------------

where

$Q_S$  = quantity of steel produced in the US measured in tons.

$L_S$  = amount of labor applied to steel production in the US measured in labor-hours.

$K_S$  = amount of capital applied to steel production in the US measured in capital-hours.

$g(\cdot)$  = the steel production function which transforms labor and capital inputs into steel output.

and where 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 US and France share the same production function  $f(\cdot)$  for clothing and  $g(\cdot)$  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,

$a_{LC} \left[ \frac{\text{labor-hrs}}{\text{rack}} \right]$  represent the unit-labor requirement in clothing production.

It is the number of labor-hours needed to produce a rack of clothing.

Let,

$a_{KC} \left[ \frac{\text{capital-hrs}}{\text{rack}} \right]$  represent the unit-capital requirement in clothing production.

It is the number of capital-hours needed to produce a rack of clothing.

Similarly,

$a_{LS} \left[ \frac{\text{labor-hrs}}{\text{ton}} \right]$  is the unit-labor requirement in steel production.

It is the number of labor-hours needed to produce a ton of steel.

And,

$a_{KS} \left[ \frac{\text{capital-hrs}}{\text{ton}} \right]$  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,  $\frac{a_{KS}}{a_{LC}}$  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:

$$\frac{a_{KS}}{a_{LS}} > \frac{a_{KS}}{a_{LC}}$$

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:

$$\frac{a_{LC}}{a_{KS}} > \frac{a_{LS}}{a_{KS}}$$

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**.

### **2.4.3 Heckscher-Ohlin Model Assumptions: Fixed versus Variable Proportions**

Two different assumptions can be applied in a Heckscher-Ohlin 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 rental rate for capital.

Fixed proportions is a more simplistic and also less realistic assumption. 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

Fixed factor proportions means that  $a_{KC}$ ,  $a_{LC}$ ,  $a_{KS}$ , 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 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.

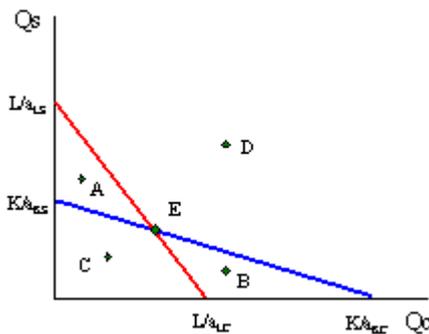
### 2.4.4 The Production Possibility Frontier (Fixed Proportions Case)

The production possibility frontier can be derived in the fixed proportions case 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 constraint contains two endogenous variables  $Q_C$  and  $Q_S$ . The remaining variables are exogenous.

We graph the two constraints in the adjoining Figure.

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 of the labor endowment were allocated to clothing and steel production, respectively. All points on the line represent combinations of clothing and steel output which could employ all of the labor available in the economy. Points outside the constraint, such as B and D, are not feasible production points since there is 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  $-\frac{a_{LC}}{a_{LS}}$ .

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 of the capital endowment were allocated to clothing and steel production, respectively. Points on the line represent combinations of clothing and steel production which would employ all of the capital in the economy. Points outside the constraint, such as A and D, are not feasible production points since there is insufficient capital resources. Points on or within the line, such as B, C and E, are feasible. The slope of the capital constraint is  $-\frac{a_{KC}}{a_{KS}}$ .

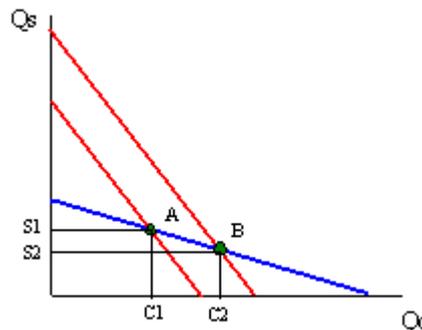
The production possibility frontier is the set of output combinations which generate full employment of resources - in this case both labor and capital. Only one point, point E, can simultaneously generate full employment of both labor and capital. Thus point E *is* the PPF. The production possibility set is the set of all output combinations that are feasible. 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 labor-intensive. If the slope of the capital constraint had been steeper then the factor intensities would be reversed.

## 2.5 The Rybczynski Theorem. The Relationship between Endowments and Outputs.

The Rybczynski theorem demonstrates how changes in an endowment affects 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 H-O model. Consider a

diagram depicting a labor constraint in red and a capital constraint in blue. Suppose production occurs initially on the PPF at point A.



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 which uses that factor intensively, and a decrease in the output of the other good.**

### 2.5.1 The Magnification Effect for Quantities

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 following values for one country:

$a_{LC} = 2$	$a_{LS} = 3$	$L = 120$
$a_{KC} = 1$	$a_{KS} = 4$	$K = 120$

$$\frac{a_{KS}}{a_{LS}} \left( \frac{4}{3} \right) > \frac{a_{KC}}{a_{LC}} \left( \frac{1}{2} \right)$$

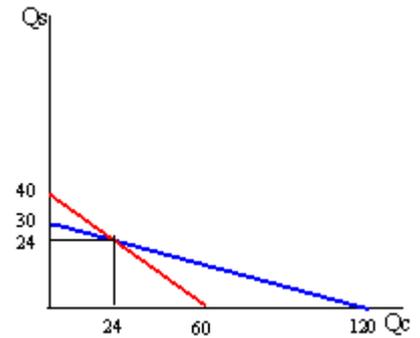
With these numbers which means that steel production is capital-intensive and clothing is labor-intensive.

The labor and capital constraints are,

$$2Q_c + 3Q_s = 120$$

Labor Constraint:

$$\text{Capital Constraint: } Q_c + 4Q_s = 120$$



We graph these on the adjacent Figure. The output quantities on the PPF can be found by solving

the two constraint equations simultaneously.

A simple method to solve these equations follows.

First, multiply the second equation by (-2) to get,

$$2Q_c + 3Q_s = 120$$

$$-2Q_c - 8Q_s = -240$$

Adding these two equations vertically yields,

$$0Q_c - 5Q_s = -120$$

$$Q_s = \frac{-120}{-5} = 24$$

which implies,

. Plugging this into the first equation

$$2Q_c + 3 * 24 = 120$$

above (any equation will do) yields,

. Simplifying we

$$Q_c = \frac{120 - 72}{2} = 24$$

get,

Thus, the solution to the two equations is: **Q<sub>C</sub> = 24 and Q<sub>S</sub> = 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,

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,

$$\begin{aligned} 2Q_C + 3Q_S &= 120 \\ -2Q_C - 8Q_S &= -300 \end{aligned}$$

Adding these two equations vertically yields,

$$0Q_C - 5Q_S = -180$$

$$Q_S = \frac{-180}{-5} = 36$$

which implies, . Plugging this into the first equation

above (any equation will do) yields,  $2Q_C + 3 \cdot 36 = 120$  . Simplifying we

get,  $Q_C = \frac{120 - 108}{2} = 6$  .

Thus the new solution is:  **$Q_C = 6$  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,  $Q_C$  falls from 24 to 6.

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. (that is,  $\hat{X}$  = % change in X).

### Percentage Changes in the Endowments and Outputs

$$\hat{K} = \frac{150 - 120}{120} \times 100 = +25\%$$

The capital stock rises by 25%.

$$\hat{Q}_s = \frac{36 - 24}{24} \times 100 = +50\%$$

The quantity of steel rises by 50%.

$$\hat{Q}_c = \frac{6 - 24}{24} \times 100 = -75\%$$

The quantity of clothing falls by 75%.

$$\hat{L} = +0\%$$

The labor stock is unchanged.

The rank order of these changes 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 percentages, 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 assuming 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.

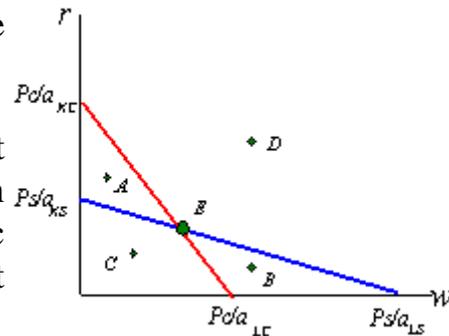
## 2.6 The Stolper-Samuelson Theorem

The Stolper-Samuelson theorem demonstrates how changes in output prices affects the prices of the factors when positive production and zero economic profit is 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 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,

$$P_s = a_{LS}W + a_{KS}r$$

$$P_c = a_{LC}W + a_{KC}r$$



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  $a_{LS}w \left[ \frac{\text{labor-hrs}}{\text{ton}} \frac{\$}{\text{labor-hr}} = \frac{\$}{\text{ton}} \right]$  is the dollar payment to workers per ton of steel produced, while  $a_{KS}r \left[ \frac{\text{capital-hrs}}{\text{ton}} \frac{\$}{\text{capital-hr}} = \frac{\$}{\text{ton}} \right]$  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 equals 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. Since the factor output ratios are also fixed, wages and rentals remain as the two unknowns. In the adjoining diagram we plot the two zero-profit conditions in wage-rental space.

The set of all wage and rental rates which will generate zero profit in the steel industry at the price  $P_S$  is given by the 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, thus 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

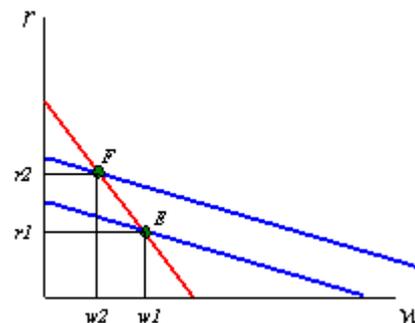
positive. Notice that the slope of the blue line is  $-\frac{P_S/a_{KS}}{P_S/a_{LS}} = -\frac{a_{LS}}{a_{KS}}$ .

Similarly the set of all wage-rental rate combinations which generate zero profit in the clothing industry at price  $P_C$  is given by the 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 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 the adjoining Figure. The equilibrium point will shift from E to F causing an increase in the equilibrium rental rate from  $r_1$  to  $r_2$ , and a decrease in the equilibrium wage rate from  $w_1$  to  $w_2$ . Only with a higher rental rate and 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.

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.**

### 2.6.1 The Magnification Effect for Prices

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 following values for one country:

$$\begin{array}{lll} a_{LS} = 3 & a_{KS} = 4 & P_S = 120 \\ a_{LC} = 2 & a_{KC} = 1 & P_C = 40 \end{array}$$

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 zero-profit conditions in the two industries are,

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,

$$3w + 4r = 120$$

$$-8w - 4r = -160$$

Adding these two equations vertically yields,

$$-5w - 0r = -40$$

$$w = \frac{-40}{-5} = 8$$

which implies, . Plugging this into the first equation

above (any equation will do) yields,  $3 * 8 + 4r = 120$  . 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,

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,

$$3w + 4r = 120$$

$$-8w - 4r = -240$$

Adding these two equations vertically yields,

$$-5w - 0r = -120$$

$$w = \frac{-120}{-5} = 24$$

which implies, . Plugging this into the first equation

above (any equation will do) yields,  $3 * 24 + 4r = 120$  . Simplifying we

$$r = \frac{120 - 72}{4} = 12$$

get,

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,  $r$  falls from \$24 to \$12 per hour.

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  $\hat{\cdot}$  above the variable. (that is,  $\hat{X}$  = % change in  $X$ ).

### 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%.

$$\hat{w} = \frac{24 - 8}{8} \times 100 = +200\%$$

The wage rate rises by 200%.

$$\hat{r} = \frac{12 - 24}{24} \times 100 = -50\%$$

The rental rate falls by 50%.

$$\hat{P}_s = +0\%$$

The price of steel is unchanged

The rank order of these changes 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 percentages, 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.

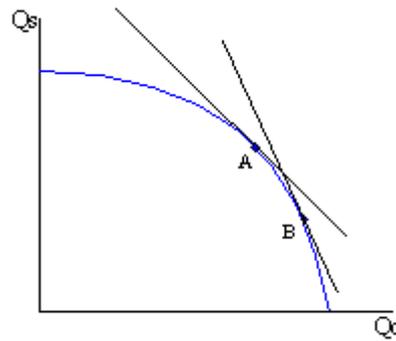
The magnification effect for prices is a generalization of the Stolper-Samuelson theorem. The effect allows for changes in both output prices simultaneously and provides information about the magnitude of the effects. The Stolper-Samuelson theorem is a special case of the magnification effect when one 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.

### **2.6.2 The Production Possibility Frontier (Variable Proportions Case)**

The production possibility frontier can be derived in the variable proportions case by using the same labor and capital constraints used in the fixed proportions case 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 cost and thus the highest profit possible.



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  $a_{LS}$  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  $a_{KS}$  are functions of  $(w/r)$ .

Under variable proportions the production possibility frontier takes the traditional bowed-out shape as shown in the adjoining Figure. 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 which indicated *constant* opportunity costs.

## 2.7 Factor-Price Equalization

The fourth major theorem that arises out of the Heckscher-Ohlin 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 countries 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 rentals 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 factors of production depends upon the value of its marginal productivity. Marginal productivity of a factor, like labor, in turn depends upon 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 upon the output price commanded by the good in the market.

In autarky, the two countries face different prices for the output goods. Different prices alone, because it affects the value of marginal productivity is sufficient to cause a deviation in wages and rentals between countries. However, in addition, in a variable proportions model, different wage and rentals 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.

### **2.7.1 Factor Mobility and Trade – Overview**

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 a 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 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 probably 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 a 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 of 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 and the specific factor models represent attempts to incorporate factor immobility precisely because of the concerns listed above. 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 100-3, especially).

The final issue of 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 capital controls 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 has been addressed in the context of some trade models. A classic result by Mundell (1957) demonstrates that international factor mobility can act as a substitute for international trade in goods and services.

### **2.7.2. Domestic Factor Mobility**

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

An example of how the adjustment costs vary across factors as factors move across industries is provided by considering 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. An accountant has skills that are used by all businesses. Although there may certain specific accounting techniques associated with the textile industry, it is likely that this worker could find employment in a variety of different industries. The worker would still suffer some adjustment costs such as a short-term reduction in salary, search costs to find another job as well as 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 was 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 very many 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 on to college. All of this requires more time and incurs a greater cost.

Next consider the capital equipment used in the textile plant. The loom that is used to weave cloth is 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 re-labeling the truck with the new company name. The truck is relatively costlessly transferable across industries.

Finally consider the land on which the textile plant has operated. 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 is sold to another business who will recondition it to suit their 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 may 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.

The examples above 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.

### **2.7.3. Time and Factor Mobility**

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 readily 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 4-6 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 are 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 the 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 a 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 though, 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.

## **2.8 The Immobile Factor Model**

### Highlights

The immobile factors model is designed to highlight the effects of factor immobility between industries within a country when a country moves to free trade. The model used is the standard Ricardian model with one variation in its assumptions. Whereas in the Ricardian model, labor can move costlessly between industries, in this model we assume that the cost of moving factors 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.

### **2.8.1 The Immobile Factors Model – Assumptions**

The immobile factors 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. Wine workers cannot be used productively in the cheese industry.

This differs from the Ricardian model which assumed that labor was freely mobile across industries. In that model a cheese worker moved to the wine industry would be immediately as productive as a longtime wine worker.

Neither assumption, free and costless mobility or complete immobility, are 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 be 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 be 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.

Below is a list of the standard assumptions in the immobile factor model.

#### Immobile Factors: Basic Assumptions

Perfect Competition prevails in all markets.

Two countries

The case of two countries is used to simplify the model analysis. Let one country be the US, the other France\*. Note, 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 wine and cheese.

## Two factors

Two factors of production are used to produce wine and cheese. Wine production requires wine workers while cheese production requires cheese workers. Although each of these factors is labor, they are different types of labor since their productivities differ across industries.

## Consumers maximize utility

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

## General Equilibrium

The immobile factors 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 outputs and the factor are chosen 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.

## **Immobile Factors: Production Assumptions**

The production functions below represent industry production not firm production. The industry consists of many small firms in light of the assumption of perfect competition.

### Production of Cheese

US	France
$Q_c = \frac{\bar{L}_c \text{ [hrs]}}{a_{Lc} \left[ \frac{\text{hrs}}{\text{lb}} \right]}$	$Q_c^* = \frac{\bar{L}_c^*}{a_{Lc}^*}$

where

$Q_c$  = quantity of cheese produced in the U.S.

$\bar{L}_c$  = fixed amount of labor applied to cheese production in the U.S.

$a_{Lc}$  = unit-labor requirement in cheese production in the U.S. ( hours of labor necessary to produce one unit of cheese)

and where all starred variables are defined in the same way but refer to the production process in France.

### Production of Wine

US	France
$Q_w = \frac{\bar{L}_w \text{ [hrs]}}{a_{Lw} \left[ \frac{\text{hrs}}{\text{gal}} \right]}$	$Q_w^* = \frac{\bar{L}_w^*}{a_{Lw}^*}$

where

$Q_w$  = quantity of wine produced in the U.S.

$\bar{L}_w$  = amount of labor applied to wine production in the U.S.

$a_{Lw}$  = unit-labor requirement in wine production in the U.S. ( hours of labor necessary to produce one unit of wine)

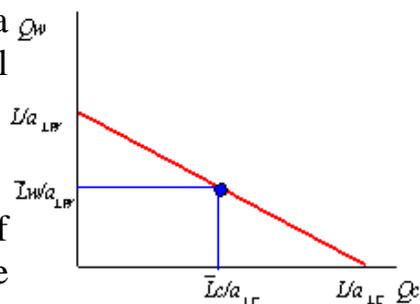
and where all starred variables are defined in the same way but refer to the production process in France.

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

### 2.8.2 The Production Possibility Frontier in the Immobile Factor Model

To derive the PPF in the immobile factors 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] Since labor is moveable across industries, any point along the PPF is a feasible production point which maintains full employment of labor.



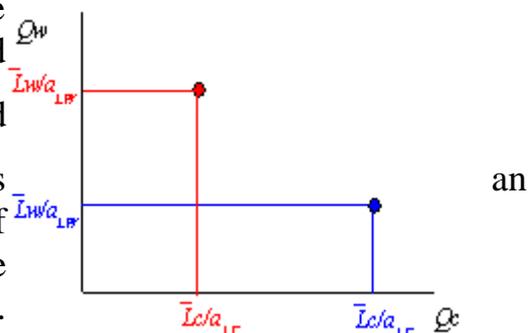
Next let's suppose that some fraction of the  $L$  workers are cheesemakers while the remainder are winemakers. Let  $\bar{L}_C$  be the number of cheesemakers and  $\bar{L}_W$  be the number of winemakers such that  $\bar{L}_C + \bar{L}_W = L$ . If we assume that these workers cannot be moved to the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

In the immobile factor model the production possibility frontier reduces to a single point represented by the blue dot in the diagram. This is the only production point which generates full employment of both wine workers and cheese workers. The production possibility set is represented by the rectangle formed by the blue lines and the axes.

Notice that in the immobile factor model there is no defined opportunity cost of production. Since it is impossible, by assumption, to increase output of either good, opportunity cost is not defined. 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.

### 2.8.3 Autarky Equilibrium in the Immobile Factor Model

Suppose two countries, the US 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 US has 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.

As an example suppose that consumers face a price ratio  $P_C/P_W = 2$  gallons of wine per pound of cheese. In this case consumers will demand wine to cheese in the same ratio, 2 gallons per pound. Suppose the price ratio rises to say,  $P_C/P_W = 3$ . This means that cheese becomes more expensive compared to wine. At the higher price ratio consumers will now demand 3 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 the Figure. The US produces more cheese than France while France produces more wine than the US. Because the factors are immobile the ratio of wine to

cheese production in the US must be  $\frac{Q_W}{Q_C} = \frac{\bar{L}_W/a_{LW}}{\bar{L}_C/a_{LC}}$ .

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,  $\frac{Q_W^D}{Q_C^D} = \frac{Q_W}{Q_C}$ .

Substituting from above yields the autarky price ratio in the US,

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

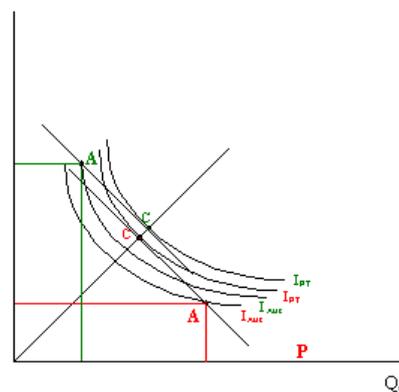
Similarly, France's autarky price ratio is given by,



respectively. Thus the US exports  $ZP$  units of cheese while France imports the equivalent  $CZ$ . Similarly France exports  $ZP$  units of wine while the US 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,  $(P_C/P_W)_{FT}$ , represented as the slope of the lines  $CP$ .

### 2.8.5 Aggregate Welfare Effects of Free Trade in the Immobile Factor Model

The adjoining diagram compares autarky and free trade equilibria for the US and France. The US PPF is given by the green dot at **A** while France's PPF is given by the red dot at **A**. We assume both countries share the same aggregate preferences represented by the indifference curves in the diagram.



The US autarky production and consumption points are determined where the aggregate indifference curve touches the US PPF at the point **A**. The US realizes a level of aggregate utility which corresponds to the indifference curve  $I_{Aut}$ .

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

France's autarky production and consumption points are determined where the aggregate indifference curve touches France's PPF at the point **A**. France realizes a level of aggregate utility which 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 which corresponds to the indifference curve  $I_{FT}$ . Since the free trade indifference curve  $I_{FT}$  lies to the north east of the autarky indifference curve  $I_{Aut}$ , national welfare also rises as France moves to free trade.

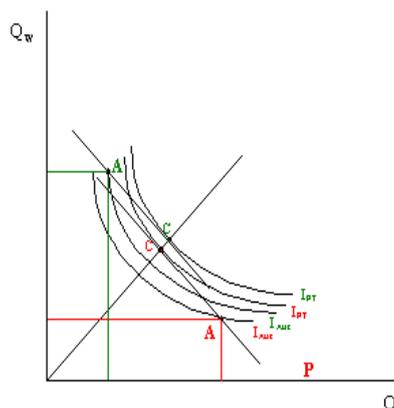
**This means that free trade will raise aggregate welfare for both countries relative to autarky. Both countries are better-off with free trade.**

### 2.8.6 Production and Consumption Efficiency Gains from Free Trade

The aggregate welfare gains from free trade can generally be decomposed into the 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 US, the increase in utility between  $I_{FT}$  and  $I_{Aut}$  shown in the Figure, represents an increase in consumption efficiency.

#### Effect of Trade on Real Wages

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. Cheesers' 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 US,  $(P_c/P_w)$ , rises.

The result is a redistribution of income as shown in the Table. 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.

<p><b>Changes in Real Wages (Autarky to Free Trade):</b>  <math>(P_c/P_w)</math> rises</p> <p style="text-align: center;">In terms of</p>
---

Real Wage of, <b>US Cheese</b>	<b>Cheese</b>	<b>Wine</b>
	$\frac{w_C}{P_C} = \frac{1}{a_{LC}}$	$\frac{w_C}{P_W} = \frac{1}{a_{LC}} \frac{P_C}{P_W}$
<b>Workers</b>	no change	rises
<b>US Wine</b>	$\frac{w_W}{P_C} = \frac{1}{a_{LW}} \frac{P_W}{P_C}$	$\frac{w_W}{P_W} = \frac{1}{a_{LW}}$
<b>Workers</b>	falls	no change

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 realize 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,  $(P_C/P_W)$ , falls when moving to free trade. The result is a redistribution of income similar to the US as shown in the Table. Cheese worker face no change in their real wage in terms of cheese and experience an decrease in their real wage in terms of wine.

<b>Changes in Real Wages (Autarky to Free Trade):</b>		
$(P_C/P_W)$ falls		
	In terms of	
Real Wage of, <b>French Cheese</b>	<b>Cheese</b>	<b>Wine</b>
	$\frac{w_C}{P_C} = \frac{1}{a_{LC}}$	$\frac{w_C}{P_W} = \frac{1}{a_{LC}} \frac{P_C}{P_W}$
<b>Workers</b>	no change	falls
<b>French Wine</b>	$\frac{w_W}{P_C} = \frac{1}{a_{LW}} \frac{P_W}{P_C}$	$\frac{w_W}{P_W} = \frac{1}{a_{LW}}$
<b>Workers</b>	rises	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 realize 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 US and in 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 occur because of 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.**

#### Intuition of Real Wage Effects

When the US and France move from autarky to free trade, the US price of cheese rises and the US 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 US while the US 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 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.**

#### Interpreting the Welfare Effects

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 to particular individuals. The immobile factor model suggest 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 gain, in that the sum of the gains will exceed the sum of the losses.

Questions:

1. Give a definition for Production Possibility Frontier (PPF).
2. What is the difference between the theories of Comparative advantage and Absolute Advantage?
2. Why the theory of David Ricardo is called the Theory of Comparative Advantage?
3. What is the opportunity cost?
4. What are the implications of the theory of Comparative Advantage?
5. Critically analyze the theory of Comparative Advantage.

6. Why do we call the Heckscher-Ohlin model the model of factor proportions?
7. What is purpose of Heckscher-Ohlin model?
8. Critically analyze the Heckscher-Ohlin model.
9. What is the purpose of the Rybczynski theorem
10. Give a brief numerical example for Rybczynski theorem
11. What is the purpose of the Stolper-Samuelson theorem?
12. Give a brief numerical example for Stolper-Samuelson theorem.

References:

*Paul R. Krugman and Maurice Obstfeld, International Economics: Theory and Policy, Fifth edition, Addison-Wesley Publishing Company, 2000.*

*James R. Markusen, James R. Melvin, William H. Kaempfer and Keith E. Maskus, International Trade: Theory and Evidence, International edition, New York: MCGraw-Hill, 1995.*

### **Lecture 3. Economies of Scale and International Trade**

#### Highlights

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 upon 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 between countries like the US, Japan and the European Union. For the most part these countries, and other developed countries, have similar technologies, endowments and to some extent similar preferences. Using classical models of trade (Ricardian, Heckscher-Ohlin), these countries would have little reason to engage in trade. And 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.

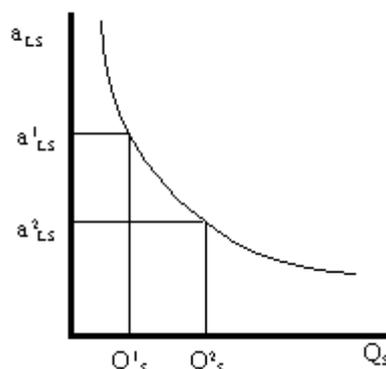
Another feature of international trade that remains unexplained with classical models is the phenomenon of intra-industry trade. A quick look at the aggregate trade data reveals that many countries export and import similar products. For example, the US imports and exports automobiles, it imports and exports machine tools, it imports and exports steel, etc. To some extent intra-industry 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 require 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 of these types are generally aggregated into one export/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 intra-industry 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.

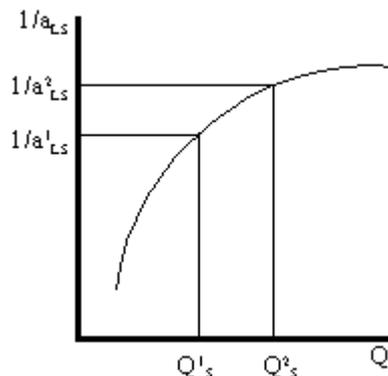
### 3.1 Economies of Scale and Returns to Scale

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 production of a good is a function of the level of output produced. In the adjoining diagram 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  $Q^1_s$ , the unit-labor requirement is given by  $a^1_{LS}$ . If production were to rise to  $Q^2_s$ , then the unit-labor requirement would fall to  $a^2_{LS}$ . This means that at the higher level of output, it requires less labor (i.e. fewer resources or cost) per unit of output than it required at the smaller scale.



With a simple adjustment it is possible to show that **economies of scale in production is equivalent to increasing returns to scale.**

Increasing returns to scale in production means that an increase in resource usage, by say  $x\%$ , results in an increase in output by more than  $x\%$ . In the adjoining diagram we plot labor productivity in steel production when production exhibits increasing returns to scale. [This graph is derived by plotting the reciprocal of the unit-labor requirement (i.e.  $1/a_{LS}$ ) for each output level in the above diagram.]



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 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 etc.

### 3.2 Gains from Trade with Economies of Scale a Simple Explanation

The main reason why 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 US 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 following production functions.

Production of Clothing:

<p>US</p> $Q_c = \frac{L_c \text{ [hrs]}}{a_{Lc} \left[ \frac{\text{hrs}}{\text{rack}} \right]}$	<p>France</p> $Q_c^* = \frac{L_c^*}{a_{Lc}}$
--	--

where

$Q_C$  = quantity of clothing produced in the U.S.

$L_C$  = amount of labor applied to clothing production in the U.S.

$a_{LC}$  = unit-labor requirement in clothing production in the U.S. and France ( hours of labor necessary to produce one rack of clothing)

and where all starred variables are defined in the same way but refer to the process in France. Note that since production technology is assumed the same in both countries, we use the same unit-labor requirement in the US and the French production function.

Production of Steel: The production of steel is assumed to exhibit economies of scale in production.

<p>US</p> $Q_S = \frac{L_S \text{ [hrs]}}{a_{LS}(Q_S) \left[ \frac{\text{hrs}}{\text{tons}} \right]}$	<p>France</p> $Q_S^* = \frac{L_S^*}{a_{LS}(Q_S^*)}$
---	---

where

$Q_S$  = quantity of steel produced in the U.S.

$L_S$  = amount of labor applied to steel production in the U.S.

$a_{LS}(Q_S)$  = unit-labor requirement in steel production in the U.S. ( hours of labor necessary to produce one ton of steel). Note, 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 below.

<p>US</p> $L_C + L_W = L$	<p>France</p> $L_C^* + L_W^* = L^*$
---------------------------	-------------------------------------

where  $L$  is the labor endowment in the US and  $L^*$  is the endowment in France. When the resource constraint holds with equality it implies that the resource is fully employed.

Demand: We will assume that the US and France have identical demands for the two products.

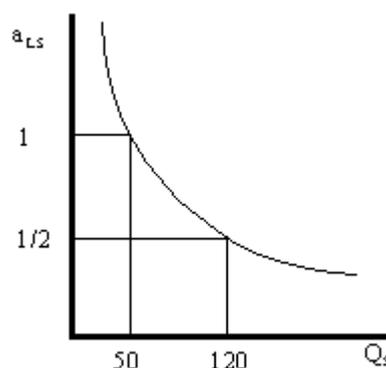
### *A Numerical Example*

We proceed much as 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 of the steel that is demanded in the world.

Suppose the exogenous variables in the two countries take the values in the following table.

US	$a_{Lc} = 1$	$L = 100$
France	$a_{Lc} = 1$	$L^* = 100$

Let the unit-labor requirement for steel be read off of the adjoining graph. The graph shows that when 50 tons of steel are produced by the economy, the unit-labor requirement is 1 hour of labor per ton of steel. However, when 120 tons of steel are produced, the unit-labor requirement falls to  $\frac{1}{2}$  hour of labor per ton of steel.



### *An Autarky Equilibrium*

The US 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 50 tons. Since at 50 tons of output, the unit-labor requirement is 1, it means that the total amount of labor used in steel production is 50 hours. That leaves 50 hours of labor to be allocated to the production of clothing, which with a unit-labor requirement of 1 also,

means that total output of clothing is 50 racks. The autarky production and consumption levels are summarized below.

<b>Autarky Production/Consumption</b>		
	Clothing	Steel
	(racks)	(tons)
US	50	50
France	50	50
World	100	100
Total		

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 all of the 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  $\frac{1}{2}$  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  $a_{LS} = \frac{1}{2}$ , 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 40 hours of labor to clothing production and if the US specializes in clothing production, then production levels in each country and world totals after the reallocation of labor would be as shown in the following table.

<b>Reallocated Production</b>		
	Clothing	Steel
	(racks)	(tons)

US	100	0
France	40	120
World	140	120
Total		

The important result here is that it is possible to find a reallocation of labor across industries 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 60 tons of steel and import 30 racks of clothing then each country would consume 70 units of clothing (20 more than in autarky) and 60 tons of steel (10 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 by concentrating production in the economies of scale industry in one country, advantage can be taken of the productive efficiency improvements.

#### Questions:

1. What is Economies of Scale?
2. What are the effects of economies of scale in free trade?
3. In your point of view what factors are needed for the existence of economies of scale?

#### References:

*Paul R. Krugman and Maurice Obstfeld, International Economics: Theory and Policy, Fifth edition, Addison-Wesley Publishing Company, 2000.*

*James R. Markusen, James R. Melvin, William H. Kaempfer and Keith E. Maskus, International Trade: Theory and Evidence, International edition, New York: MCGraw-Hill, 1995.*

## **Lecture 4. Monopolistic Competition**

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 firms in the industry and the likelihood 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 which 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 many more.

The model is especially useful in explaining the motivation for intra-industry trade, i.e. 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 intra industry trade may arise, but 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 compared to autarky.

### **Model Assumptions - Monopolistic Competition**

A monopolistically competitive market has features which represent a cross between a perfectly competitive market and a monopolistic market (hence the name). Below are listed 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 which 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, another might produce a white toothpaste with a wintergreen taste. This assumption is similar to a monopoly which 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 upon 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.

**Love of Variety:** 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, etc. 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 between rather than ten.

**Ideal Variety:** 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, etc. 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.

Depending on the type of consumer demand for the market, then, 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 if firms are making positive economic profits, it acts 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: the long-run is defined as the period of time necessary to drive economic profit to zero.] This assumption is identical to the free entry and exit assumption in a perfectly competitive market.

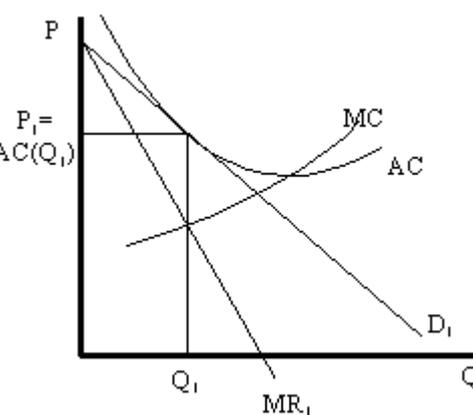
5) There are economies of scale in production (internal to the firm). This is incorporated as a downward sloping average cost curve. If average costs fall when firm output increases it means that the per-unit cost falls with an increase in the scale of production. Since monopoly markets can arise when 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 the assumptions described above. 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.

#### **4.1. The Effects of Trade in a Monopolistically Competitive Industry**

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: 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 obtain even if firms were not symmetric.]

In the adjoining diagram 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, i.e.  $P_1 = AC(Q_1)$  which implies that profit is zero. Thus the firm is in a long-run equilibrium since entry or exit has driven profits to zero.

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 which are also in a long-run equilibrium initially.

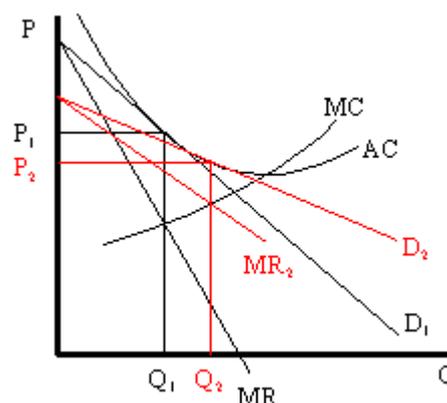
Next suppose whatever barriers to trade that had previously existed are suddenly and immediately removed. That is, suppose the countries move from autarky to free trade. The changes that ultimately arise will be initiated by the behavior of consumers in the market. Recall that market demand can be described 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 between. Since consumer welfare rises as the number of varieties increases, domestic consumers will shift some of their demand towards foreign varieties while foreign consumers will shift their demand towards 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 of the prices of all the goods in both countries are initially identical. In terms of the diagram, 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 upon the relative sizes of these effects.

Regardless of the size of these effects, **the removal of trade barriers would cause intra-industry trade to arise.** Each country would become an exporter and an importer of differentiated products which would be classified in the same industry. Thus the country would export and import automobiles, toothpaste, clothing etc. 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 between, 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.**

The final equilibrium for the representative firm is shown in the adjoining diagram. [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 (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.

#### **4.2. The Costs of Free Trade under Monopolistic Competition**

There are two potential costs of free trade in this model. **The first cost involves the potential costs of adjustment in the industry. The second cost involves the possibility that more varieties will increase transactions 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. Now it is impossible to identify which country's firms would close, however, it is likely to be those firms who lose more domestic customers than they gain of 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 of 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, etc. Eventually these resources are likely to be re-employed 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, one might purchase magazines that offer evaluations, one might talk to friends about their experiences with different autos. All of 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 increase the number of varieties available to each consumer, each consumer is more likely to find a product which is closer to 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 transactions costs by choosing to evaluate only a sample of the available products. However, in this case there might also arise a psychological cost because of the inherent uncertainty about whether the best possible choice was indeed made. Thus in welfare would be diminished among consumers to the extent that there are increased transactions costs because of the increase in the number of varieties to evaluate.

### **4.3 The Net Welfare Effects of Free Trade under Monopolistic Competition**

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 might still be positive if the production and consumption efficiency effects are larger.

#### Questions:

1. What do we mean by monopolistic competition?
2. What is the main difference between perfect competition and monopolistic and oligopoly competition?
3. What are the Net Welfare Effects of Free Trade under Monopolistic Competition?

#### References:

*Paul R. Krugman and Maurice Obstfeld, International Economics: Theory and Policy, Fifth edition, Addison-Wesley Publishing Company, 2000.*

*James R. Markusen, James R. Melvin, William H. Kaempfer and Keith E. Maskus, International Trade: Theory and Evidence, International edition, New York: MCGraw-Hill, 1995.*

## **Lecture 5. Trade Policy Effects with Perfectly Competitive Markets**

This section analyzes the price and welfare effects of trade policies under the assumption that markets are perfectly competitive.

The effects vary significantly depending on the size of a country in international markets. This distinction is made by analyzing policy effects under both "large" and "small" country assumptions.

Two different methods of analysis are common. Partial equilibrium analysis focuses on the effects in one sector only. It uses standard supply and demand curves and measures welfare using producer and consumer surplus. General equilibrium analysis incorporates the interaction of import and export sectors and 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.

For now only the partial equilibrium analysis is available. The general equilibrium analysis will be added in the future.

### **Basic Assumptions of the Model**

1) Assume there are two countries, the US and Mexico. The analysis generalizes by assuming one of the countries is the rest of the world.

2) Each country has producers and consumers of a tradeable good, wheat. The analysis can generalize by considering broad classes of products, like manufactured goods, or services.

3) Wheat is a homogeneous good. All wheat, from Mexico and the US, 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**

Partial equilibrium analysis means that the effects of policy actions are examined only in the markets which 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 in 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.

### "Large" vs. "Small" Country Assumption

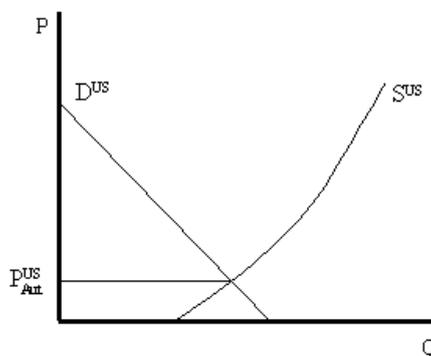
Two cases are considered regarding the size of the policy-setting country in international markets.

If the country is "**large**" 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.** Essentially 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 "**small**" in international markets then the policy-setting country has a very small share of 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.

### 5.1 Depicting a Free Trade Equilibrium Large Country Case

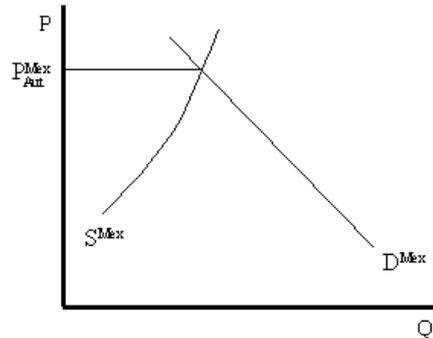
The adjoining graph depicts the supply and demand for wheat in the US market. The supply curve represents the quantity of wheat that US producers would be willing to supply at every potential price for wheat in the US market. The demand curve represents demand by US consumers at every potential price for wheat in the US



market.

The intersection of demand and supply corresponds to the equilibrium autarky price and quantity in the US. The price,  $P_{Aut}^{US}$ , is the only price that will balance domestic supply with domestic demand for wheat.

The next graph 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 the Mexico. The price,  $P_{Aut}^{MEX}$ , is the only price that will balance Mexican supply with demand for wheat.

The curves are drawn such that the US 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 US would export wheat to Mexico. Once trade is opened, the higher Mexican price will induce profit-seeking US 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 US market wheat supply falls because of US exports. The reduced supply raises the equilibrium price in the US. These prices move together as US exports rise, until the prices are equalized between the two markets. The free trade price of wheat,  $P^{FT}$  is shared by both countries.

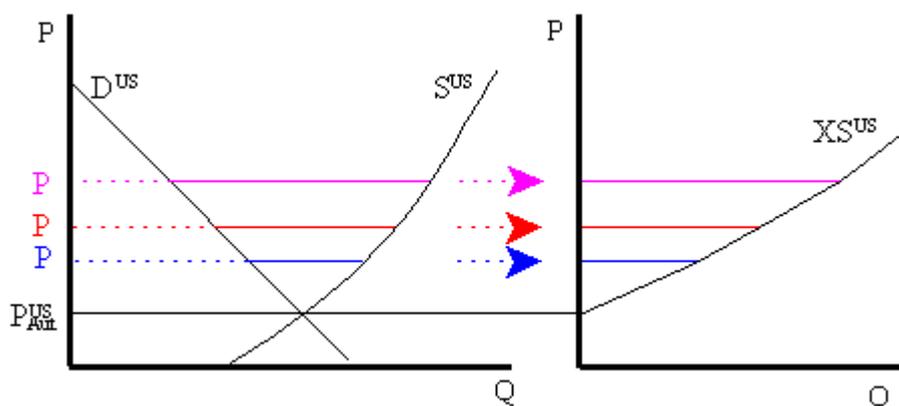
To derive the free trade price and the quantity traded we can construct an export supply curve for the US and an import demand curve for Mexico.

Notice that at prices above the autarky price in the US, there is excess supply of wheat, i.e., supply exceeds demand. If we consider prices either

at or above the autarky price we can derive an export supply curve for the US. The equation for export supply is given by,

$$XS^{US}(P^{US}) = S^{US}(P^{US}) - D^{US}(P^{US})$$

where  $XS^{US}(\cdot)$  is the export supply function,  $S^{US}(\cdot)$  is the supply function for wheat in the US and  $D^{US}(\cdot)$  is the demand function for wheat in the US. Each function is dependent on the US price of wheat,  $P^{US}$ .



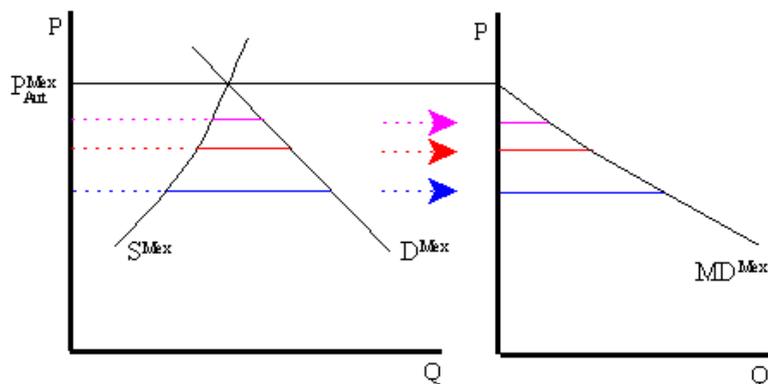
Graphically, export supply is the horizontal difference between the supply and demand curve at every price, at and above the autarky price, as shown in the adjoining Figure. At the autarky price,  $P_{Aut}^{US}$ , export supply is zero. At prices,  $P$ ,  $P$  and  $P$ , export supply is given by the 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. The export supply curve gives the quantities the US 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,

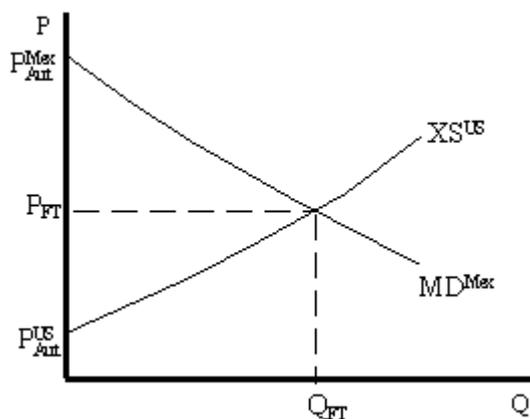
$$MD^{Mex}(P^{Mex}) = D^{Mex}(P^{Mex}) - S^{Mex}(P^{Mex})$$

where  $MD^{Mex}(\cdot)$  is the import demand function,  $D^{Mex}(\cdot)$  is the demand function for wheat in Mexico and  $S^{Mex}(\cdot)$  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 the adjoining Figure. At the autarky price,  $P_{Aut}^{Mex}$ , import demand is zero. At prices,  $P$ ,  $P$  and  $P$ , 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. The import demand curve gives the quantities Mexico would be willing to import if it faced prices below its autarky price.



The intersection of the US 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. The free trade price,  $P_{FT}$ , must be that price which equalizes US export supply with Mexican import demand. Algebraically, the free trade price is that price which solves,



$$XS^{US}(P_{FT}) = MD^{Mex}(P_{FT})$$

This implies also that world supply is equal to world demand since,

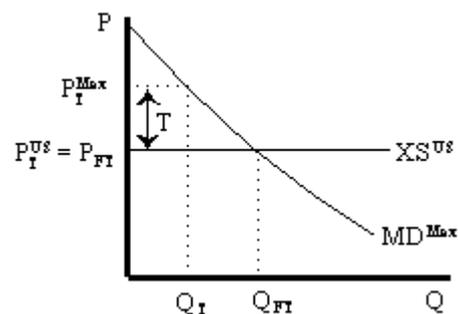
$$S^{US}(P_{FT}) - D^{US}(P_{FT}) = D^{Mex}(P_{FT}) - S^{Mex}(P_{FT})$$

and,

$$S^{US}(P_{FT}) + S^{Mex}(P_{FT}) = D^{US}(P_{FT}) + D^{Mex}(P_{FT})$$

## 5.2 Price Effects of a Tariff: 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 upon 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 upon the world price.**



To depict the price effects of a tariff using an export supply/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. From the perspective of the small importing country, it takes the world price as exogenous since it can have no effect upon it. From the exporters perspective, it 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 large country case. Namely,

$$P_T^{Mex} = P_T^{US} + T$$

$$XS^{US}(P_T^{US}) = MD^{Mex}(P_T^{Mex})$$

However, now  $P_T^{US}$  remains at the free trade price. This implies that **in a small country case, the price of the import good in the importing country will rise by the amount of the tariff.** As seen in the adjoining diagram, the higher domestic price reduces import demand and export supply to  $Q_T$ .

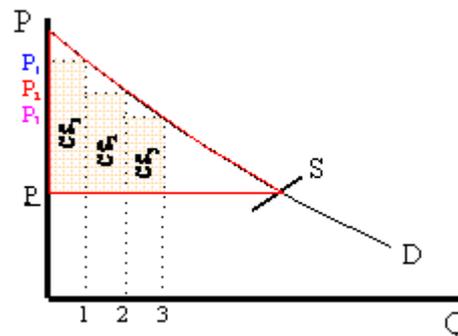
## The Welfare Effects of Trade Policies Partial Equilibrium

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 the welfare of somebody.

### 5.3 Consumer and Producer Surpluses

#### 5.3.1 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 off of 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 the adjoining Figure, 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

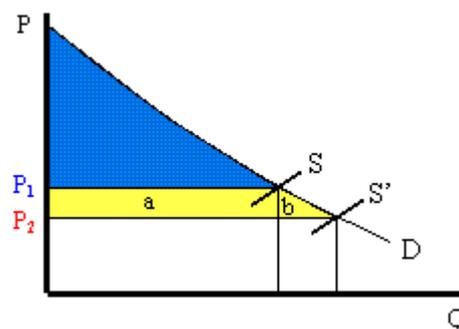
high income. To sell two units of the good the price would have to be lowered to  $P_2$ . (This assumes that the firm cannot perfectly price discriminate and charge two separate prices to two customers.) A slightly lower price might induce another customer to purchase the product, or, might induce the first customer to buy two units. Three units of the good could be sold if the price is lowered to  $P_3$ , etc.

The price that ultimately prevails in a free market is that price which equalizes market supply with market demand. That price will be  $\underline{P}$  in the diagram as long as the firms do not price discriminate. Now 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  $\underline{P}$  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  $\underline{P}$ . 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  $\underline{P}$  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 the diagram. 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 as a rightward shift in the supply curve from  $S$  to  $S'$  in the adjoining diagram. At the original price  $P_1$ , consumer surplus is given by the blue area in the diagram. 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 the Figure. The change in consumer surplus, CS, is given by the yellow area in the Figure. 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

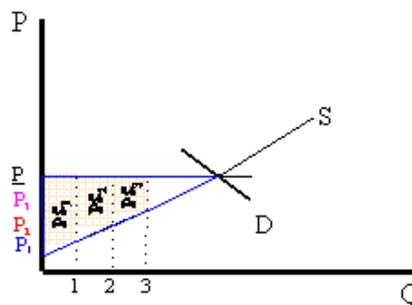


groups of consumers are affected. Consumers who would have purchased the product even at the higher price  $P_1$ , now receive more surplus ( $P_1 - P_2$ ) for each unit they purchase. These extra benefits are represented by the rectangular area a in the diagram. Also, there are additional consumers 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.

### 5.3.1 Producer Surplus

Producer Surplus is used to measure the welfare of a group of firms who 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 off of 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 the adjoining Figure, 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 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  $P_3$ , etc.



The price that ultimately prevails in a free market is that price which equalizes market supply with market demand. That price will be  $\underline{P}$  in the diagram. Now 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  $\underline{P}$  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

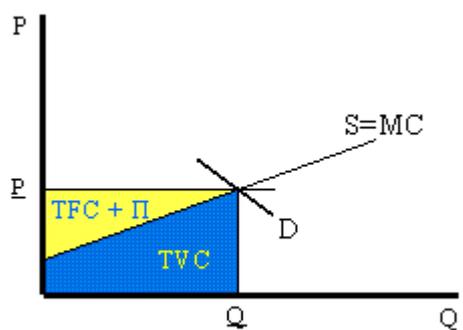
ultimately receives  $\underline{P}$ . The second unit generates a smaller amount of surplus than the first unit.

We can continue this procedure until the market demand at the price  $\underline{P}$  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 the diagram. 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 price equal to marginal cost. Thus marginal cost is equal to the price  $\underline{P}$  in the Figure at industry output equal to  $\underline{Q}$ . Marginal cost represents the addition to cost for each additional unit of output. As such it represents additional *variable* cost for each additional unit of output. This implies that the area under the supply curve at an

output level, such as  $\underline{Q}$  represents total variable cost (TVC) to the industry and is shown as the blue area in the diagram.

On the other hand, the market price times the quantity produced ( $\underline{P} \times \underline{Q}$ ) represents total revenue received by firms in the industry. This is represented as the sum of the blue and yellow areas in the diagram. The difference between total revenue and total variable cost, in turn, represents payments made to fixed factors of production (TFC) and any short-run profits ( $\Pi$ ) accruing to firms in the industry. (The yellow area in the diagram). This area is the same as producer surplus as defined above.

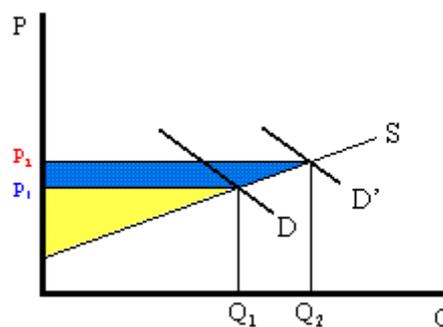


Since fixed factors of production represents capital equipment that must be installed by the owners of the firms before any output can be

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 as a rightward shift in the demand curve from  $D$  to  $D'$  in the adjoining diagram. At the original price  $P_1$ , producer surplus is given by the yellow area in the diagram. 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 change in



producer surplus,  $PS$ , is given by the blue area in the Figure. 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.

### 5.4 Price Effects of a Tariff: Large Country Case

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 US 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 US 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 US market. Since Mexico is assumed to be a "large" importer, the supply shifted back to the US market will be enough to induce a reduction in the US price. The lower price will reduce US 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 monopsonist 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.

$$P_T^{\text{Mex}} = P_T^{\text{US}} + T$$

$$XS^{\text{US}}(P_T^{\text{US}}) = MD^{\text{Mex}}(P_T^{\text{Mex}})$$

where  $T$  is the tariff,  $P_T^{\text{Mex}}$  is the price in Mexico after the tariff, and  $P_T^{\text{US}}$  is the price in the US after the tariff.

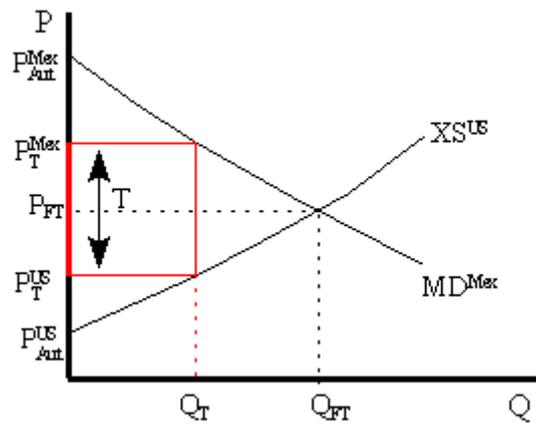
The first condition represents a price wedge between the final US price and the Mexican price, equal to the amount of the tariff. The prices must differ by the tariff because US suppliers of wheat must receive the same price for their product, regardless of whether the product is sold in the US or Mexico 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 US 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 on the adjoining graph. The Mexican price of wheat

risers from  $P_{FT}$  to  $P_T^M$  which reduces its import demand from  $Q_{FT}$  to  $Q_T$ . The US price of wheat falls from  $P_{FT}$

to  $P_T^U$  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 specific tariff rate  $T$ .



Notice that there is a unique set of prices which 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 US price and a further reduction in the quantity traded.

At the extreme, if the tariff were set equal to the difference in autarky

$$T = P_{Aut}^{Mex} - P_{Aut}^{US}$$

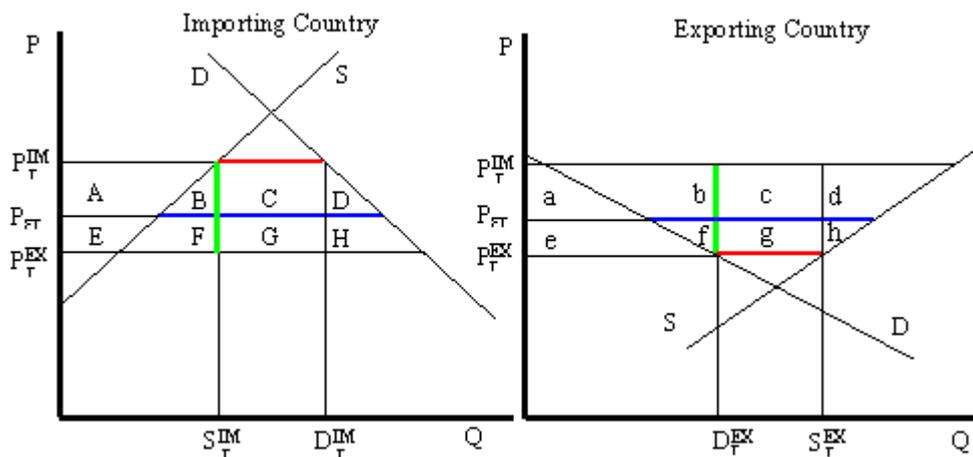
prices, (i.e. ) then the quantity traded would fall to zero. In other words the tariff would *prohibit* trade. Indeed any tariff set greater than or equal to the difference in autarky prices would eliminate trade and cause the countries to revert to autarky in that market. Thus we define a prohibitive tariff as any tariff,  $T_{pro}$ , such that,

$$T_{pro} \geq P_{Aut}^{Mex} - P_{Aut}^{US}$$

For an intuitive explanation about why these price changes would likely occur in the a real world setting, read the following.

### 5.4.1 Welfare Effects of a Tariff: Large Country

S uppose for simplicity that there are only two trading countries, one importing and one exporting country. The supply and demand curves for the two countries are shown in the adjoining diagram.  $P_{FT}$  is the free trade equilibrium price. At that price, the excess demand by the importing country equals excess supply by the exporter.



The quantity of imports and exports is shown as the blue line segment on each country's graph. 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  $T = P_T^{IM} - P_T^{EX}$ , equal to the length of the green line segment in the diagram. If the tariff were an ad valorem tax then the tariff

$$T = \frac{P_T^{IM}}{P_T^{EX}} - 1$$

rate would be given by .

The following Table 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. Positive welfare effects are shown in black, negative effects are shown in red.

<b>Welfare Effects of an Import Tariff</b>		
	<b>Importing Country</b>	<b>Exporting Country</b>
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)	

**Tariff Effects on:**

**Importing Country 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 the Table and Figure to see how the magnitude of the change in consumer surplus is represented.

**Importing Country 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 induces an increase in output of existing firms (and perhaps the addition of new firms), an increase in employment, and an increase in profit and/or payments to fixed costs. Refer to the Table and Figure to see how the magnitude of the change in producer surplus is represented.

**Importing Country 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 is targeted at certain worthy groups. Thus, someone within the country is the likely recipient of these benefits. Refer to the Table and Figure to see how the magnitude of the tariff revenue is represented.

**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). Refer to the Table and Figure 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. 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,

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

and 3) there will be a positive optimal tariff that will maximize national welfare.

However, it is also important to note that everyone's welfare does not rise 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:**

**Exporting Country 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. Refer to the Table and Figure to see how the magnitude of the change in consumer surplus is represented.

**Exporting Country 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 and/or payments to fixed costs. Refer to the Table and Figure to see how the magnitude of the change in producer surplus is represented.

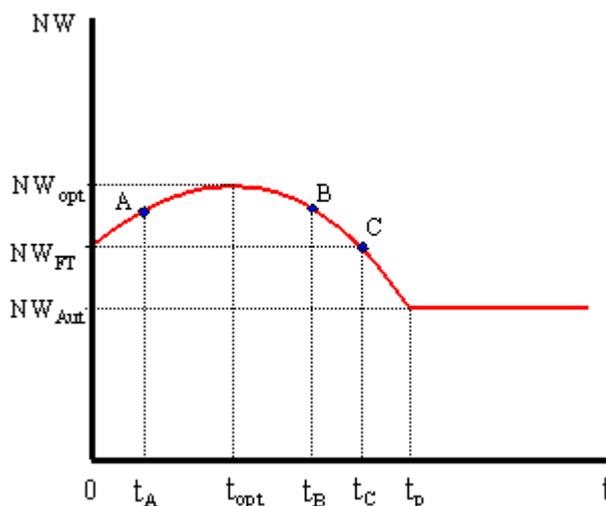
**Exporting Country Government** - There is no effect on the exporting country government revenue as a result of the importer's tariff.

**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). Refer to the Table and Figure to see how the magnitude of the change in national welfare is represented.

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, i.e., 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 in 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**.

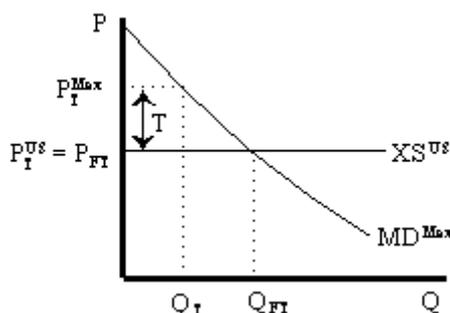


**5.5 The Optimal Tariff**

The possibility that a tariff could improve national welfare for a large country in international markets was first noted by Robert Torrens (1844). 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 be welfare improving in a variety of perfectly competitive models. This section describes the general results that come from that analysis.

In the adjoining diagram we present the general relationship between tariff levels ( $t$ ) and national welfare (NW) that arises out of that analysis. The tariff rate may be specified as either a specific or an ad valorem rate. The relationship exhibits the same pattern for each. If the tariff is set at zero, ( $t=0$ ), then we will presume the country allows imports to enter freely in this market. The level of national welfare attained in free trade is given by  $NW_{FT}$ .



As long as the import country is large in its import market, a small tariff will raise national welfare in the country. In the diagram one can see that national welfare rises as the tariff is raised from 0 to  $t_A$ . At low tariff rates, an increase in the tariff raises the terms of trade gain faster than the increase in the deadweight losses.

National welfare will continue to rise for additional increases in the tariff up until some maximum or optimum level,  $NW_{opt}$ . The tariff rate which achieves the optimal level of national welfare is referred to as the optimum or optimal tariff and is labeled  $t_{opt}$  in the diagram.

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 the diagram 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

high enough tariff, imports will be eliminated entirely. The tariff will prohibit trade. At the prohibitive tariff,  $t_p$  in the diagram, 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 above 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 is not necessarily welfare improving for a large importing country.

### **5.6 Price Effects of a Quota: Large Country Case**

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 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 US 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 US market. Since Mexico is assumed to be a "large" importer, the supply shifted back to the US market will generate excess supply in the US market at the original price and cause a reduction in the US price. The lower price will, in turn, reduce US supply, raise US demand and cause a reduction in US 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.

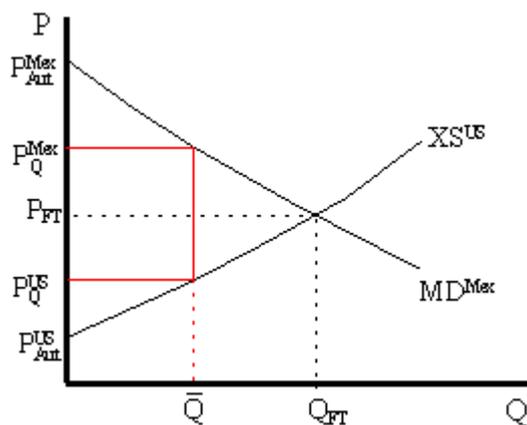
$$MD^{Mex}(P_Q^{Mex}) = \bar{Q}$$

$$XS^{US}(P_Q^{US}) = \bar{Q}$$

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 US 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 US such that export supply falls to the quota level  $\bar{Q}$ . In order for this to occur the price in the US falls.

The quota equilibrium is depicted graphically on the adjoining graph. The Mexican price of wheat rises from  $P_{FT}$  to  $P_Q^M$  which is sufficient to reduce its import demand from  $Q_{FT}$  to  $\bar{Q}$ . The US price of wheat falls from  $P_{FT}$  to  $P_Q^{US}$  which is sufficient to reduce its export supply also from  $Q_{FT}$  to  $\bar{Q}$ .



Notice that there is a unique set of prices which 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 US 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.

### Administration of an Import Quota

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 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.

There are three basic methods used to administer import quotas.

1) First-Come, First-Served - 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.

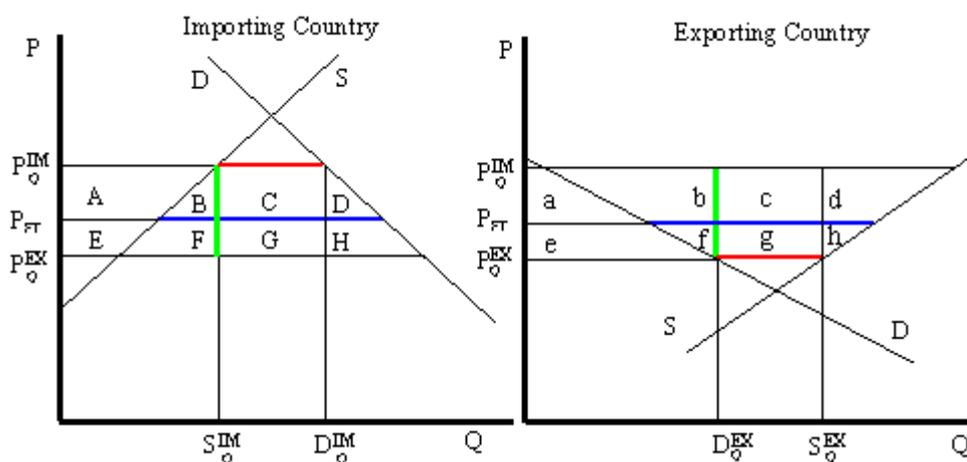
2) Auction Quota Rights - The government could auction quota rights. Essentially the government sells quota tickets where each ticket, presented to a customs official, allows the entry of one unit of the good. If the tickets are auctioned, or if the price is determined competitively, the price each ticket would be sold for 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 quota rents, equal to the difference in prices. If the government sells the quota tickets at the maximum attainable price, then the government would receive all of 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 share. Thus, if an importer of the product had imported 20% of all imports prior to the quota, then they would be given 20% of the quota tickets. Some times 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, governments can use them to direct rents towards its political supporters.

### 5.6.1 Welfare Effects of an Import Quota: Large Country

Suppose for simplicity that there are only two trading countries, one importing and one exporting country. The supply and demand curves for the two countries are shown in the adjoining diagram.  $P_{FT}$  is the free trade equilibrium price. At that price, the excess demand by the importing country equals excess supply by the exporter.



The free trade quantity of imports and exports is shown as the blue line segment on each country's graph. Suppose the large importing country implements a binding quota 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.

The following Table 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.

Positive welfare effects are shown in black, negative effects are shown in red.

<b>Welfare Effects of an Import Quota</b>		
	<b>Importing Country</b>	<b>Exporting Country</b>
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)	

### **Import Quota Effects on:**

**Importing Country 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. Refer to the Table and Figure to see how the magnitude of the change in consumer surplus is represented.

**Importing Country 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 induces an increase in output of existing firms (and perhaps the addition of new firms), an increase in employment, and an increase in profit and/or payments to fixed costs. Refer to the Table and Figure to see how the magnitude of the change in producer surplus is represented.

**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 the diagram.

2) If the government gives away the quota rights then the quota rents accrue to whomever 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 they receive the quota rents. This would imply that these rents should be shifted to the exporting country effects and subtracted from the importing country effects.

Refer to the Table and Figure to see how the magnitude of the quota rents is represented.

**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). Refer to the Table and Figure 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. 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,

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

and 3) there will be a positive quota level that will maximize national welfare.

However, it is also important to note that everyone's welfare does not rise 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:**

**Exporting Country 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. Refer to the Table and Figure to see how the magnitude of the change in consumer surplus is represented.

**Exporting Country 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 and/or payments to fixed costs. Refer to the Table and Figure to see how the magnitude of the change in producer surplus is represented.

**Quota Rents** - There are no quota rent effects in 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.

**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). Refer to the Table and Figure to see how the magnitude of the change in national welfare is represented.

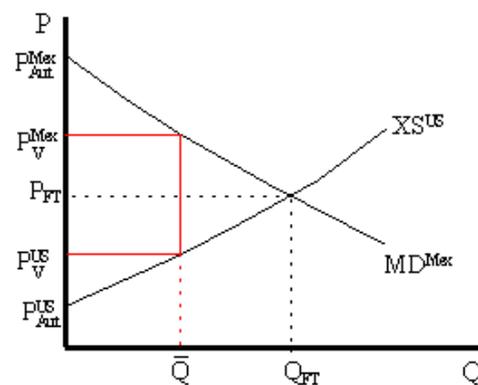
Since all three components are negative, the importer's tariff must result in a reduction in national welfare for the exporting country. However, it is important to note that a redistribution of income occurs, i.e., some groups gain while others lose. In this case the sum of the losses exceeds the sum of the gains.

### **Import Quota Effects on:**

**World Welfare** - The effect on world welfare is found by summing the national welfare effects in 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**.

### 5.7 Price Effects of a Voluntary Export Restraint: Large Country Case

Suppose the US, an exporting country in free trade, imposes a binding voluntary export restraint (VER) on wheat exports to Mexico. The VER will restrict the flow of wheat across the border. Since the US 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 US 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 US market causing excess supply in the US market at the original price and a reduction in the US price. The lower price will, in turn, reduce US supply, raise US demand and cause a reduction in US export supply.

The restricted wheat supply to Mexico will shift supply back to the US market causing excess supply in the US market at the original price and a reduction in the US price. The lower price will, in turn, reduce US supply, raise US demand and cause a reduction in US export supply.

These price effects are identical in direction to the price effects of an import tax, an import quota and an export tax.

A new VER equilibrium will be reached when the following two conditions are satisfied.

$$MD^{Mex}(P_V^{Mex}) = \bar{Q}$$

$$XS^{US}(P_V^{US}) = \bar{Q}$$

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 US 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 US such that export supply falls to the VER level  $\bar{Q}$ . In order for this to occur the price in the US falls.

The VER equilibrium is depicted graphically on the adjoining graph. 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 US price of wheat falls from  $P_{FT}$  to  $P_V^{US}$  which is sufficient to reduce its export supply also from  $Q_{FT}$  to  $\bar{Q}$ .

Notice that there is a unique set of prices which 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 US 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.

### **Administration of a Voluntary Export Restraint**

When a quantity restriction is set by a government it must implement procedures to prevent exports beyond the restricted level. A binding 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.

There are three basic methods used to administer VERs.

**1) First-Come, First-Served** - 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.

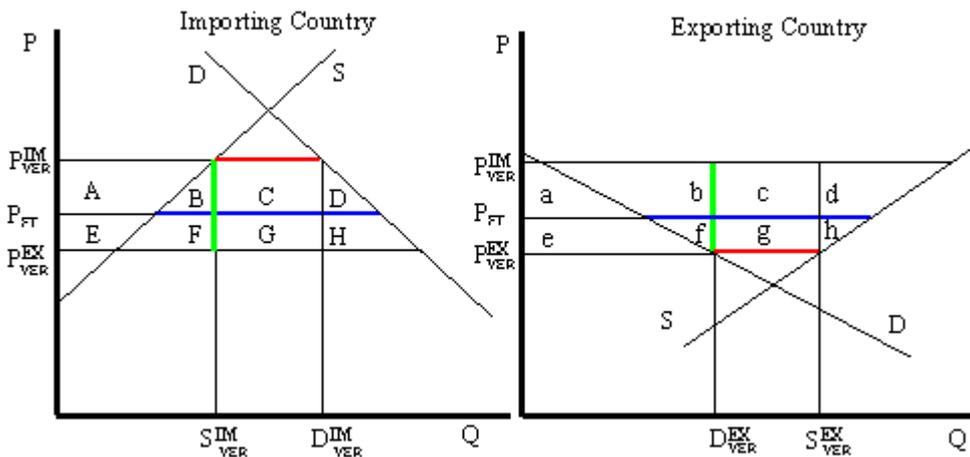
If administered in this way, the VER may result in a fluctuating price for the product over the year. During the open period a sufficient amount of imports may flow in to achieve free trade prices. Once the window is closed, prices would revert to the autarky prices.

**2) Auction Export Rights** - The government could auction the export rights. Essentially the government sells quota tickets where each ticket, presented to a customs official, allows the exit of one unit of the good. If the tickets are auctioned, or if the price is determined competitively, the price each ticket would be sold for 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 quota rents, equal to the difference in prices. If the government sells the quota tickets at the maximum attainable price, then the government would receive all of 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 share. Thus, if an exporter had exported 40% of all exports before the VER, then they would be given 40% of the quota tickets. It worth noting that because quota rents are so valuable, governments can use them to direct rents towards its political supporters.

### 5.7.1 Welfare Effects of a Voluntary Export Restraint: Large Country

Suppose for simplicity that there are only two trading countries, one importing and one exporting country. The supply and demand curves for the two countries are shown in the adjoining diagram.  $P_{FT}$  is the free trade equilibrium price. At that price, the excess demand by the importing country equals excess supply by the exporter.



The quantity of imports and exports is shown as the blue line segment on each country's graph. 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.

The following Table 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. Positive welfare effects are shown in black, negative effects are shown in red.

<b>Welfare Effects of a Voluntary Export Restraint</b>		
	<b>Importing Country</b>	<b>Exporting Country</b>

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)	

### VER Effects on:

**Exporting Country 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. Refer to the Table and Figure to see how the magnitude of the change in consumer surplus is represented.

**Exporting Country 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 and/or payments to fixed costs. Refer to the Table and Figure to see how the magnitude of the change in producer surplus is represented.

**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 the diagram.

2) If the government gives away the quota rights then the quota rents accrue to whomever 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 though the benefits would remain in the domestic economy.

Refer to the Table and Figure to see how the magnitude of the quota rents is represented.

**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). Refer to the Table and Figure 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. 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,

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

and 3) there will be a positive quota level that will maximize national welfare.

However, it is also important to note that everyone's welfare does not rise 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:**

**Importing Country 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. Refer to the Table and Figure to see how the magnitude of the change in consumer surplus is represented.

**Importing Country 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 induces an increase in output of existing firms (and perhaps the addition of new firms), an increase in employment, and an increase in profit and/or payments to fixed costs. Refer to the Table and Figure to see how the magnitude of the change in producer surplus is represented.

**Quota Rents** - There are no quota rent effects in the importing country as a result of the VER

**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). Refer to the Table and Figure to see how the magnitude of the change in national welfare is represented.

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, i.e., 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 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 importing country national welfare is reduced, the import competing producers gain nonetheless.

#### **VER Effects on:**

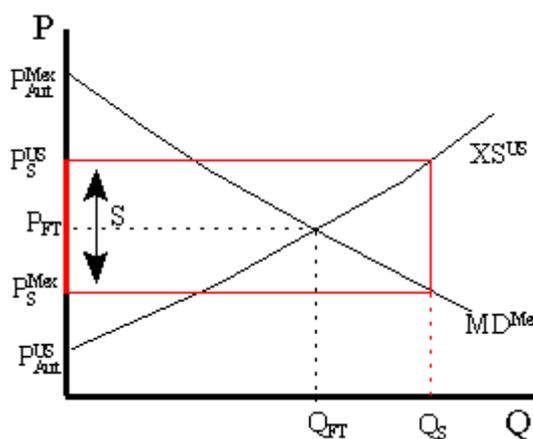
**World Welfare** - The effect on world welfare is found by summing the national welfare effects in the importing and exporting countries. By noting that the terms of trade gain to the importer is equal to the terms of trade loss to the exporter, the world welfare effect reduces to four components: the 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.**

### 5.9 Price Effects of an Export Subsidy: Large Country Case

Suppose the US, 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 US 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 US is assumed to be a "large" country, the price of all wheat sold in Mexico, both Mexican wheat and US 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 US market and induce an increase in the US price. The higher price will raise US export supply.

A new subsidy-ridden equilibrium will be reached when the following two conditions are satisfied.

$$P_S^{US} = P_S^{Mex} + S$$

$$XS^{US}(P_S^{US}) = MD^{Mex}(P_S^{Mex})$$

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 US after the subsidy. The first condition represents a price wedge between the final US price and the Mexican price, equal to the amount of the export subsidy. The prices must differ by the subsidy because US suppliers of wheat must receive the same price for their product, regardless of whether the product is sold in the US

or Mexico and all wheat sold in Mexico must be sold at the same price. Since a subsidy is paid to US 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 US 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 on the adjoining graph. 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 US 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  $S$ .

### 5.9.1 Welfare Effects of an Export Subsidy: Large Country

Suppose there are only two trading countries, one importing and one exporting country. The supply and demand curves for the two countries are shown in the adjoining diagram.  $P_{FT}$  is the free trade equilibrium price. At that price, the excess demand by the importing country equals excess supply by the exporter.

The quantity of imports and exports is shown as the blue line segment on each country's graph. 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 to  $P_T^{EX}$ . 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 the diagram. The following Table 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. Positive welfare effects are shown in black, negative effects are shown in red.

<b>Welfare Effects of an Export Subsidy</b>		
	<b>Importing Country</b>	<b>Exporting Country</b>
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)	

**Export Subsidy Effects on:**

**Exporting Country Consumers** - Consumers of the product in the exporting country experience an 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. Refer to the Table and Figure to see how the magnitude of the change in consumer surplus is represented.

**Exporting Country 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 and/or payments to fixed costs. Refer to the Table and Figure to see how the magnitude of the change in producer surplus is represented.

**Exporting Country 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 some other government program is cut back. If the subsidy is paid for 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 back or the tax increase can be postponed until some future date.

Regardless of how the subsidy is funded, though, someone in the domestic economy must ultimately pay for it. Refer to the Table and Figure to see how the magnitude of the subsidy payments are represented.

**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 ( $d$ ). Refer to the Table and Figure to see how the magnitude of the change in national welfare is represented.

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, i.e., 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:**

**Importing Country 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. Refer to the Table and Figure to see how the magnitude of the change in consumer surplus is represented.

**Importing Country 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 output of existing firms, a decrease in employment, and a decrease in profit and/or payments to fixed costs. Refer to the Table and Figure to see how the magnitude of the change in producer surplus is represented.

**Importing Country Government** - There is no effect on the importing country government revenue as a result of the exporter's subsidy.

**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). Refer to the Table and Figure to see how the magnitude of the change in national welfare is represented.

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 WTO allows countries to impose countervailing duties to retaliate against its trading partners when it can be shown that an exporting country government has used export subsidies.

However, it is also important to note that everyone's welfare does not rise 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 in

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.**

Questions:

1. Explain the free trade situation between two countries after autarky, while both of the countries produce the same product and there prevails different levels of supply and demand in each country.

2. What are the price effects of an export subsidy?

3. What are the welfare effects of an export subsidy?

4. What is the Consumer Surplus? Bring an example.

5. What is the Producer Surplus? Bring an example

6. What are the price effects of a tariff?

7. What are the welfare effects of a tariff?

8. What are the price effects of an import quota?

9. What are the welfare effects of an import quota?

10. What are the price effects of voluntary export restraints?

11. What are the welfare effects of voluntary export restraints?

References:

*Paul R. Krugman and Maurice Obstfeld, International Economics: Theory and Policy, Fifth edition, Addison-Wesley Publishing Company, 2000.*

*James R. Markusen, James R. Melvin, William H. Kaempfer and Keith E. Maskus, International Trade: Theory and Evidence, International edition, New York: MCGraw-Hill, 1995.*

## Lecture 6. Domestic Policies – Overview

Policy analysis in international trade theory generally emphasizes the analysis of *trade* policies specifically. Trade policy includes any policy which *directly* affects the flow of goods and services between countries, such as import tariffs, import quotas, voluntary export restraints, export taxes or export subsidies, et. al. During the 1980s and 1990s however, as trade barriers have come down, especially between developed countries, more and more attention has been turned to the effects of certain types of domestic policies and the international effects that these policies may have.

For example, in the US there is increasing concern about the environmental and labor policies of many US trade partners. With regard to environmental policies, some have argued that more lenient environmental regulations in many less developed countries gives firms in those countries a competitive edge relative to firms operating in the US. The same argument is used in regard to labor practices. Many US industry representatives argue that low foreign wages, lenient occupational safety regulations, and in some cases the use of prison labor, gives some countries a competitive edge in international markets.

In general, for small countries, domestic policies **will** have effects upon domestic prices, production levels, trade flows and welfare, but **will not** affect foreign prices, production levels or welfare. This means that countries like the US 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 have effects on 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 upon international trade.

For example, income taxes are levied on wage and capital income of individuals. Profit taxes are levied on the profits of businesses. Sales taxes are generally levied as a percentage of retail sales. In the US 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 US prohibits the use of recreational drugs like marijuana and cocaine, as well as pharmaceuticals that have not been approved by the US Food and Drug Administration.

Governments also provide subsidies for many purposes. They disburse R&D subsidies to high technology industries and encourage such activities through their defense spending contracts. Governments give out educational subsidies (grants) and subsidize student loans. In agriculture, governments often have elaborate programs designed to raise the incomes of farmers. This includes the use of price floors, subsidized loans, payments to encourage fallow acreage etc.

Although many domestic policies are complex regulations, the analysis here will focus on simple domestic tax and subsidy policies applied either to production or consumption. Many of the insights learned in this analysis, however, do carry over to more complex situations.

#### *Domestic Policy vs. 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 is implemented, such as a tariff, 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 (this price, we'll call the consumer price). The foreign price would remain equal to the consumer price in the domestic country. Note, 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. This can result even if a country is small in international markets. Two examples are analyzed.

The first case considers a small country initially in free trade, which 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 of 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 which 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 shown here 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 the second case we consider a consumption tax implemented by a small country which 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 shown 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 that is 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, with rates set the same, 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 WTO/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.<sup>(1)</sup> There are two main losses that 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 their domestic policies would completely offset the effects of trade liberalization, it is conceivable that they 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 US and Japan. Because of the large trade surpluses that Japan has had with the US during the 1980s and 1990s, some people in the US have charged Japan with having excessive barriers to trade. Japan has responded by noting that its average tariff rates are roughly equivalent to tariffs charged by the US and the EU. By the late 1980s, US policymakers began to focus on Japan's domestic policies as the source of trade problems. In particular, the US has noted that Japan's distribution system, and practices such as keiretsu (business groupings) may be preventing US firms' access to the Japanese market. This led to discussions known as the "Structural Impediments Initiative" . Although this section does not claim that such effects are indeed occurring, it does show that domestic policies can have an impact on trade flows between countries. It is conceivable that a country's domestic practices and policies could inhibit the inflow of goods into a country and act as if there were tariffs or quotas on imports.

### **6.1. Domestic Production Subsidies**

A domestic production subsidy is a payment made by a government to firms in a particular industry based on the output or production. The subsidy can be specified either as an ad valorem subsidy (% of the value of production) or as a specific subsidy (dollar payment per unit of output). The domestic production subsidy is different from an export subsidy. The production subsidy provides a payment based on all production regardless of where it is sold. The export subsidy, on the other hand, only offers a payment to the quantity or value that is actually exported.

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; because it raises the

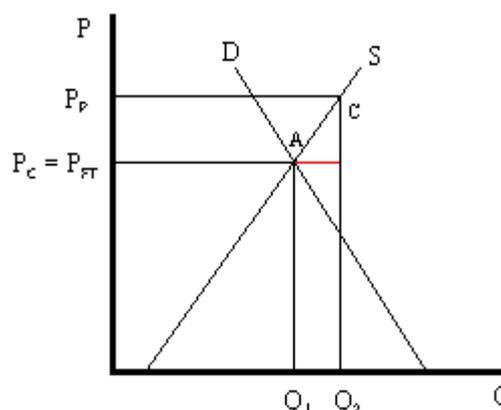
incomes of farmers. The second reason to use production subsidies is to stimulate output of a particular good. This may be done because the product is assumed to be critical for national security. This argument is sometimes used to justify subsidies to agricultural goods, as well as steel, motor vehicles, and many other commodities. 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 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.

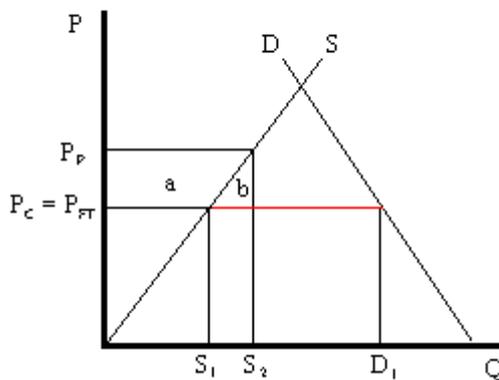
Next we consider the effects of a production subsidy under two different initial conditions. In the first case the subsidy is implemented in a country that is not trading with the rest of the world. This case is used to show how a domestic policy can cause international trade. The second case considers 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.

### 6.1.2. Production Subsidies as a Source of Trade

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 source 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 the adjoining diagram. 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 prices,  $P_{FT}$ . This implies that no imports or exports occur even though there is free trade.



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 have an effect upon the domestic price that consumers pay. In other words, the subsidy will cause the price received by producers (we'll call this the producer price) to rise above the price paid by consumers (called the consumer's price). The new producer price is labeled  $P_p$  in the diagram, while the consumer price,  $P_c$ , remains equal to the free trade price. These price changes occur because these prices will allow domestic firms in the small country to maximize their profit in the face of free competition with firms in the rest of the world.

The subsidy effectively raises the price that the producer receives for each unit of the good produced and sold.

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 the country makes 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 to occur (exports).

### 6.1.3. Domestic 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 (% of the value of good) or as a specific tax (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 of the goods sold in the domestic market regardless of where the goods are produced. The consumption tax can be levied on products that are imported or on products that are produced domestically; it doesn't matter. An import tariff or export tax, on the other hand, is levied only on units of the goods actually imported or exported.

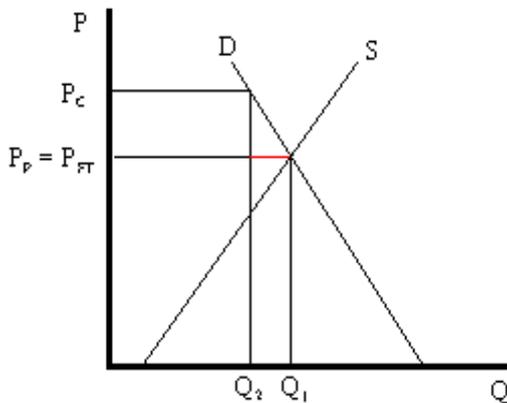
Domestic consumption taxes are generally used as a source of government revenue. In the US the most common type of ad valorem consumption taxes are sales taxes levied by state governments. The most common specific consumption taxes include gasoline, alcohol and cigarette taxes. The latter two are sometimes referred to as "sin" taxes, since they are also designed to reduce consumption of potentially harmful substances.

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 different initial conditions. 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.

### Consumption Taxes as a Source of Trade

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, could induce trade between countries.



and demand equals  $Q_1$  and thus no imports or exports occur even though there is free trade.

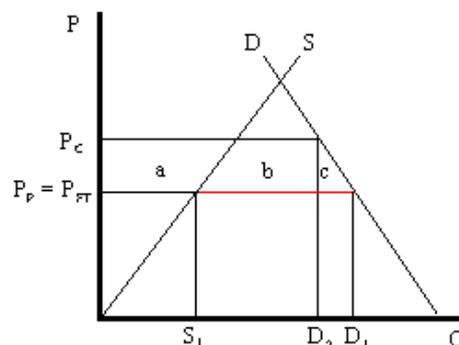
Next suppose that the government of this country imposes a specific (per unit) consumption tax. Let the tax rate be set at "t". This means the government will collect "t" dollars for every unit of the good sold in the domestic market, regardless of whether the product is produced domestically or is imported.

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 maintain their profit maximizing price at the world price of  $P_{FT}$ . This means that the producer price  $P_P$  will remain equal to the free trade price  $P_{FT}$ .

Since the tax has no effect upon the producer price but raises the consumption price, domestic demand falls to  $Q_2$  while domestic supply remains at  $Q_1$ . The difference  $Q_1 - Q_2$  (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 to occur (exports).

**6.1.4. Equivalence of an Import Tariff with a (Domestic Consumption Tax + Production Subsidy)**

Consider a small open economy with a perfectly competitive industry. Let the domestic market be represented by the supply and demand curves in the adjoining diagram. 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



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.

We depict the initial equilibrium in the adjoining diagram. 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).

When a specific consumption tax "t" 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 consumption 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  $D_1 - S_1$  (the red line) to  $D_2 - S_2$ .

The combined welfare effects of the production subsidy and consumption tax are shown in the Table below. The letters refer to the area in the previous graph. Red letters indicate losses while black letters indicate gains.

<b>Static Welfare Effects of a Production Subsidy + Consumption Tax</b>	
	<b>Importing Country</b>
Consumer Surplus	- (a + b + c + d)
Producer Surplus	+ a
Tax Revenue	+ (a + b + c)
Subsidy Cost	- (a + b)
Govt. Revenue	+ c
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 out money for the production subsidy. However, since the subsidy and tax rates are assumed 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 or the consumption tax. (See page 90-11 for a comparison). If a specific tariff "t", of the same size as the subsidy and tax, were applied, the domestic price would rise to  $P_P = P_{FT} + t$ . Domestic producers, who are not charged the tariff, would experience an increase in their price to  $P_P$ . The consumer price would also rise to  $P_P$ . This means that the producer and consumer welfare effects would be identical to the case of a production subsidy/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).

### **6.1.5 Trade Policies with Market Imperfections and Distortions**

Most arguments for protection arise when markets have either imperfections or distortions present. These cases are worthy of study because it is clear that markets rarely satisfy all of 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 and distortions, generally, mean any deviation from the assumptions of perfect competition. This includes 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. Many cases are demonstrated in this chapter 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 policy with market imperfections and distortions represent applications of the General Theory of the Second Best formalized by Lipsey and Lancaster. 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 non-distorted 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. In this paper he characterized many or most 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 as well. He showed that for most distortions, trade policy is inferior (in terms of the extent to which it can raise national welfare) to other purely domestic policies. A general rule to identify the most appropriate (or first-best) policy, would be that policy which 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 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 for national defense reasons, or when unemployment is a serious concern in a market, or when trade causes environmental degradation, or when there are infant industries in a country. On the other hand, in almost all of these cases 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 unmeasurable) 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 upon prices and resource allocation potentially spreading across numerous sectors. Suppose one other sector, adversely affected, generates positive spillover effects which act to raise well-being to 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.

### **6.1.5.1 Imperfections and Distortions Defined**

Market imperfections and distortions, generally, mean any deviation 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 is a description of many different types of imperfections and distortions.

### ***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. In other words each oligopoly firm is large enough, relative to the size of the market, that changes in its output cause a change in the equilibrium price 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 allowed. The typical method of justifying this is by assuming that there are relatively high fixed costs. High fixed costs, in turn, implies 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. It was shown in Section 90-23 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 analagous to that of a monopolist operating in it's 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 monoposonist represents a case in which there is a single buyer in a market where there are many sellers. A monopsonist raises his own welfare or utility by restricting his demand for the product and thereby forcing the sellers to lower their price to him. By buying fewer units at a lower price the monopsonist 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 Section 90-8 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 "power" like a pure monopsonist.

### ***Externalities***

Externalities represent economic actions which have effects *external* to the market in which the action is taken. Externalities can arise out of production processes (production externalities) or out of 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 occur to someone other than the producer or consumer, they do not take the effects into

account when they make their production or consumption decision. 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 that 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 which 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 involve pollution or other environmental effects.

Thus when a factory emits smoke into the air, the pollution will reduce the well being of all of 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 or 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 a homeowner landscapes their property and plants beautiful gardens, it benefits not only themselves but neighbors and passers-by as well. 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 more healthy 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 healthcare 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 second-hand smoke causes negative health effects. At the least though, cigarette smoke does bother non-smokers when smoking occurs in public enclosed areas.

## ***Public Goods***

Public goods have two defining characteristics: non-rivalry and non-excludability. Non-rivalry means that the consumption or use of a good by one consumer does not diminish the usefulness of the good to another. Non-excludability means that once the good is provided it is exceedingly costly to exclude non-paying customers from using it. The main problem posed by public goods is the difficulty of a free market to get people to pay for them.

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 non-rival. Since it would be impossible to provide the lighthouse services only to those passing ships that paid for the service, the lighthouse is non-excludable.

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 non-payers.

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 onto a web site it can be accessed and used by millions of consumers almost simultaneously. Thus it is non-rivalrous. Also, it can be difficult to exclude non-paying customers from accessing the services.

### **Non-Clearing 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 this arises, for whatever reason, the market is distorted.

The most obvious case of a non-clearing market occurs when there is unemployment in the labor market. Unemployment could arise if there is price stickiness in the downward direction. If firms are reluctant to lower their wages in the face of restricted demand, then unemployment would arise. 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 which are perfectly competitive and exhibit no other distortions or imperfections. These were labeled policy-imposed distortions by Bhagwati.

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 represents a distorted equilibrium.

Questions:

1. What are the main factors that affect the domestic trade policies?
2. What is the positive production externality?
3. What is positive production externality?
4. What do we mean by non-clearing markets?
5. What is negative consumption externality?
6. What is positive consumption externality?

References:

*Paul R. Krugman and Maurice Obstfeld, International Economics: Theory and Policy, Fifth edition, Addison-Wesley Publishing Company, 2000.*

*James R. Markusen, James R. Melvin, William H. Kaempfer and Keith E. Maskus, International Trade: Theory and Evidence, International edition, New York: MCGraw-Hill, 1995.*

## Lecture 7. The Theory of the Second-Best

The theory of the second-best was formalized by Richard Lipsey and Kelvin Lancaster in 1956.

The primary focus of the theory is on 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 many other government policies as well.

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 are 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 out of the maximizing behavior of producers and consumers. Thus the solution is also called an optimum.

For example, in a standard perfectly competitive model, the equilibrium conditions include, 1) output price equal to 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, i.e. supply does not equal demand in that one market? Would it still be appropriate for the firms to set price equal to 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 deviate from these conditions? Lipsey and Lancaster show that, generally, when one optimal equilibrium condition is not satisfied, for

whatever reason, all of the other equilibrium conditions will change. Thus if one market does not clear, it would no longer be optimal for firms to set price equal to marginal cost or for consumers to set the price ratio equal to the marginal rate of substitution.

### *First-Best vs. Second-Best Equilibria*

Consider a small perfectly competitive open economy that has no market imperfections or distortions, no externalities in production or consumption, no public goods. An economy in which all resources are privately owned, where the participants maximize their own well-being, firms maximize profit and consumers maximize utility always in the presence of perfect information. An economy in which markets always clear, in which there are no adjustment costs or unemployment of resources.

The optimal government policy in this case is laissez-faire. With respect to trade policy 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, etc. 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 severe 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 marginal cost rather than equal to 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 of 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. It can apply these to production, to consumption, or to factor usage. Sometimes it even applies two or more of these policies simultaneously in the same market. Some policies, like tariffs or export

taxes, are designed to directly affect the flow of goods and services between countries. These are called **trade policies**. Other 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. These can be referred to as **domestic policies**.

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 be welfare-improving. 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 which 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 *et.al.*, policies are not commonly denoted.

#### *Trade Policies in a Second-Best World*

In a 1971 paper titled "A General Theory of Domestic Distortions and Welfare", Jagdish Bhagwati provided a framework for understanding the welfare implications of trade policies in the presence of market distortions. 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 that is 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, VERs and export taxes, 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 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 which corrects the distortion or imperfection sufficiently to outweigh the detrimental effects of the policy itself. In other words, whenever there are market imperfections or distortions 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 trade policy the first best policy choice to correct a market imperfection or distortion. Instead trade policy is second best. The first best policy, generally, would be a purely domestic policy targeted directly at the market imperfection or distortion.

On the following pages 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.

Unemployment and Trade Policy  
The Infant Industry Argument  
Trade Policy with a Foreign Monopoly  
Monopoly/Monopsony Power in Trade  
Public Goods and National Security

### **Unemployment and Trade Policy**

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 their productivity in textile production rises relative to non-textile 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.

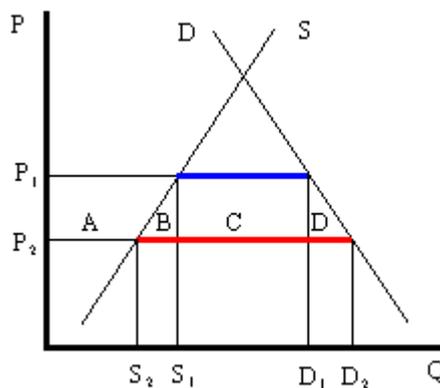
These assumptions imply that although workers might be free to move across sectors of the economy they might not be easily or costlessly transferred. Workers in one industry, accustomed to being paid a wage proportional to their productivity, might be unwilling to accept a lower wage in another industry even though the lower wage would reflect their productivity in that industry. Worker reluctance to transfer could lead to long search times between jobs as workers continue 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, 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, i.e., 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 the adjoining diagram. At that price demand is given by  $D_1$ , supply by  $S_1$  and imports by  $D_1 - S_1$  (the blue line segment).

Suppose that international market conditions suddenly change such that a surge of imports begins in the textile industry.

The surge can be represented as 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 is shown in the Table below.

<b>Welfare Effects of a Lower FT Price</b>	
	<b>Importing Country</b>
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 which 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 these costs do not appear in the diagram above.

The national welfare effects of the import surge depend on how large 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. The following Table 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. Positive welfare effects are shown in black, negative effects are shown in red.

<b>Welfare Effects of an Import Tariff</b>	
	<b>Importing Country</b>
Consumer Surplus	- (A + B + C + D)
Producer Surplus	+ A
Govt. Revenue	+ C
Unemployment Cost	+ F
National Welfare	F - (B + D)

**Tariff Effects on:**

**Importing Country 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 the Table and Figure to see how the magnitude of the change in consumer surplus is represented.

**Importing Country 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 the Table and Figure to see how the magnitude of the change in producer surplus is represented.

**Importing Country 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 is targeted at certain worthy groups. Thus, someone within

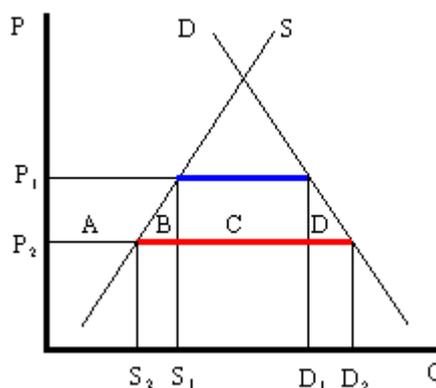
the country is the likely recipient of these benefits. Refer to the Table and Figure to see how the magnitude of the tariff revenue is represented.

### 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.

**Importing Country** - The aggregate welfare effect for the 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, 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 exceeds 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 which 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 above example.

### Objections to Protection

Of course, it is also conceivable that the aggregate costs of the tariff (B + D) exceeds 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 is 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 benefits of protection, i.e. eliminating unemployment, represent 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. The benefits of free trade, however, 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 vs. Second-Best Policy**

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 above in the import market, 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 from [95-1b](#) 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 will 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  $D_2$

The following Table 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. Positive welfare effects are shown in black, negative effects are shown in red.

<b>Welfare Effects of a Production Subsidy</b>	
	<b>Importing Country</b>
Consumer Surplus	0
Producer Surplus	+ A
Govt. Revenue	- (A + B)
Unemployment Cost	+ F
National Welfare	F - B

### **Production Subsidy Effects on:**

**Importing Country 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.

**Importing Country 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 the Table and Figure to see how the magnitude of the change in producer surplus is represented.

**Importing Country 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 the Table and Figure 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  $F$ .

**Importing Country** - The aggregate welfare effect for the 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 exceeds 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 the diagrams 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 reason the production subsidy is superior is 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.

The above 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 an 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 above, 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 superior policy would probably be one which 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 which 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 US 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.

## **7.2. The Infant Industry Argument and Dynamic Comparative Advantage**

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, etc. 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 less a developed country, on the other hand, would not have the same production technology available to it. It's 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.

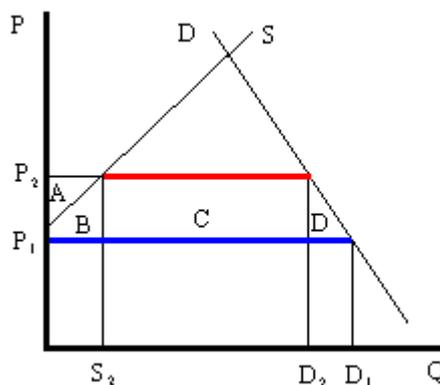
Protection of these LDC firms, perhaps in the form of an import tariff, would raise the domestic price of the product and reduce imports from the rest of the world. If prices are raised sufficiently, the domestic firms would be able to cover their higher production costs and remain in business. Over time these LDC firms would gain production and management experience that would lower its costs of production. 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 US and Germany during their rapid industrial development before the turn of the 20<sup>th</sup> century. Both the US 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 counter-argument 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 those goods in which the before-trade prices are lower than in the rest of the world. This implies that the US 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 LDC's 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, in other years the prices are very low. If a country allocates many of its resources to production of goods with volatile prices, then GDP will fluctuate along with the prices. Some years will be very good, others 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 spillover 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.

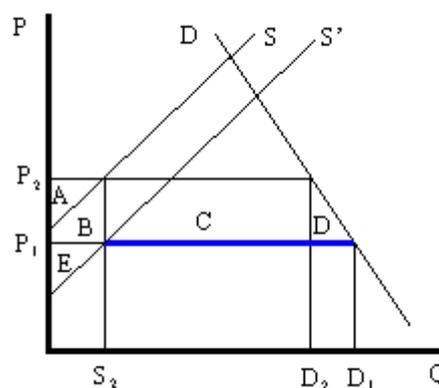
Suppose that the supply and demand curves in the country are as shown in the adjoining diagram. Suppose initially free trade prevails and the world price of the good is  $P_1$ . At that price consumers would demand  $D_1$  but the domestic supply curve is too high to warrant any production. This is the 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,  $D_1$ .

Suppose that the infant industry argument is used to justify protection for this currently non-existent domestic industry. Let a specific tariff be implemented which raises the domestic price to  $P_2$ . In this case the tariff would equal the difference between  $P_2$  and  $P_1$ , i.e.  $t = P_2 - P_1$ . 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 is shown in the Table below. Red letters indicate losses while black letters indicate gains.

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, there remains two deadweight losses to the economy. 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 the adjoining diagram.

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/efficiency improvement is summarized in the following table. Note 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. Red letters indicate losses while black letters indicate gains.

<b>Static Welfare Effects of Tariff Removal/ Efficiency Improvement</b>	<b>Importing Country</b>
Consumer Surplus	0
Producer Surplus	+ E
Govt. Revenue	0
National Welfare	+ E

Consumers again face the same free trade price that they would have had no protection been offered. Thus, they experience no loss or gain. Producers however face a new supply curve that generates 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.

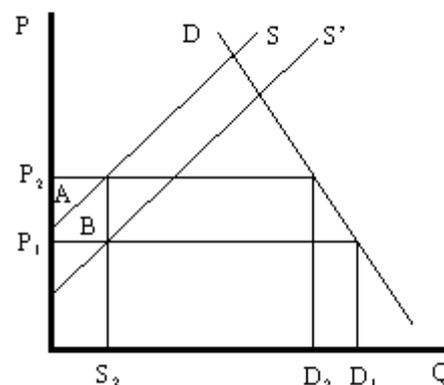
But wait. Presumably the efficiency improvement in the domestic industry would remain, if not improve, in all subsequent periods as well. Thus it is not complete to consider the effects only over two periods. Instead, and for simplicity again, suppose that the new supply curve prevails in all subsequent periods. In this case the true dynamic national welfare effects would consist of area E times 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 to 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. 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 improves 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 in the original example. 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 is shown in the Table below. Red letters indicate losses while black letters indicate gains.

<b>Static Welfare Effects of a Production Subsidy</b>	
	<b>Importing Country</b>
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. Secondly, 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, not only must governments decide which industries to protect, they must also decide 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.

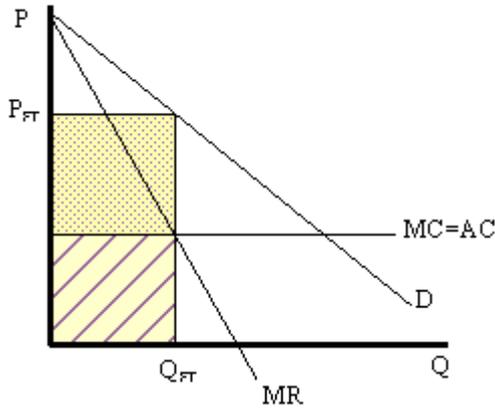
Failure of Import-Substitution Strategies - One popular development strategy in the 1950s and 1960s was known as import substitution. Essentially this strategy is just an application of the infant industry argument. However, many of the countries who pursued these kinds of inward-looking strategies, 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.

## **7.2. Trade Policy with a Foreign Monopoly**

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 the adjoining diagram. 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.



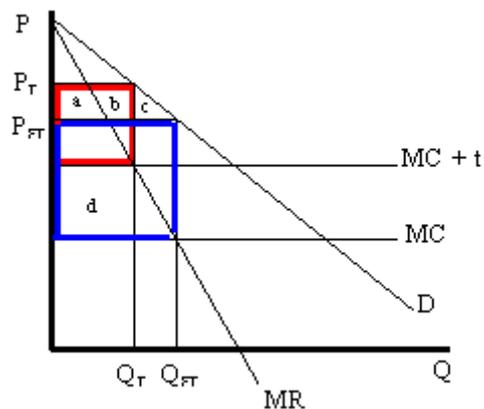
Assuming the monopolist maximizes profit, the profit maximizing output level is found by setting marginal cost equal to marginal revenue. Why? Profit maximizing output occurs at the quantity level  $Q_{FT}$ . At that quantity the monopolist would set the price at  $P_{FT}$ , the only price that equalizes 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 ( $AC$ ) times output ( $Q_{FT}$ ), given by the striped area. The monopolist's profit is represented as the dotted rectangle in the diagram.

### 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 the adjoining diagram 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.

The following Table 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. Positive welfare effects are shown in black, negative effects are shown in red.

<b>Welfare Effects of a Tariff</b>	
	<b>Importing Country</b>
Consumer Surplus	- (a + b + c)
Producer Surplus	0
Govt. Revenue	+ d
National Welfare	d - (a + b + c)

### **Import Tariff Effects on:**

**Importing Country Consumers** - Consumers of the product in the importing country suffer a reduction in surplus because of the higher price that prevails. Refer to the Table and Figure to see how the magnitude of the change in producer surplus is represented.

**Importing Country Producers** - It is assumed that there are no domestic producers of the goods, thus, there are no producer effects from the tariff.

**Importing Country Government** - The government receives tariff revenue given by the perunit tax ( $t$ ) times the quantity of imports ( $QT$ ). 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 to sustain transfer payments. In either case someone in the economy ultimately benefits from the revenue. Refer to the Table and Figure to see how the magnitude of the subsidy payments is represented.

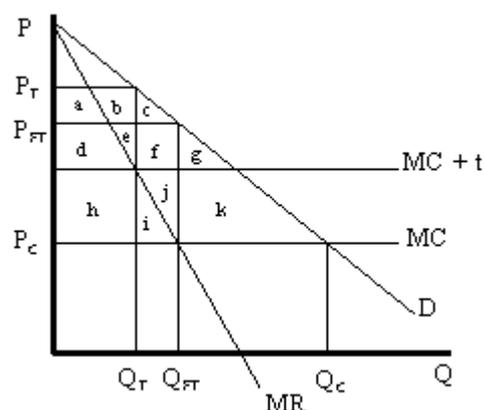
**Importing Country** - The aggregate welfare effect for the country is found by summing the gains and losses to consumers, producers, and the government. The net effect consists of two components: a positive effect on the recipients of the government tariff revenue ( $d$ ) and a negative effect on consumers, ( $a + b + c$ ), 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 non-prohibitive 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 the diagram above. When the tariff is implemented the monopolists 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, i.e. 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. It is this deviation, i.e.  $P > MC$ , that 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 US. 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. These rules set the allowable prices that the firms can charge. 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 needed to optimally regulate the industry are relatively complicated. In the case of a foreign monopolist with 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 the adjoining diagram. A second-best policy is the tariff. It would raise national welfare by the area (h - a - b - c), which as mentioned above will be positive for some tariff and for a linear demand curve. The first-best policy is a price ceiling set equal to marginal cost at  $P_C$ . The price ceiling would force the monopolist to set price equal to marginal cost and induce an increase in supply to  $Q_C$ . Consumers would experience an increase in consumer surplus given by 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.

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.

#### **7.4. Monopoly/Monopsony Power in Trade**

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 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 Section 90-23 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.

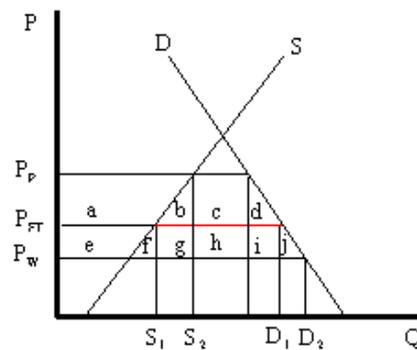
Similarly, when a country is a large importer of a good we say that it has "monopsony power." A monopsonist represents a case in which there is a single buyer in a market consisting of many sellers. A monopsonist raises his own welfare or utility by restricting his demand for the product and thereby forcing the sellers to lower their price to him. By buying fewer units at a lower price the monopsonist 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 Section 90-8 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 "power" like a pure monopsonist.

*Trade Policy: 1<sup>st</sup>-Best or 2<sup>nd</sup>-Best*

It has already been shown that 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 Section 100-2 that the first best policy will always be that policy that attacks the market

imperfection or market distortion most directly. In the large country case 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 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 (Section 95-3) 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 the adjoining figure.

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).

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 the diagram), 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 rises, the effect of the subsidy on imports is, in general, ambiguous.

The welfare effects of the production subsidy are shown in the Table below. The letters refer to the area in the previous graph. Red letters indicate losses while black letters indicate gains.

<b>Welfare Effects of a Production Subsidy</b> (Large Country Case)	
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 take note of, 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 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 improve. 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 which restricts international demand for a product will potentially raise national welfare. I say "potentially" here because it is necessary to set the policy at the proper level. The other obvious domestic policy which 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 which, when applied together, substitutes for an import tariff. Since the import tariff can raise welfare, so can its constituent parts.

### *Summary*

What follows is a short list of some of the important results from this section.

- 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.

## **7.5. Public Goods and National Security**

One of the oldest and most common arguments supporting protection is the so-called "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 at a time 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, etc. etc., in the event of a war. The products that could be added to this list are enormous. Indeed, at one time or another, in most country's histories,

almost every product imaginable has been argued is important from a national security perspective, and thus is deserving of protection. One of the most interesting arguments I've heard (related in another textbook) is that made by the embroidery industry who once argued for a protective tariff in the US 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 a non-economic objective. The effects that food production may have on the nation's sense of security, for example, was thought to fall outside the realm of traditional economic markets.

In general, public goods have the following two consumption characteristics; they are non-excludable and they are non-rival. Non-excludability means that once the product is produced it is impossible to prevent people from consuming it. Non-rivalry means that many people can consume the produced product without diminishing its usefulness to others. Here's a few examples to explain the point. First consider a non-public good, soda pop. 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 I 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 non-excludable, 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 non-rival, 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 TV 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, it is a) difficult to exclude people within the country from the safety and security generated and b) 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 policy 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-rider-ship. If a person believes that others may pay for a good and if its subsequent provision gives a benefit to 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 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% of its annual food supplies during wartime. Suppose also, that under free trade and laissez-faire domestic policies, the country produces only 50% of its annual food supply and imports the remaining 50%. 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% and subsequently cause domestic production to rise to 90%. We know from tariff analysis, that in a small country case, 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 towards 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 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 when a Trade Policy is First-Best*

There is one case in which 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 those which 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 an adequate national security.

In the US 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 US licenses are required for goods in short supply domestically, goods related to nuclear proliferation, missile technology, chemical and biological weapons, and other goods that might affect regional stability, crime, or terrorist activities. In addition the US maintains a Special Designated Nationals list which contains a list of organizations to whom sales of products is restricted and a Denied Persons List which contains names of individuals with whom business is prohibited. Finally, the US maintains exports bans to several countries including Cuba, Iran, Iraq, Libya, Sudan and the UNITA faction in Angola. (This info is as of Dec 2002: See the US Dept of Commerce's Trade Information Page [here](#) for more information).

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 the national security, using a purely domestic policy.

### *Summary*

What follows is a short list of some of the important results from this section.

- The preservation of national security is a common justification for the use of protection.
- The preservation of national security is a type of non-economic 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.
- Protection can be beneficial because of the presence of a market imperfection. National security is a public good which is the imperfection
- 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.

### Questions:

1. What is the main underpinning of the theory of second best?
2. What is the difference between the theories of second best and first best?

3. What *Welfare Improving Policies* do you know in a *Second-Best World*?

4. What trade policies are followed in the context of improving the level of employment?

5. What do we mean by monopsony power in trade?

6. in your point of view what trade policies should be followed while there is a foreign monopoly in national market?

References:

*Paul R. Krugman and Maurice Obstfeld, International Economics: Theory and Policy, Fifth edition, Addison-Wesley Publishing Company, 2000.*

*James R. Markusen, James R. Melvin, William H. Kaempfer and Keith E. Maskus, International Trade: Theory and Evidence, International edition, New York: MCGraw-Hill, 1995.*

## **Lecture 8. Political Economy and Trade – Overview**

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 government's behavior. Governments are rarely comprised of a solitary decisionmaker whose primary interest is the maximum well being of the nation's constituents. Such a person, if he or she existed, could reasonably be labeled a "benevolent dictator." Although, in history, some nations have been ruled almost singlehandedly 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 (aka, happiness, satisfaction, well-being, etc). In economic analysis we presume that individuals obtain all of 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, 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 a maximum. 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 proscribes policies which 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 do 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 decisionmaking 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 trade policy. Among the key questions are:

- 1) Why do countries choose protection so often, especially given that economists have been emphasizing the advantages of free trade for 300 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 policy, why is so much attention seemingly given to the policy 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?

#### Some Features of a Democratic Society

1) 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 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 constituents then those constituents eventually have a chance to vote for someone else. Thus, if elected officials are perceived as good representatives of their constituent interests, then 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.

2) Citizens in democratic societies are traditionally granted the right to free speech. It is generally accepted that people should be allowed to voice their opinion 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, as well as recommendations, for government policy actions must be allowed if a truly representative government is to operate effectively.

### **8.1. The Nature of Lobbying**

We can define **lobbying** as the activity wherein individual citizens voice their opinion 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 their leisure time to petition or inform government officials of their 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 foregone 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 they win the petition. Since in this case the law firm is paid to provide lobbying services, there is an opportunity cost represented by the foregone 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, or designing buildings, or building refrigerators, etc. (This poses the question: what would lawyers do if they

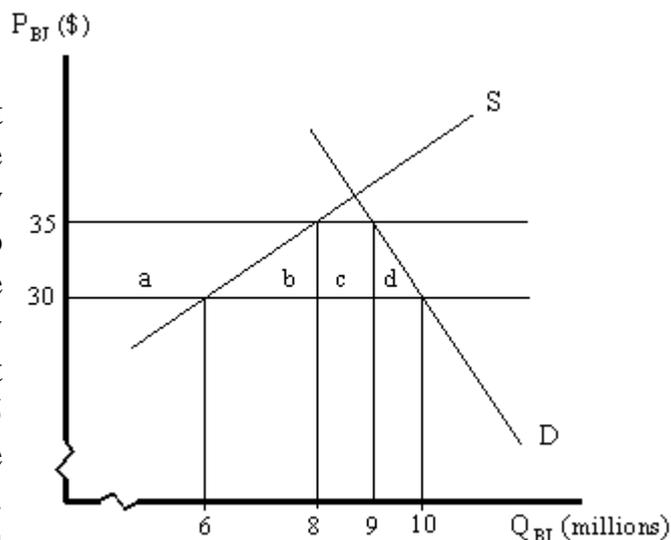
weren't lawyering?) The lawyers' actions with this type of lobbying is essentially redistributive in nature, since the lawyers' income will derive from the losses that will accrue to others in the event that the lobbying effort is successful. If the lobbying effort is not successful the lawyer will still be paid, only this time the losses will accrue to the firm that hired the lobbyist. 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 Activity**", or DUP.

Lobbying is a necessity 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 opinion. The extent of the lobbying efforts may also inform the government about the intensity of the preferences as well.

### 8.1.2. The Economic Effects: An Example

Consider the market for blue jeans in a small importing country depicted in the adjoining diagram. 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 9 to 10 million pairs of jeans, a decrease in domestic supply from 8 to 6 million pairs, and an increase in imports from 1 to 4 million.

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, this type of action is



allowable to 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 the following table. The dollar values are calculated from the respective areas on the graph.

<b>Welfare Effects of an Import Tariff</b>		
	<b>Area on Graph</b>	<b>\$ Value</b>
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 which 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 make up the demand side of the market is much larger than the number of firms that make 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 35 separate firms.

### **8.1.3 The Consumers' Lobbying Decision**

If the \$5 tariff is implemented, it will raise the price from \$30 to \$35. Consumption will fall from 10 million to 9 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 money to buy something else they think is more valuable than jeans for \$35. The other 9 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, 9 million consumers lose \$5 each for a total of \$45 million (area a + b + c) while the remaining 1 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 towards a lobbying effort, since that is the most one can gain if a tariff is prevented. One might argue that if even a quarter of that could be collected from 10 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, if not impossible, to do effectively. Many of the reasons are discussed in detail in Mancur Olson's well-known book, "The Logic of Collective Action." One of the key points made is that large groups are much less effective than small groups in applying effective lobbying pressure on legislators.

Consider the problems one would face in spearheading a consumer lobbying effort to oppose a 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 the ones 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 their

time at the hourly wage rate that they earn at their job. If the person makes \$20 per hour then you'll have less than 15 minutes to convince the person to contribute to the lobbying effort since 15 minutes is worth the \$5 you are trying to save for the person. 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 10 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 the costs of 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 costs 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 jean consumers regardless whether they contribute to the lobbying campaign or not. 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, 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 there is \$47.5 million dollars that will be lost to consumers of blue jeans if the \$5 tariff is implemented, it is very unlikely that this group would be able to form a lobbying campaign to oppose the tariff. Since each household will lose, at most, \$5, 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.

### 8.1.4 The Producers' Lobbying Decision

On the producer side, let's assume that there are 35 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 2 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 though, 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 is 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, \$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. 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 2000% 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 35 firms to keep track of, contributors would probably learn who is not participating. Non-

participation would establish a poor reputation and could have unpleasant consequences in 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.

### **8.1.5. The Government's Decision**

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 an escape clause 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 though, we shall consider the motivations of the government more generically.

The first thing the government may notice when being petition to consider raising the tariff is that government revenues will rise, in the example, by \$5 million. Relative to many government budgets, this is a small amount and so it may have very little influence on a 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 upon to take actions which 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 for 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 they would vote for the tariff. This, 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 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 25000 jobs in the initial equilibrium when 8 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 2 million units, that amounts to 6,250 jobs. The lobby group would then frequently state that 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 hard-working domestic citizens. Finally, the lobby would emphasize the positive government budget effects as a result of the tariff revenue. All of this info would clearly be quite true.

If the lobby mentioned the higher prices that would result from the tariff, surely they 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 job will one day be in jeopardy due to imports Plus, it is such a small price to pay ... 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 more effectively in his political ads. Consider this political ad if he supports the industry, ... "I passed legislation which created over 6000 jobs!" Compare it with this truthful ad if he doesn't support the industry ... "By opposing protectionist legislation, I saved you 5 bucks!" Which one do you think sounds better?

### **8.1.6. The Lobbying Problem in a 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 expected costs per person 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 which 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. In many countries this 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 which are designed to protect firms and industries in particular situations. In evaluating these types of petitions in the US, 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.

## **8.2 Retaliation and Trade Wars**

The analysis of tariffs in a perfectly competitive market demonstrates that when 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 falls. 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 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, TVs 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.

		Japan	
		Free Trade	Optimal Tariffs
US	Free Trade	100 100	120 70
	Optimal Tariffs	70 120	90 90

We examine the effects of optimal tariffs and retaliation more formally by using a simple game theoretic setup. Suppose the players in the game are the governments of two large countries, the US and Japan. Suppose the US imports a set of products (A, B, C etc.) from Japan while Japan imports a different set of products (X, Y, Z, etc.) from the US. 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 US chooses free trade then it imposes no tariffs on imports of goods A,B,C etc. If the US chooses optimal tariffs then it

determines the optimal tariff in each import market and sets the tariff accordingly. Japan is assumed to have the same set of policy choices available.

In the adjoining diagram, US strategies are represented by the two columns, Japan's 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 US chooses a free trade policy, while Japan chooses to impose optimal tariffs then the payoffs are shown in the



box. Japan's payoff is below the diagonal while the US payoff is above the diagonal. Thus, Japan gets 120 units of welfare while the US 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 US and Japan choose free trade. If Japan decides to impose optimal tariffs on all of its imports, and the US maintains its free trade position, then a partial equilibrium welfare analysis suggests that,

(1) Japan's welfare will rise (we'll assume from 100 to 120 units),

(2) US welfare will fall (we'll assume from 100 to 70 units), and

(3) world welfare will fall (thus the sum of the US's and Japan's welfare initially is 200 units, but falls to  $120 + 70 = 190$  afterwards).

Similarly if the US were to impose optimal tariffs on all of its imports while Japan maintains free trade, then the countries will realize the payoffs



in the box. The US would get 120 units of welfare while Japan gets 70. To keep the example simple we are assuming that the effects of tariffs are symmetric. In other words, the effect of US optimal tariffs on the two countries is of the same magnitude as the effects of Japan's 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 lowers 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. Afterwards we will consider the outcome when the governments do cooperate.

### **The Non-Cooperative Solution (Nash Equilibrium)**

A non-cooperative 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 US's strategy (call it  $r$ ) maximizes US welfare when Japan chooses strategy ( $s$ ) and if Japan's strategy ( $s$ ) maximizes Japan's welfare when the US chooses strategy ( $r$ ), then the strategy set ( $r,s$ ) is a non-cooperative solution to the game. A non-cooperative 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 answering the following series of questions. First, choose a strategy for one of the players. Then ask,

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 non-cooperative solution is the set of strategies (optimal tariffs, optimal tariffs). That is, both the US and Japan would choose to implement optimal tariffs. Why?

First, suppose the US chooses the free trade strategy. Japan's optimal policy, given the US choice, is to implement optimal tariffs. This is because 120 units of national welfare is greater than 100 units (see diagram). Second, if Japan chooses optimal tariffs, then the US's optimal policy is optimal tariffs, since 90 units of welfare is greater than 70 units. Finally if the US chooses optimal tariffs, then Japan'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 which 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 non-cooperative game, each country is acting in its own best interests and 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 realize 100 units of welfare. This kind of result is often referred to as a prisoner's dilemma outcome.<sup>(1)</sup> The dilemma being 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's countries restrictions or would retaliate with tariff increases of one's 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 US in 1930. The Smoot-Hawley tariff Act raised tariffs to an average rate of 60% on many products imported into the US. Although it is unlikely that the US government set optimal tariffs, the tariffs nevertheless reduced foreign exports to the US and injured foreign firms. In response to the US tariffs approximately 60 foreign nations retaliated and raised their tariffs on imports from the US. 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 US 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 which facilitates movement towards the free trade strategy set for all countries. If a GATT member nation refuses to reduce its tariffs, then other members would refuse to lower theirs. If a GATT member raises its tariffs on some product above the level that 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 then, offers a simple explanation of the need for international organizations like the GATT or the WTO. These agreements may represent methods to achieve cooperative solutions between trading countries.

Questions:

1. What is casual lobbying?
2. What is professional lobbying?
3. What affects the consumers lobbying decision?
4. What affects the producers lobbying decision?
5. What is the Nash equilibrium?

References:

*Paul R. Krugman and Maurice Obstfeld, International Economics: Theory and Policy, Fifth edition, Addison-Wesley Publishing Company, 2000.*

*James R. Markusen, James R. Melvin, William H. Kaempfer and Keith E. Maskus, International Trade: Theory and Evidence, International edition, New York: MCGraw-Hill, 1995.*

## Lecture 9. Economic Integration: Overview

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. 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 who liberalize labor and capital movements across borders, who coordinate fiscal policies and resource allocation towards agriculture and other sectors and who coordinate their monetary policies.

Any type of arrangement in which countries agree to coordinate their trade, fiscal, and/or monetary policies is referred to as economic integration. Obviously, there are many different degrees of integration.

### *Preferential Trade Agreement (PTA)*

A preferential trade agreement 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 non-discriminatory tariffs, would remain in all remaining product categories. This type of trade agreement is not allowed among WTO members who are obligated to grant most-favored nation status to all other WTO members. Under the most-favored nation (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%, then it must charge 5% 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 US 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: 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 (FTA)*

A free trade area occurs when a group of countries agree to eliminate tariffs between themselves, but maintain their own external tariff on imports from the rest of the world. The North American Free Trade Area is an example of a FTA. When the NAFTA is fully implemented, tariffs of automobile imports between the US and Mexico will be zero. However, Mexico may continue to set a different tariff than the US on auto 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 made up the NAFTA, most of them described rules of origin.

### *Customs Union*

A customs union occurs when a group of countries agree to eliminate tariffs between themselves and set a common external tariff on imports from the rest of the world. The European Union 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 European Union 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 will also relegate some fiscal spending responsibilities to a supra-national agency. The European Union's Common Agriculture Policy (CAP) is an example of a type of fiscal coordination indicative of an economic union.

## *Monetary Union*

Monetary union establishes a common currency among a group of countries. This involves the formation of a central monetary authority which will determine monetary policy for the entire group. The Maastricht treaty signed by EU members in 1991 proposed the implementation of a single European currency (the Euro) by 1999. The degree of monetary union that will arise remains uncertain in 1998.

Perhaps the best example of an economic and monetary union is the United States. Each US state has its own government which 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 US states and the Nations sets a common external trade policy.

### **9.1 Multilateralism vs. Regionalism**

In the post World War II period many nations have pursued the objective of trade liberalization. One device used to achieve this was the GATT and its successor, the WTO. Although the GATT began with less than 50 member countries, the WTO claimed 132 members by 1997. Since GATT and WTO agreements commit all member nations to reduce trade barriers simultaneously, it is sometimes referred to as a *multilateral* approach to trade liberalization.

An alternative method used 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 towards 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 non-discrimination. 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 represents discriminatory policies. 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 its 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" which 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.

There is much that has been written on this subject recently. Here we have merely scratched the surface. For a good overview of the issues from an historical perspective see Bhagwati (1992) and Irwin (1994). For a review of the recent literature regarding the merits of regionalism versus multilateralism see Winters (1996).

In what follows here 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 from those that are detrimental. As mentioned above, 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 towards 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.

## **9.2 Trade Diversion and Trade Creation**

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 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: 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 a MFN (i.e., the same tariff against both countries) specific tariff applied on imports from both countries B and C.

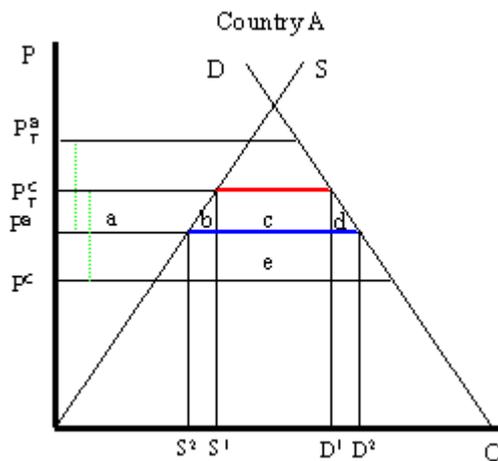
In each case below we will first describe an initial tariff-ridden equilibrium. Then, we will calculate the price and welfare effects that would occur in this market if Country A and B form a free trade area. When the FTA is formed, country A maintains the same tariff against country C, the non-FTA country.

### **Trade Diversion**

In general, trade diversion means that a free trade area diverts trade, away from a more efficient supplier outside the FTA, towards 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.

The adjoining diagram depicts the case in which trade diversion is harmful to a country that joins a 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 country's B and C, respectively. Note that country C is assumed capable of supplying the product at a lower price than country B. (Note: 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)



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 the diagram 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 area  $(c + e)$ , the tariff rate times the quantity imported.

Next, assume countries A and B form a 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 of 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 non-distorted (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 the Table below.

<b>Welfare Effects of Free Trade Area Formation Trade Diversion Cases</b>	
	<b>Country A</b>
Consumer Surplus	+ (a + b + c + d)
Producer Surplus	- a
Govt. Revenue	- (c + e)
National Welfare	+ (b + d) - e

#### **Free Trade Area Effects on:**

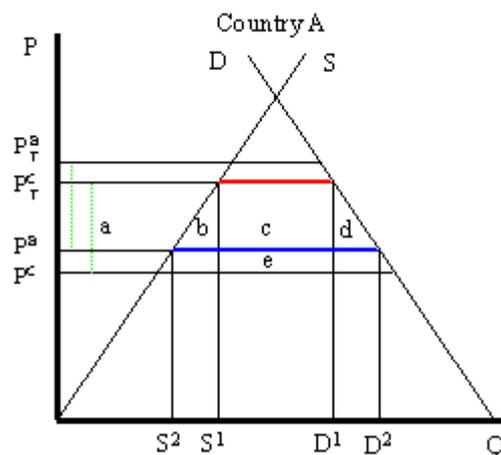
**Country A Consumers** - Consumers of the product in the importing country benefit from the free trade area. The reduction in the domestic price of both imported goods and the domestic substitutes raises consumer surplus in the market. Refer to the Table and Figure to see how the magnitude of the change in consumer surplus is represented.

**Country A 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 output of existing firms (and perhaps some firms will shut down), a decrease in employment, and a decrease in profit and/or payments to fixed costs. Refer to the Table and Figure to see how the magnitude of the change in producer surplus is represented.

**Country A Government** - The government loses all of 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 the Table and Figure to see how the magnitude of the tariff revenue is represented.

National Welfare Country A - 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 of 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 the Table and Figure 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. The diagram above 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.



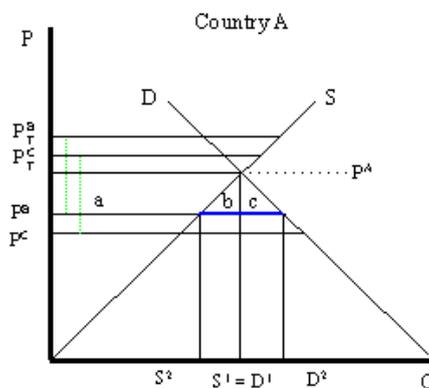
If conditions were different, however, the national welfare change could be positive. Consider the adjoining diagram. This diagram differs from the one above only in that the free trade supply price offered by country B,  $P^B$ , is lower and closer to country C's free trade supply price  $P^C$ . The description above 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 a FTA that causes trade diversion, may have a positive net national welfare effect. Thus, **trade diversion may be, but is not necessarily, welfare-reducing.**

Generally speaking, the larger is the difference between the non-distorted prices in the FTA partner country and in the rest of the world, the more likely 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.

The adjoining diagram 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 country's B and C respectively. Note that country C is assumed capable of supplying the product at a lower price than country B. (Note: 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)



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 the diagram 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 the diagram, 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 a 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 the Table below.

<b>Welfare Effects of Free Trade Area Formation Trade Creation Case</b>	
	<b>Country A</b>
Consumer Surplus	+ (a + b + c)
Producer Surplus	- a
Govt. Revenue	0
National Welfare	+ (b + c)

### **Free Trade Area Effects on:**

Country A 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 the Table and Figure to see how the magnitude of the change in consumer surplus is represented.

Country A 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 and/or payments to fixed costs. Refer to the Table and Figure to see how the magnitude of the change in producer surplus is represented.

Country A 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.

National Welfare Country A - 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 a FTA is formed, it must

result in net national welfare gains. Refer to the Table and Figure to 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 upon 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 a 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 a 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 from trade creation are larger than the negative effects from trade diversion, then the FTA will improve national welfare." A more succinct statement, though also somewhat less accurate, is that "if a FTA causes more trade creation than trade diversion then the FTA is welfare improving."

However, the converse statement is also possible, i.e., "if a 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 second-best theory 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 a 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 a 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, i.e., the tariffs applied to one's FTA partners. However, other distortions remain, i.e., tariffs applied against the non-member 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 a 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.

### **9.3. Countervailing Duties in a Perfectly Competitive Market**

The WTO allows countries 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 Section 20-4 for a more complete description of the CVD 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. Below we will first describe the effects of the export subsidy (which will closely mimic the analysis in

section 90-26) after which we will consider the effects of the CVD action in response.

### *The Initial Export Subsidy*

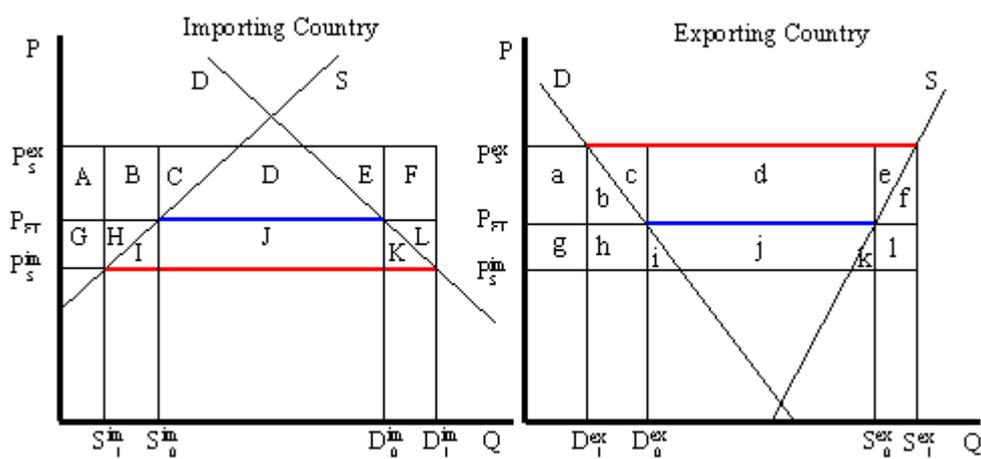
An export subsidy will reduce the price of the good in the import market and raise the price of the good in the export market relative to the free trade price. After the subsidy is imposed the following two conditions will describe the new equilibrium.

$$P_S^{ex} = P_S^{im} + S$$

$$XS(P_S^{ex}) = MD(P_S^{im})$$

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 the adjoining diagram. The initial free trade price is labeled  $P_{FT}$ . In free trade the exporting country exports  $(S^{ex}_0 - D^{ex}_0)$  and the importing country imports  $(D^{im}_0 - S^{im}_0)$ . Since there are the 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  $(S^{ex}_1 - D^{ex}_1)$ , are equal to imports, given by  $(D^{im}_1 - S^{im}_1)$  and are depicted by the red line segments in the diagram.



The following Table 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. Positive welfare effects are shown in black, negative effects are shown in red.

<b>Welfare Effects of the Initial Export Subsidy</b>		
	<b>Importing Country</b>	<b>Exporting Country</b>
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)	

The Table 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 by

the exporting country government, which must ultimately be paid for 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, (we will assume it is here) and if the subsidy causes injury to the import competing firms.

It is worth emphasizing that the CVD 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 is 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  $S^{im}_0$  to  $S^{im}_1$  in the diagram). 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 of 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 US, the US 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 now 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.

$$P_{S+t}^{ex} + t = P_{S+t}^{im} + S$$

$$XS(P_{S+t}^{ex}) = MD(P_{S+t}^{im})$$

However, since  $t = S$ , the first condition reduces to  $P_{S+t}^{ex} = P_{S+t}^{im}$ . 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  $D^{im0} - S^{im0}$  in the diagram), domestic supply will rise (from  $S^{im1}$  to  $S^{im0}$ ), employment in the import-competing industry will rise back up 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 the case 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 the situation when the export subsidy alone was in place. These effects are summarized in the Table below.

<b>Welfare Effects of a CVD</b>		
	<b>Importing Country</b>	<b>Exporting Country</b>
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 while 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 benefit 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 in both countries. The expression is simplified first by noting that area  $(C + D + E) = \text{area } (d)$  and second by noting that area  $(h) = \text{twice area } I$  or  $(2I)$  and area  $(l) = \text{area } (2K)$ . The final expression shows that world welfare will rise as a result of the CVD.

*Welfare Effects of the Combined Policies (Export Subsidy + 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 the situation when neither policy is imposed. The effects can be calculated by either by summing the individual welfare effects from each of the two stages depicted above, or, by noting that prices have not changed from the initial pre-subsidy state to the final post-CVD state, but that the governments do have expenditures and receipts respectively.

The welfare effects are summarized in the Table below.

<b>Welfare Effects of an Export Subsidy plus a CVD</b>		
	<b>Importing Country</b>	<b>Exporting Country</b>
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 taxpayers of the country which 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 effects 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 CVD is that the exporting country government transfers money to the importing country government with consumers and producers left unaffected.** In practice what happens is that 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 government collects a tariff (or 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.

Questions:

1. What forms economic integration do you know?
2. What are the main criteria of free economic zone?
3. What are the main functions of WTO?
4. What is countervailing duty?
5. in your point of view how does economic integration effects the economies of countries?

References:

*Paul R. Krugman and Maurice Obstfeld, International Economics: Theory and Policy, Fifth edition, Addison-Wesley Publishing Company, 2000.*

*James R. Markusen, James R. Melvin, William H. Kaempfer and Keith E. Maskus, International Trade: Theory and Evidence, International edition, New York: MCGraw-Hill, 1995.*

## **Lecture 10. Evaluating the Controversy Between Free Trade and Protectionism**

### Introduction

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".<sup>(1)</sup>

The original arguments for free trade began to supplant mercantilist views in the early to mid-18<sup>th</sup> 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 19<sup>th</sup> and 20<sup>th</sup> 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 include 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 counter-arguments which have acted to reassert the position of free trade as a favored policy despite the objections. The most important of these counter-arguments include the potential for retaliation, the theory of the 2<sup>nd</sup>-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 argue, however, that these exceptions are invalid or illogical. Rather it argues that each exception which might support government intervention in the form of 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 which 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" which establishes the argument for free trade.<sup>(2)</sup>

---

1. See Krugman (1987), "Is Free Trade Passe?", *Journal of Economic Perspectives*, 1 (2) pp. 131-144. [Go Back](#)

2. Ideally we would create a supermodel of the world economy which 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.

## 10.1. Economic Efficiency Effects from Free Trade

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 Demand Difference model, the simple Economies of Scale model, and the monopolistic competition model. 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 means that countries can produce more goods and services with the same amount of resources. In other words, productivity rises 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 must contract. Exactly which industries expand and contract will depend upon the underlying stimulus or basis for trade. Different trade models emphasize different stimuli to trade. For example, the Ricardian model emphasizes technological differences between countries as the basis for trade. The factor-proportions model emphasizes differences in endowments, etc. In the real world it is likely that each of these stimuli plays some role 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 which 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 which 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 countries national output and income.

### *Consumption Efficiency*

Consumption efficiency improvements arise for an individual when changes in the relative prices of goods and services allows the consumer to achieve a higher level of utility. Since the change in prices gives the consumer a choice that he did have before, we can say that consumption efficiency improvements implies that more satisfying choices become available. When multiple varieties of goods are available in a product category 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 conceptually to describe it 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 generally 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. It is probably also likely that individuals have different preferences for goods.

## **10.2. Free Trade and the Distribution of Income**

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. Lionel Robbins (?) once wrote that the objective of the economics discipline is to determine how to allocate scarce resources towards production and consumption. Economics describes 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 which 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 for compensation to work, 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. A 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 which, 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.<sup>(1)</sup> 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.

What all of this implies is 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 which 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 special benefits are being eliminated for those groups. On the other hand, those groups that benefit from free trade are the same one's 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, the difficulty of identifying who lost and who gained and by how much would be virtually impossible to achieve thus making this compensation scheme equally unworkable.

1. It has been shown that under some conditions it is possible to specify a tax and subsidy policy which would guarantee an increase in aggregate economic efficiency with free trade. (See for example Dixit and Norman (1980)).

### **10.3. Economic Efficiency with Imperfectly Competitive Markets or Market Distortions: The Case for Selected Protection**

An argument for selected protection arises in the presence of imperfectly competitive markets and/or market distortions. 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. There are numerous examples found in the trade literature which 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 assumed that markets were perfectly competitive and implicitly assumed that there were no market distortions.

This general criticism of the standard case for free trade, then, 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, 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 which 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 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 larger 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 which, 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 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 spillover 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, then, 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 who 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 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 which 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 is larger 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 pollution reduction outweigh the costs of the export tax, domestic national welfare may rise.

If domestic production of certain high technology goods could wind up in the hands of countries who 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 acts to reduce or eliminate 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, then, from these examples that a compelling case can certainly be made in support of selected protectionism. Indeed Paul Krugman (1987) once announced that, "never before has the case for free trade been so much in doubt". [get exact quote]. Many of these arguments showing the potential for welfare improving trade policies 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) and John Stuart Mill in his "Principles of Political Economy" (1848). The terms of trade argument was established by Robert

Torrens in 1844 in "The Budget: On Commercial and Colonial Policy". Frank Graham in his 1923 article "Some Aspects of Protection Further Considered", noted the possibility that free trade would reduce welfare if there are variable returns to scale in production. During the 1950s and 60s 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, conceived in the 1980s, are merely the latest formalization 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 counter-arguments were also developed.<sup>(4)</sup>

#### **10.4. The Economic Case Against Selected Protection**

The economic case against selected protectionism does not argue that the arguments 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 counter-arguments 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 which 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
- The Theory of the 2<sup>nd</sup>-Best
- Information Deficiencies
- Political Economy Issues

##### **10.4.1 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 which restricts exports or imports (optimally), it would raise its national welfare. 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. See 1, 2, 3, and 4. Thus, the use of

an optimal tariff, export tax, import quota or 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 reductions in national welfare for both countries.<sup>(1)</sup> 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 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.<sup>(2)</sup>

Perhaps the best empirical support for this result is the experience of the world during the Great Depression of the 1930s. After the US imposed the Smoot-Hawley tariff act of 1930, raising its tariffs to an average of 60%, approximately 60 countries retaliated with similar increases in their own tariff barriers. As a result, world trade in the 1930s fell to one-quarter 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, 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 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.<sup>(3)</sup> Thus one

country's gains are other countries' 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 retaliations would not pose the same problems. There are other problems though.

---

1. 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. [Go Back](#)

2. Indeed Robert Torrens, the originator of the terms of trade argument, was convinced that a large country should maintain protective barriers to trade when one's 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. [Go Back](#)

3. One exception arises in the model by Eaton and Grossman (1986) who show that when the government implements an export tax in the presence of an international duopoly following a Bertrand pricing strategy, then the profits of both the domestic and the foreign firm will rise. However, the losers in their model are the consumers in the third-country market who must face higher prices. Potentially that country could retaliate with import tariffs to protect its consumers and negate the benefits of the strategic trade policy. [Go Back](#)

### 10.4.2. The Theory of the 2<sup>nd</sup>-Best

One of the more compelling counter-arguments to potentially welfare-improving trade policies relies on the theory of the 2<sup>nd</sup>-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 2<sup>nd</sup>-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 2<sup>nd</sup>-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 1<sup>st</sup>-best policy. The general rule used to identify 1<sup>st</sup>-best policies is to use that policy which "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 counter-argument to selected protection based on the theory of the 2<sup>nd</sup>-best is that 1<sup>st</sup>-best rather than 2<sup>nd</sup>-best policies should be chosen to correct market imperfections or distortions.

Since trade policies are generally 2<sup>nd</sup>-best while purely domestic policies are generally 1<sup>st</sup>-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 counter-argument 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 trade policy is 1<sup>st</sup>-best, as when a country is large in international markets, this argument does not act as a counter-argument to protection. However, retaliation remains a valid counter-argument in many of these instances.

### **10.4.3. Information Deficiencies**

The next counter-argument 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, or stimulate positive externality effects, or shift foreign profits to the domestic economy, etc., 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 governments decision 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 that are 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 were relatively high. In the case of strategic trade policy the government would have to identify which industries are oligopolistic and exhibit the potential to shift foreign profits towards 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 infant industry case. 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 if 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 optimal tariff case, there would be a range of tariff levels which would raise national welfare above the level attained in free trade. A similar range of welfare improving protection levels would also hold in all of the other cases of selected protection.

However, there is one other informational constraint that is even ignored in most economic analysis 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 analysis incorporates one economic distortion into a model and then analyzes 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 in 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 (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 others products in consumption. Since the other industries 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 inter-market 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 which are interconnected through factor or goods market competition, then, in order to determine the true optimal set of policies which would correct or reduce all of the imperfections and distortions simultaneously would require the solution to a dynamic general equilibrium model which accurately describes the real economy, not only today but 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 or not. This represents a serious blow to the case for government intervention in the form of trade policy. 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 counter-argument against selected protection.

#### **10.4.4. 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 towards 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 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 to 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 their 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 have an effect on 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, was 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 who would face less competition for their product and the government who collects tariff revenue. The losses would accrue to the thousands or millions of consumers of the product in the domestic economy.

As an 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 100 domestic textile firms who 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 100 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 to hire a lobbying firm to help make your 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 (#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 the consumer 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 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.

### **10.5. Free Trade as the "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 theory shows 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. In the first place, in many instances 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. Secondly, even when 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 also expend resources to gather information, to implement and administer policies, and to monitor the effectiveness of these policies. In the US the following agencies and groups devote at least some of their time to trade policy implementation: the US Trade Representative's office, the International Trade Commission, the

Department of Commerce, the Federal Trade Commission, the Justice Department, 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 are 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 with any system of selected protectionism, free trade remains the policy most likely to produce the highest level of economic efficiency attainable.

#### Questions:

1. What are the economic efficiency effects from free trade?
2. How does trade help in the distribution of income?
3. What do we mean by selected protection?
4. Do you agree with argument that as countries develop they become more open?

#### References:

*Paul R. Krugman and Maurice Obstfeld, International Economics: Theory and Policy, Fifth edition, Addison-Wesley Publishing Company, 2000.*

*James R. Markusen, James R. Melvin, William H. Kaempfer and Keith E. Maskus, International Trade: Theory and Evidence, International edition, New York: MCGraw-Hill, 1995.*

#### Useful web links:

<http://internationalecon.com/v1.0/index.html>

<http://faculty.uwb.edu/danby/Teachingmaterials.htm>

<http://www.worldscibooks.com/economics/4456.html>

<http://www.econ.iastate.edu/classes/econ355/choi/>

<http://elsa.berkeley.edu/~chad/Handbook.html>

[www.wto.org](http://www.wto.org)

[www.imf.org](http://www.imf.org)

[www.worldbank.org](http://www.worldbank.org)

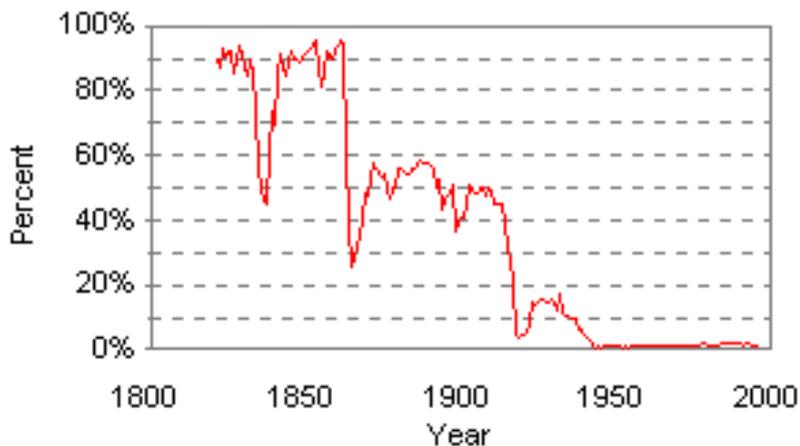
[www.nber.org](http://www.nber.org)

## Slide Materials

### Average Tariff Rates

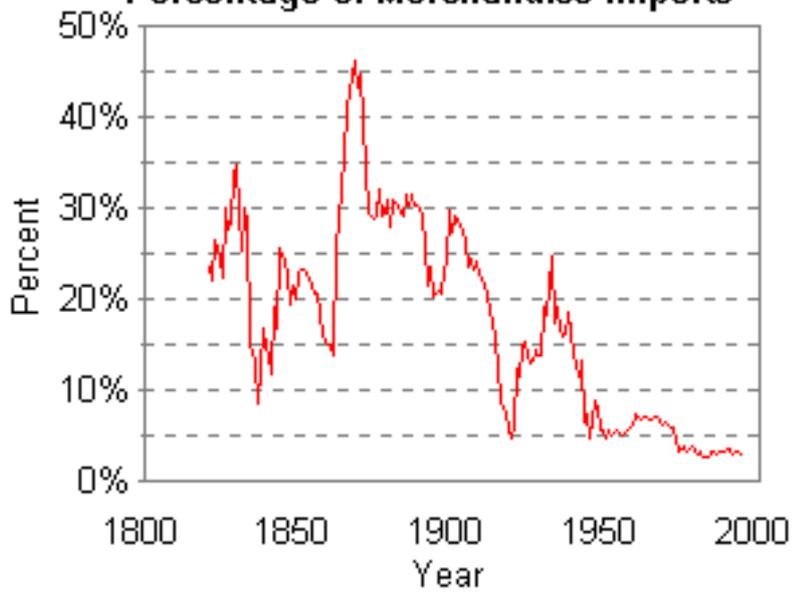
Japan (2000)	6.5%
European Union (2002)	
Industrial Goods	6.4%
Agriculture	16.1%
Norway (2000)	8.1%
Canada (2000)	7.1%
Brazil (2000)	13.7%
Mexico (2002)	16.5%
Chile (1997)	11.0%
El Salvador (1996)	10.1%
Cyprus (1997)	
Overall	16.4%
with EU	7.2%
Agriculture	37.6%
Morocco (1996)	23.5%
Bahrain (2000)	7.7%
Malawi (2002)	14.0%
India (2002)	32.0%
Pakistan (2002)	20.4%
Zambia (1996)	13.6%
Malaysia (2001)	9.2%

US Customs Duties as a %  
of Federal Government Receipts

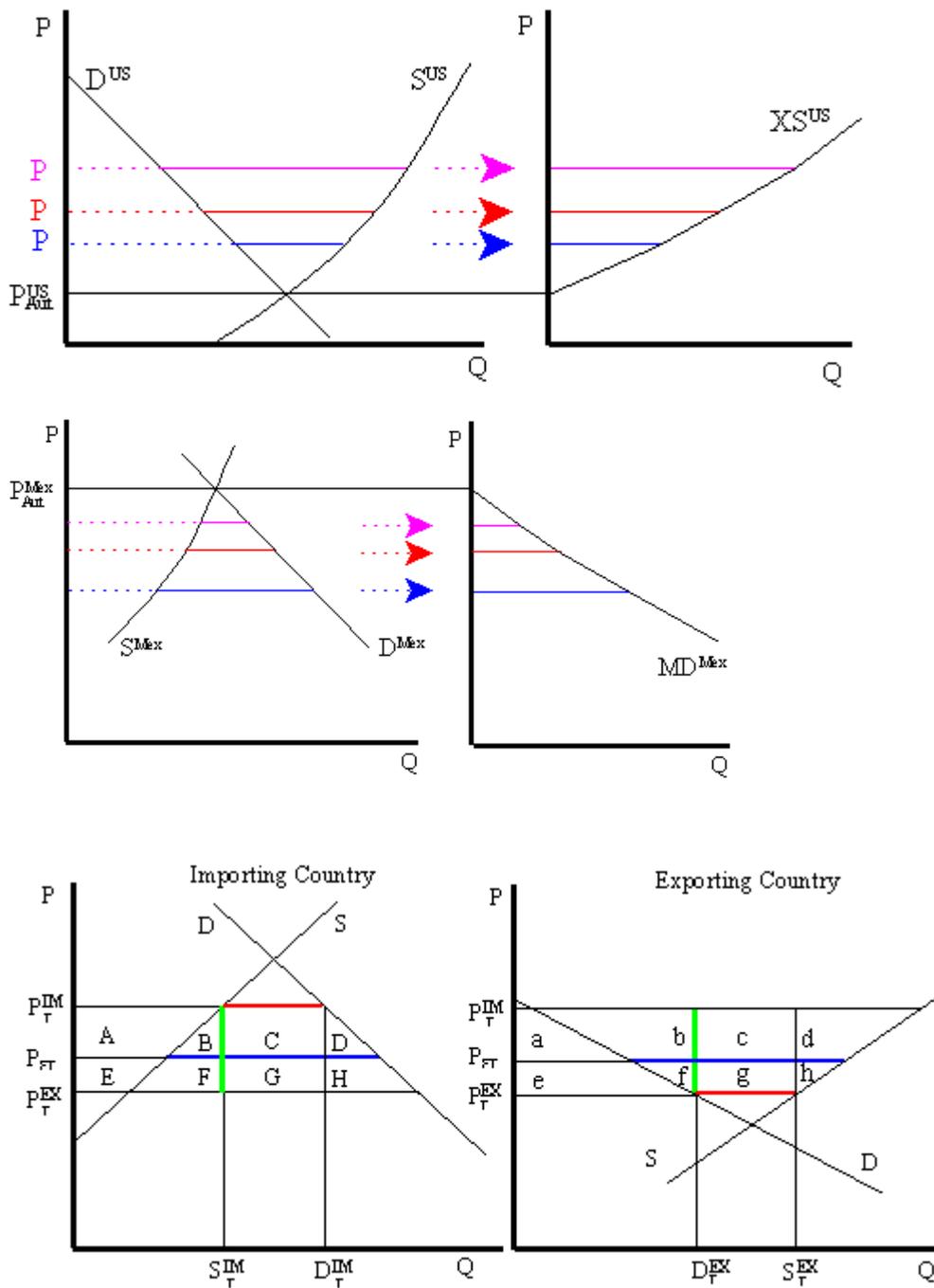


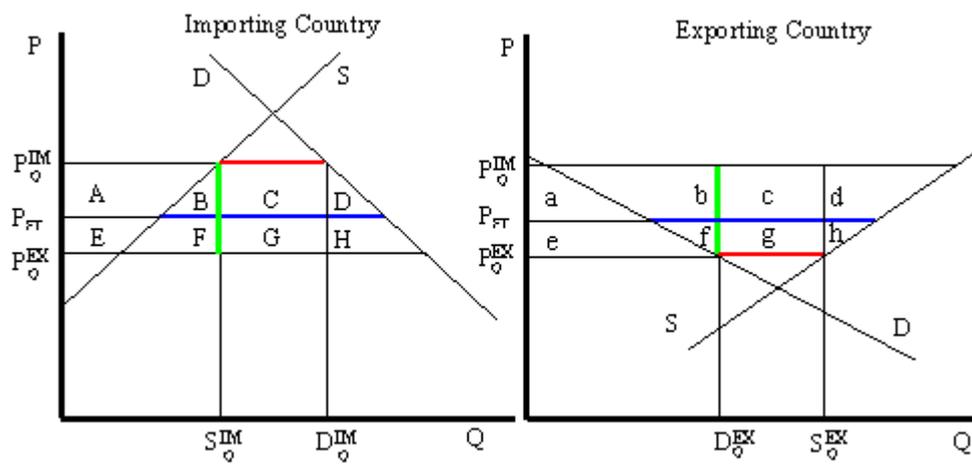
Source: Bureau of Census, *Historical Sources of the United States, Part 3, 1976*,  
*Statistical Abstract of the United States, 1976 - 1997*

### US Customs Tax Revenue as a Percentage of Merchandise Imports



Source: 1821-1970: U.S. Dept. of Commerce: Bureau of Census, Historical Statistics of the United States, Part 2, 1976.





**Topics recommended for graduation or diploma works  
(International Trade)**

1. International practice of accessing the World Trade Organization (WTO) (in example of foreign countries).
2. Integration of the developing countries to the system of international trade by accessing the WTO.
3. Liberalization of foreign economic activity in the step of deepening market reforms in Uzbekistan.
4. Problems of participating for Uzbekistan in WTO as a full member.
5. The impact of regional economic integration on multilateral trade.
6. Specificity of foreign trade regulation in developed, developing and in countries with transition economy.
7. Specificity of the activity of International Commodity Organizations in particular commodity markets.
8. Formation of “Euro zone”: functions and role in accelerating the integration.
9. A common agricultural policy of European Union: main directions and results.
10. Impact of membership in EU on the structure foreign trade of the member country (country – for the choice of the student).
11. Specificity and perspectives of Northern American Free Trade Association.
12. The state, specificity and problems of mutual relations of the EU with third countries: USA, Japan, countries of European Association of Free Trade, Eastern Europe, CIS (Country for the choice of the student).

13. Mechanisms of integration in European Union and in Northern American Free Trade Association: Comparative Analysis.
14. Formation integration zone in the region of Northern American Free Trade Association, regionalism and sub regionalism.
15. Analyses of contemporary economic model of China and its place in contemporary economic relations.