
CHAPTER 6

Trade Policy Analysis (Revised)

In Chapter 5, you saw that there are reasons to expect that landowners in Japan might oppose the import of rice from Vietnam or, for that matter, from any other country. This opposition to imports exists despite the overall gains to Japan from these imports. Indeed, Ikuo Kanno, a fourth-generation Japanese rice farmer stated: “I believe that the value of agriculture can’t be measured just by an economic yardstick. Japan has been a farming country for centuries, and rice farming is embedded in the culture. It should be preserved.”¹ Mr. Kanno might have added that it was in his own personal interest that rice farming be “preserved.” In fact, as we discussed in Chapter 5, rice farming in Japan has been supported a great deal through various stringent limits on imports.

For an international affairs professional or a trade policy analysis, knowing that factor conditions lead to the demand for import protection is not enough. These individuals are often called upon to assess, both qualitatively and quantitatively, the numerous impacts of government interventions in international trade. If you pursue an international economic affairs career, it is likely that you will either be involved in making these assessments or in interpreting the assessments made by someone else. Therefore, it is important for you to understand how the assessments are made. This is the purpose of the present chapter.

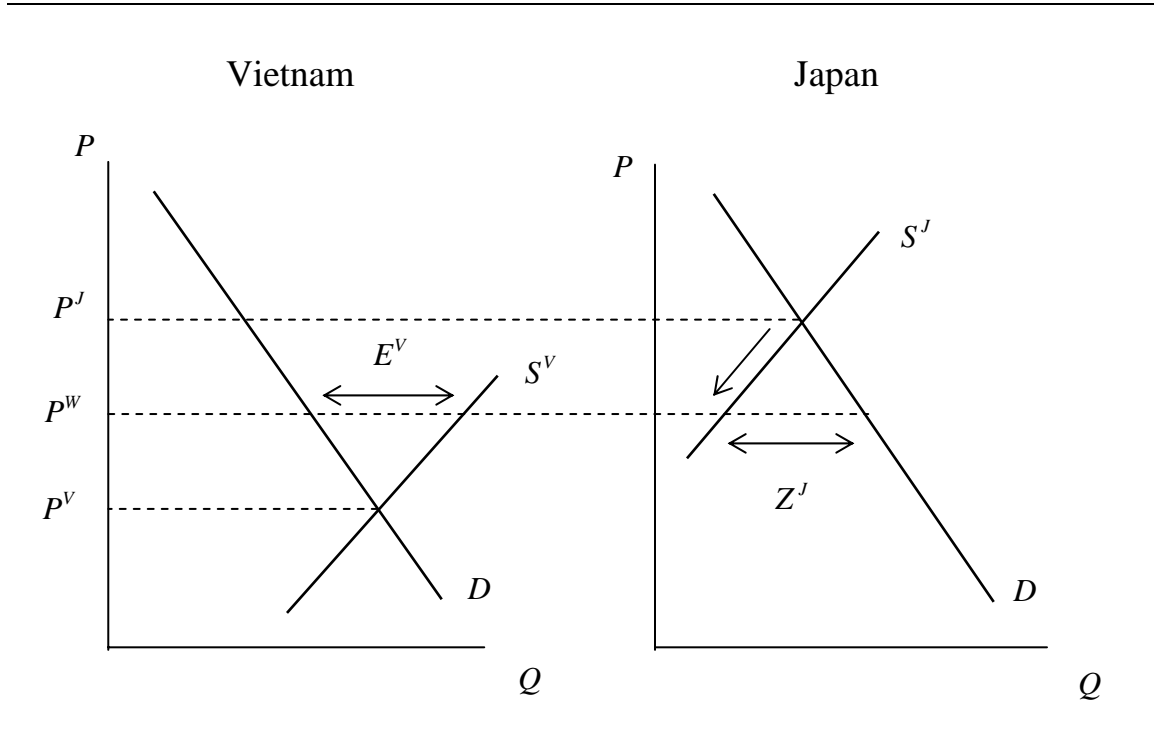
We will begin our discussion of trade policy analysis by revisiting the model of absolute advantage in rice between Japan and Vietnam we developed in Chapter 2. Next, we will consider the large variety of trade policy measures available to governments. Then we will analyze what happens when Japan introduces a **tariff** on its imports of rice. We also will consider the **terms of trade effects** of this tariff. Next, we will consider what happens when Japan introduces a **quota** on its imports of rice. Tariffs and quotas compose the basic means of protecting domestic markets from competition. It is important that you are familiar with both of these policies. Finally, we will briefly take up trade policy analysis using the comparative advantage model of Chapter 3. For the interested reader, appendices to the chapter consider the case of the imperfect substitutes model, used in many kinds of trade policy analysis, and the case of tariff rate quotas used to protect the Japanese rice sector and other agricultural sectors. In terms of the analytical elements outlined in Chapter 1, we will focus on *countries* and *sectors* with some mention of *factors of production*.

¹ Planet Rice (2000).

Absolute Advantage Revisited

In Chapter 2, we developed a model of absolute advantage and trade in rice between Vietnam and Japan. This model is summarized in Figure 6.1. Recall from Chapter 2 that we assume the demand conditions in the two countries to be exactly the same. Consequently, we can use the same demand curve in both the diagrams of this figure. We also assume that supply conditions in the two countries are such that Vietnam's supply curve for rice is farther to the right than Japan's supply curve. Consequently, the autarky price of rice in Vietnam, P^V , is lower than the autarky price of rice in Japan, P^J . This gives Vietnam an absolute advantage in producing rice. The world price settles between the two autarky prices. Vietnam exports rice, while Japan imports rice. The world price will adjust to ensure that Vietnam's exports are the same as Japan's imports.

Figure 6.1. Absolute Advantage and Trade in the Rice Market



Note that, in moving from autarky to trade in Figure 6.1, there is a reduction in domestic quantity supplied in Japan as indicated by the arrow along S^J . It is possible that the firms producing rice in Japan would lobby the Japanese government to oppose this decrease in domestic quantity supplied, demanding protection from Vietnam exports. This is exactly what has happened in Japan, given the political voice of people like Ikuo Kanno mentioned above. More generally, though, demands for protection are nearly universal.

Indeed, since protective policies are so widespread in the world economy, analyzing them is an important sub-field of international economics.

Trade Policy Measures

When a country seeks to grant import protection to a sector of its economy, it can choose among a number of measures which can be broadly classified as either *tariffs* or *nontariff measures*. A **tariff** is a tax on imports. It is a very common trade policy used by almost all countries. There are two primary kinds of tariffs. A *specific tariff* is a fixed tax per physical unit of the import, and an *ad valorem* tariff is a percentage tax applied to the value of the import. Governments in the world trading system employ both types of tariffs.²

From the point of view of many trade policy analysts and the World Trade Organization (WTO), the ideal trading system would consist of only tariffs. Tariffs, particularly *ad valorem* tariffs, are seen as the most transparent kind of trade policy and one that is least susceptible to political manipulation and corruption. However, tariffs are far from the only type of trade policy. Therefore, the second category of trade policy measures we need to consider is the inclusive and large collection of **non-tariff measures** (NTMs).³ The range of these NTMs is limited only by the imaginations of policy makers, and the particularly strange case of used automobile imports in Latin America is discussed in the accompanying box.

To get a handle of the numerous kinds of NTMs, we can follow Takacs (2009) and distinguish among four categories: tax-like measures, cost-increasing measures, quantitative trade restrictions, and government procurement policies. A number of examples of these are presented in Table 6.1. *Tax-like measures* include anti-dumping (AD) duties, countervailing duties (CVDs), temporary import surcharges and variable levies. Dumping involves the price of an exported good being lower than the price of the same good in the exporting country, and AD duties can be applied in certain circumstances when dumping takes place. CVD measures “countervail” subsidies by exporters and again can be applied in certain circumstances. AD and CVD measures are together often referred to as “administrative protection” and form a veritable industry of trade policy analysis spanning national governments and trade policy law firms attempting to assure that trade is “fair.”⁴

² Bacchetta (2009) notes that there are three additional kinds of tariffs. A *compound tariff* has both an *ad valorem* component and a specific component. A *mixed tariff* takes on an *ad valorem* or a specific form depending on which is higher. Finally, a *technical tariff* depends on the products content and inputs.

³ You might come across an older, less inclusive term of *non-tariff barriers* or NTBs.

⁴ For a review of AD and CVD measures from a legal perspective, see Chapters 10 and 11 of Matsushita, Schoenbaum and Mavroidis (2006).

Table 6.1. Non-Tariff Measures

Category	Measure	Description
<i>Tax-like measures</i>	Anti-dumping (AD) duties	Tariff-like charges imposed on imports that are deemed by the imposing government to have been “dumped” or sold at “less than fair value” by the exporter.
	Countervailing duties (CVDs)	Tariff-like charges imposed on imports that are deemed by the imposing government to have been “unfairly” subsidized by the exporting country government.
	Temporary import surcharges	Extra import tariffs imposed in “emergency” circumstances of various kinds.
	Variable levies	Import tariffs whose size depends on the price of the imported good. This is usually to help maintain a certain level of domestic price, particularly in agricultural sectors.
<i>Cost-increasing measures</i>	Standards and technical regulations (STRs) or technical barriers to trade (TBTs)	A large set of measures including certification guidelines, performance mandates, testing procedures and labeling requirements designed to contribute to consumer safety, environmental protection, national security, product interoperability and other goals.
	Sanitary and phytosanitary (SPS) requirements	Technical barriers to trade in the agricultural arena designed to protect plant, animal and human health.
	Prior import deposits	Non-interest bearing deposits equal to a percentage of the value of an imported good that must be deposited into a central bank for a specified amount of time.
	Customs procedures	Inspection and customs clearance procedures that can increase costs of imports and impose delays.
	Reference or minimum import prices	Official (and higher) prices used to calculate import tariffs.
<i>Quantitative measures</i>	Import quota	A maximum import quantity set for a particular good.
	Tariff rate quota (TRQ)	Involves two tariff levels: a lower tariff for levels of imports within the quota and a higher tariff for levels of imports above the quota.
	Voluntary export restraint (VER)	An export quota that is “voluntarily” applied by the exporting country.
	Import licensing	The requirement that a license be obtained from the importing country government before a product can be imported

Category	Measure	Description
<i>Quantitative measures continued</i>	Foreign exchange controls	The allocation of foreign exchange by the importing country government among potential importers as a way to limit imports.
	Sanctions and embargoes	Export bans and trade embargoes imposed on countries for political reasons.
	Local or domestic content requirements	A requirement that imported goods must contain a minimum amount of intermediate products from the importing country.
	Import or export balancing requirements	A requirement that a firm importing intermediate products must export a certain amount.
<i>Government procurement practices</i>		The myriad processes that governments employ in determining their contract procurements and the posture of these contracts toward imported goods.

Sources: Takacs (2009) and Laird (1997)

Cost-increasing measures include what is known both as standards and technical regulations (STRs) and technical barriers to trade (TBTs), sanitary and phytosanitary (SPS) requirements, prior import deposits, customs procedures and reference or minimum import prices. STRs and TBTs are a growing area of trade policy activity and analysis.⁵ It is one area where there are clear cases in which increasing protection can improve welfare in instances such as consumer health and safety. However, it is also an area where barriers are put in place simply for their protective effect. Customs procedures is another area that has received increased attention. This is for two reasons. First, there is a concern that slow customs clearance procedures in developing countries can be wasteful. Second, customs clearance, particularly in a post-911 context, can be a real barrier for developing country exporters trying to enter developed country markets. Consequently there is a concern with capacity building for developing country exporters in this area.

Used Automobile Protection in Latin America

In the wake of the debt crises of the early 1980s, Latin America embarked on a process of significant trade liberalization, reducing tariffs and removing quotas. In the case of used automobiles, however, this liberalization has not, in general, taken place. Many Latin American countries retain significant restrictions on the imports of used automobiles even as liberalization has occurred in the new automobiles sector. What is more, the protective measures applied to used automobile imports are rather creative.

As of 1999, seven relatively small Latin American countries imposed only minimal restrictions on imports of used automobiles. These countries were Bahamas, Barbados,

⁵ See Wilson (2009).

Belize, Bolivia, El Salvador, Guatemala, and Panama. Some of these countries used “reference prices” to value the used automobiles. These reference prices were either domestically generated or published, “Blue Book” values.

Five relatively small countries imposed clear restrictions on the imports of used automobiles. These countries were Costa Rica, Dominican Republic, Haiti, Honduras, and Nicaragua. A popular measure here was capped depreciation. For example, the Dominican Republic accepted invoices as the value of new automobiles, but it did not do so for used automobiles. Instead, the value of a used automobile was calculated using a depreciation schedule based on the price of an equivalent, new automobile in the current year. However, given the depreciation schedule, the price of the used automobile could not fall below 50 percent of the new automobile. As we know, the market prices of used automobiles are often substantially below 50 percent of equivalent, new automobiles, so this represented a discriminatory measure.

Jamaica, Peru, and Trinidad and Tobago imposed relatively severe protection measures against imports of used automobiles. Trinidad and Tobago required that used automobiles be *disassembled* before importation! Engines were often removed from used vehicles before importation and shipped separately. Peru and Jamaica both had age delimited bans. Beginning in 1996, Peru banned automobiles over five years old and commercial vehicles over eight years old. Furthermore, imported used automobiles with fewer than 24 seats faced a ‘selective consumption tax’ of 45 percent, while similar new automobiles faced a rate of only 20 percent. In 1998, Jamaica's motor vehicle policy was tightened to allow only licensed used automobile dealers to import automobiles no older than four years old and light commercial vehicles no older than five years old.

Finally, in 1999, nine of the largest Latin American countries prohibited imports of used automobiles altogether. These countries were Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Uruguay, and Venezuela. In the cases of Argentina, Brazil, Paraguay and Uruguay, this import ban was part of the Mercosur preferential trade agreement (see Chapter 8). It is clear that, when it comes to used automobiles, even “free trade” countries such as Chile chose the most severe form of protection.

Source: Pelletiere and Reinert (2002)

Quantitative measures is a large group of NTMs including import quotas, tariff rate quotas (TRQs), voluntary export restraints (VERs), import licensing, foreign exchange controls, sanctions and embargoes, local or domestic content requirements, and import or export balancing requirements. As will be discussed in Chapter 7, for many years, import quotas were the norm in agriculture, textiles and clothing trade. This is no longer the case among WTO members, but can still exist in non-member countries. TRQs, however, are still in use in agricultural sectors including the Japanese rice sector. These involve two tariff levels: a lower tariff for levels of imports within the quota (the within-quota tariff) and a higher tariff for levels of imports above the quota (the out-of-quota tariff). These

complexities make it complicated to administer and analyze.⁶ Sanctions and embargoes are a perennial topic with regard to their effectiveness in influencing regimes deemed to be unacceptable (e.g., Apartheid South Africa or present-day Myanmar).

Government procurement practices concern the processes that governments employ in determining their contract procurements and the posture of these contracts toward imported goods. Takacs (2009) reminds us that “In most countries, regardless of the stage of development, government is the single largest purchaser of goods and services” (p. 845). That makes the government procurement processes and their specific posture towards imports an important matter.

From this discussion and the content of Table 6.1, it is clear that trade policies are numerous. We are going to simplify greatly in this chapter and focus on the basic analysis of a tariff and quota within the absolute advantage framework. We begin with the case of a tariff.

A Tariff

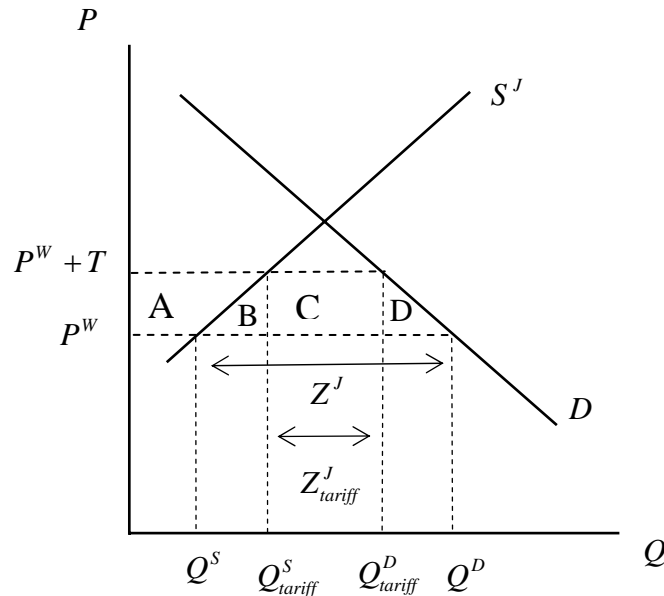
As mentioned above, there are two kinds of tariffs, a specific tariff and an ad valorem tariff. For our graphical analysis in this chapter, it is much simpler to consider a specific tariff, so that is what we will do. The basic results you will learn here, however, will also apply to an ad valorem tariff. Let’s introduce a specific tariff on Japan’s imports of rice. This policy is depicted in Figure 6.2. The world price is P^W . At this price, Japanese rice suppliers choose to supply Q^S . Japanese consumers demand Q^D . The difference, $Q^D - Q^S = Z^J$, is imported from Vietnam.

Suppose then that the Japanese government imposes a specific tariff of T on its imports of rice from Vietnam. This raises the domestic price to $P^W + T$. You can now see that a tariff increases the domestic price of the imported product above the world price. In the case of Japanese rice, the domestic price is many times larger than the world price. The increase in the domestic price of rice above the world price has a number of effects. Japan’s production of rice expands from Q^S to Q_{tariff}^S . This expansion in output is what the Japanese rice farmers hoped to gain from the tariff. Domestic consumption of rice falls from Q^D to Q_{tariff}^D . Imports fall from Z^J to Z_{tariff}^J . The tariff has suppressed the importing relationship of Japan with Vietnam.⁷

⁶ See Hertel and Martin (2000), de Gorter (2009) and the appendix to this chapter.

⁷ This makes sense. A tariff is a tax, and a tax on any activity causes the amount of that activity to decrease. In this case, the taxed activity is rice imports by Japan.

Figure 6.2. A Tariff on Japan's Imports of Rice



In addition to the above quantity effects of a tariff, there are also a set of welfare and revenue effects. These involve Japan's households, firms, and government. What has happened to the consumer surplus of Japanese households in Figure 6.2?⁸ Examining this diagram carefully, you should be able to see that the tariff has caused consumer surplus to fall by area $A+B+C+D$. Since Japanese rice consumers are paying more and consuming less, this fall in consumer surplus makes sense.

What has happened to the producer surplus of Japanese firms? Again examining the diagram carefully, you should be able to see that producer surplus has increased by area A . Japanese rice producers are better off as a result of the tariff; their welfare has increased. Since Japanese producers are receiving more for their product and producing more as well, the increase in producer surplus makes sense.

⁸ Remember that the concepts of consumer and producer surplus are covered in the appendix to Chapter 2. Please review this appendix if necessary.

What about the Japanese government? It is receiving revenue from the import tax. How much revenue? The tariff is T , and the post-tariff import level is Z_{tariff}^J . Therefore, the tariff revenue is $T \times Z_{tariff}^J$, or area C in Figure 6.2.⁹

Economists or trade policy analysts are often asked to assess the *net welfare effect* of a trade policy. This measure summarizes the welfare impact of the policy for the country as a whole. What would the net welfare effect be? In this case, we take the gains to firms and the government and subtract the losses to households. Doing this, we have:

$$N = A + C - (A+B+C+D) = - (B+D) \quad (6.1)$$

Area A is a transfer from consumers to producers, while area C is a transfer from consumers to the government. These areas cancel out with each other in equation 6.1. That leaves areas B and D. There is a net welfare *loss* of the tariff equal to area B+D. From an economic standpoint, the tariff hurts the Japan society as a whole. Although it benefits producers and government, the losses imposed on consumers outweigh these benefits. The two triangles B and D are similar to the “deadweight loss” triangle of a monopoly you learned about in introductory microeconomics. They represent economic inefficiency. In certain situations, tariffs do not necessarily cause a net welfare loss. One such situation, a *terms-of-trade* gain, is explored in the next section.

Please note one more thing. Figure 6.2 gives us information on what happens to Japanese rice output as a result of the tariff. As we stated above, Japanese rice output increases from Q^S to Q_{tariff}^S . Given information on the employment/output ratio in this sector, we could translate the change in output into a change in employment. From the point of view of Japan politicians, this employment effect is important. Therefore, trade policy analysts often include an estimate of the employment effects of tariffs and other trade policies.

Terms of Trade Effects

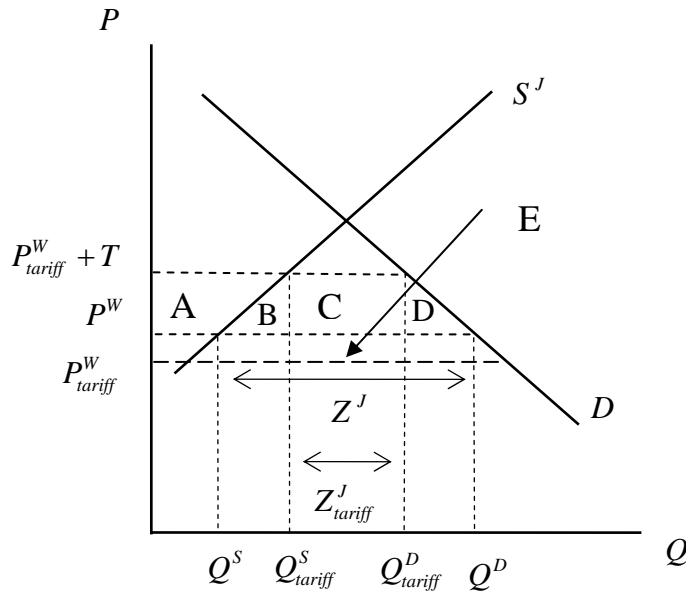
In some important cases, the analysis of the above section is incomplete. Why? We have showed that, when Japan imposes a tariff on its imports from Vietnam, the amount of these imports decreases. Looking at Figure 6.1, however, we can see that, as Japan’s imports of rice decrease, there will be excess supply in the world market for rice. As we discussed in Chapter 2, this excess supply of rice will cause the world price to fall. Since Japan is importing rice, this is a good thing for this country. The fall in the price of an import good is one kind of **terms of trade effect**. It is depicted in Figure 6.3.

⁹ There is an important public finance lesson here. An increase in the import tax (tariff) from zero to T reduces the potential *tax base* from Z^J to Z_{tariff}^J . All increases in taxes decrease the base on which the tax is assessed. For many developing countries, tariffs are an important source of government revenue.

The main difference between Figure 6.3 and Figure 6.2 is that, in Figure 6.3, the world price does not stay constant as the Japanese government places a tariff on imports of rice. The world price before the tariff is P^W . After the tariff, the world price falls to P_{tariff}^W , and the tariff is placed on top of this lower world price. Therefore, after the tariff is in place, the domestic price is $P_{tariff}^W + T$. The fall in the world price of rice affects the welfare analysis of the tariff. Consumer surplus in Japan falls by $(A+B+C+D)$ as in Figure 6.2. Producer surplus in Japan rises by A as in Figure 6.3. Japan government revenue, however, is now area $C + E$. Therefore, the net welfare effect is:

$$N = A + (C+E) - (A+B+C+D) = - (B+D) + E \tag{6.2}$$

Figure 6.3. The Terms of Trade Effect of Japan's Tariff



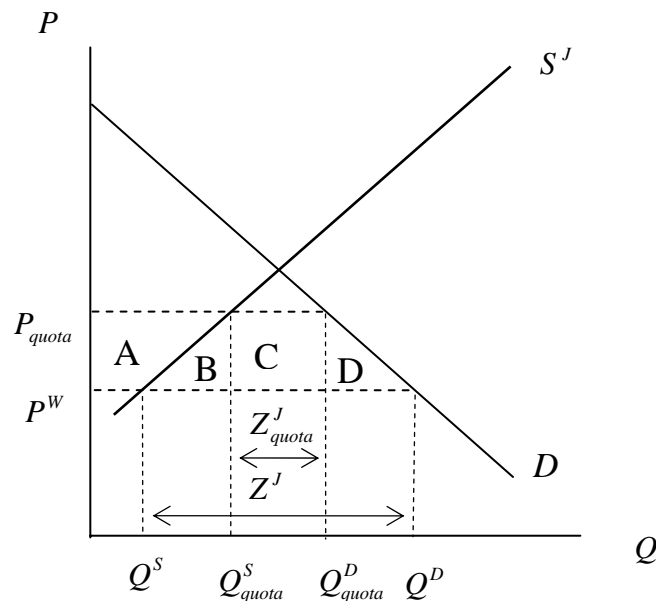
The net welfare effect in Figure 6.3 is different than in Figure 6.2. There is still the efficiency loss of $B+D$ as in the previous case. Now, however, there is a *terms of trade gain* of area E in equation 6.2. For this reason, we cannot say whether the tariff hurts welfare in Japan or not. If the world price falls by a lot, E could be very large, even larger than $(B+D)$. However, we should not jump to the conclusion that, given large terms of trade effects, tariffs are good for countries. This is because Vietnam would probably not sit idly by when Japan imposes a tariff on imports of rice. Vietnam could instead *retaliate* by imposing a tariff on a product that Japan exports. This tariff would lower the world price of Japan's export good, which would hurt Japan's welfare. Japan might further retaliate in turn. This

tit-for-tat retaliation process is often known as a *trade war*, and it is always welfare reducing. It is to prevent such trade wars that the General Agreement on Tariffs and Trade (GATT) was drawn up after World War II. We discuss the GATT and its successor, the World Trade Organization (WTO), in Chapter 7.

A Quota

An import **quota** is a quantitative restriction on imports and one important type of NTM. When the Japanese government imposes a quota on rice imports, it says to rice exporters and domestic importers, we will allow imports up to this amount, and no more! Suppose that instead of imposing a tariff as in Figures 6.2 and 6.3, Japan imposes a quota. We examine this in Figure 6.4.

Figure 6.4. A Quota on Japan's Rice Imports



Before the quota, rice imports are $Z^J = Q^D - Q^S$. For one reason or another, the Japanese government is not satisfied with this outcome. It decides to restrict imports to a smaller amount $Z^J_{quota} = Q^D_{quota} - Q^S_{quota}$. This policy induces a shortage of rice relative to the initial situation without the quota. The domestic price of rice in Japan rises from P^W to P_{quota} . The difference between these two prices is known as the **quota premium**. As with the case of a tariff, consumer surplus falls by area $A+B+C+D$, and producer surplus

increases by area A. The new matter we must deal with in the case of a quota is the nature of area C.

The quota policy is typically administered via a system of **import licenses**. In effect, the quota policy has restricted the supply of import licenses in the world. The area C represents the extra value of the right to import amount Z_{quota}^J . It is known as **quota rents**.¹⁰ Who receives the rents depends on how the quota licenses are allocated. There are two common possibilities:¹¹

1. Import licenses are *allocated to domestic (Japanese) importers*. Here, the quota rents accrue to the importers, so they remain within the country. They are a *gain to Japan*.
2. Import licenses are *allocated to foreign (Vietnamese) exporters*. Here, the quota rents accrue to these exporters, so they leave the country. They are a *loss to Japan*.

With the above in mind, we can address the question of the net welfare effect of the quota. In the case of import licenses allocated to *domestic* importers, the area C is a transfer from domestic consumers to domestic importers. Area C is a loss to consumers and a gain to importers for a net effect of zero for Japan as a whole. Our net welfare effect is just like a specific tariff, equal to the quota premium $P_{quota} - P^W$, that results in an import level of Z_{quota}^J :

$$N = A + C - (A+B+C+D) = - (B+D) \quad (6.3)$$

In the case of import licenses allocated to *foreign* exporters, area C is a transfer from domestic consumers to these foreign exporters. It is no longer a net loss of zero, because the loss to consumers is not offset by a gain to domestic importers. Our net welfare effect is simply the gain to firms less the loss to consumers:

$$N = A - (A+B+C+D) = - (B+C+D) \quad (6.4)$$

In this case, the quota is worse than a tariff that results in an import level of Z_{quota}^J .

Given what we have just said, suppose you were a government official administering quota policy. Which of the above two alternatives would you choose: a quota allocated to

¹⁰ Corden (1997) notes that "(T)here will be quota profits... received by the lucky people who obtain the import licenses. These quota profits are *rents* because they are not received as payments for any services, and any reduction in these profits would not affect the supply of any resource" (p. 127).

¹¹ There is a third possibility in which the import licenses are auctioned to the highest bidder by the government. The welfare properties of this case are like that of the case in which the import licenses are allocated to domestic importers.

domestic importers or quota allocated to foreign exporters? Your answer is probably the quota allocated to domestic importers, since these have the smaller welfare loss. Now, here is a puzzle: in many circumstances, governments choose a foreign allocated quota. Why? One possibility is that they are uninformed about the economic implications of their choices. Another possibility is that political considerations cause such a choice. For some reason, governments find it beneficial from a political point of view to assist foreigners, particularly developing countries. A better approach from the viewpoint of developing country exporters, however, would be to remove the quota altogether.

In this and the previous two sections, we have discussed four trade policy possibilities: a tariff, a tariff with terms of trade effects, a domestic-allocated quota, and a foreign-allocated quota. Before moving on to briefly discuss comparative advantage analyses of trade policies, let's summarize the four possibilities in a box:

Tariff: unambiguous net welfare loss due to consumer surplus loss outweighing gains in producer surplus and government revenue.

Tariff with terms of trade effects: ambiguous net welfare effect due to terms of trade gain (fall in world price) potentially outweighing the efficiency loss.

Domestic-allocated quota: unambiguous net welfare loss due to consumer surplus loss outweighing gains in producer surplus and quota rents.

Foreign-allocated quota: unambiguous net welfare loss that exceeds that of the domestic-allocated quota case.

Comparative Advantage Models

Our analysis of trade policies in this chapter has been based on the absolute advantage model of Chapter 2. The absolute advantage model has taken us quite far. We have shown how one can examine trade policies to make estimates of production, consumption, trade, employment, and welfare impacts. In many instances, however, the effects of trade policies go beyond a single sector. Protecting a large sector such as automobiles can draw resources from other sectors into the protected automobile sector. Perhaps workers in the metal furniture sector will move into the automobile sector as it expands under protection. Also, protecting a large intermediate product sector, like petroleum or steel, can raise costs for other sectors that use petroleum or steel in their production processes.

In these cases, trade policy analysts turn to models of comparative advantage such as those we discussed in Chapter 3. As you will recall, the comparative advantage model analyzes more than one sector simultaneously (e.g., rice and motorcycles). In some instances, this is an important feature. Such models are much more complicated than the absolute advantage models we considered in this chapter, and we will not formally discuss them here. You should, however, be aware of their use. At the level of basic theory, the

central insight of the comparative advantage approach include the fact that a protective measure in one sector acts as an implicit tax on production in other sectors, reducing their output levels. This is the result of the opportunity costs of production we discussed in Chapter 3.¹²

Given the importance of the comparative advantage perspective in many trade policy issues, trade policy analysts have turned to mathematical models of comparative advantage known as applied general equilibrium (AGE) models.¹³ These combine the insights of the comparative advantage model of Chapter 3 with the framework of the imperfect substitutes model discussed in the appendix. Some years ago, constructing an AGE model for trade policy analysis was a substantial undertaking. More recently, however, a few standard models have eased the difficulty of using them. We discuss one such standard model in the accompanying box. We will also encounter AGE models again in Chapter 8 in the context of preferential trade agreements or PTAs.

The Global Trade Analysis Project

The Global Trade Analysis Project (GTAP) began in 1993 and is based at Purdue University. It has evolved into a global network of trade policy analysts conducting research in an applied general equilibrium (AGE) framework. At its core, GTAP is a source for a database of global production and trade that is combined with a standard GTAP AGE model. Around this core is a global network of users, developers and contributors who use the database and the model or just the database and their own model. At the time of this writing, the latest version of the database is GTAP 7, describing the world economy in 2004 with 113 regions/countries and 57 sectors. The latest version of the model was GTAP 6.2a, was released in 2007.

The GTAP network of trade policy analysts convene each year in an annual conference, and short courses on using the GTAP database and model are held around the world. This effort has advanced the use of AGE models of trade policy in both national governments and global organizations such as the United Nations. In addition, multilateral financial institutions often rely on the GTAP model or database for their own trade policy analysis. For example, the World Bank's Linkage model, used to simulate the Doha Round of multilateral trade negotiations (see Chapter 7), relies on the GTAP database.

Efforts such as GTAP have contributed immensely to the ease and widespread use of the comparative advantage framework in trade policy analysis.

Sources: Hertel (1997), van der Mensbrugge D. (2005) and <https://www.gtap.agecon.purdue.edu>

¹² See Chapters 15 and 16 of Markusen et al. (1995).

¹³ On AGE models in general, see Reinert (2009) and references therein.

Conclusion

In order to help protect the losers of increased international trade, most countries of the world engage in trade policies. The supply and demand analysis of the absolute advantage model allows us to discover the effects of these trade policies on production, consumption, trade, welfare, and employment. In this chapter, we have analyzed tariffs, tariffs with terms of trade effects, and quotas. The appendix considers the important cases of the imperfect substitutes model and TRQs. In addition, we briefly mentioned trade policy analysis based on comparative advantage models of trade. In general, the intervention in free trade reduces the overall welfare of the country intervening. However, certain groups might benefit from these policies, which is why they are usually implemented.

This chapter has engaged in formal, economic analysis of trade policies. In Chapter 7, we will engage in a more institutional or legal analysis of trade policies when we examine the World Trade Organization. In practice, trade policy analysis is a combination of formal economic analysis and institutional or legal analysis. The marriage of these two perspectives is what allows for a full appreciation of trade policies.

Review Exercises

1. Consider Figure 6.2. For a given T , what would be the impact of an *increase in supply* (a shift of the supply curve to the right) on government revenue? What would be the impact of an *increase in demand* (a shift of the demand curve to the right)?
2. In Figure 6.3, we introduced the terms of trade effects of Japan's tariff on imports of rice. These terms of trade effect (area E in the diagram) was positive for Japan. In a new diagram similar to Figure 6.1, show that these terms of trade effects adversely affect the welfare of Vietnam.
3. Consider our diagram of a quota in Figure 6.4. Suppose the government reduced the quota to below Z_{quota}^J . What would happen to the *quota premium*? Can you say with certainty what would happen to the total *quota rent*? What would this depend on?
4. Trade protection is often used to maintain employment in a sector. Given our analysis, what do you think of this approach to maintaining employment? Can you think of any other measures that might also maintain employment in a sector?

Further Reading and Web Resources

For some fundamental introductions to trade policy analysis, see Vousden (1990), Corden (1997), and Francois and Reinert (1997). Anderson (2005) discussed the role economics has played in trade policy analysis in the post World War II era and provides an excellent set of references. Goode (2003) provides an excellent dictionary of the plethora of trade

policy terms. You can visit the Global Trade Analysis Project website at <https://www.gtap.agecon.purdue.edu>.

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Appendix: The Imperfect Substitutes Model

The absolute advantage model used in this chapter assumes that the imported good and domestic competing goods are perfect substitutes. In a number of instances, however, trade policy analysts want to allow for the possibility that the imported and domestic competing goods are *imperfect* substitutes.¹⁴ This leads us to what is now known as the imperfect substitutes model depicted in Figure 6.5.¹⁵ This figure allows for the terms of trade effects described in this chapter.

The important difference between Figure 6.5 and those previously considered in this chapter is that there are now *two* closely-related markets, one for the imported good Z and another for a domestic competing good D . The demand curves for these two markets are related through the cross-price elasticity of demand between the two goods. The initial equilibrium in the absence of a tariff results in the two prices P_{Z1} and P_{D1} .

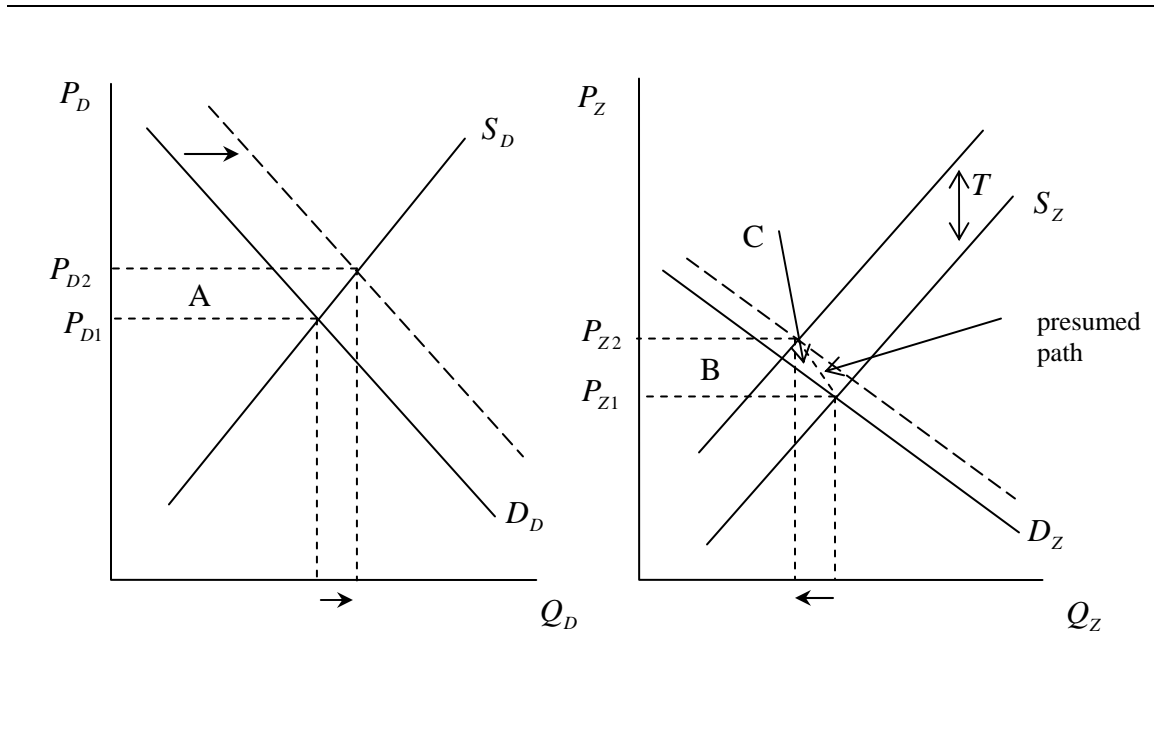
¹⁴ This is one type of product differentiation known as *product differentiation by country of origin* that is related to explanations of intra-industry trade we discussed in Chapter 4. An early contribution to this approach was Armington (1969).

¹⁵ The original contribution on this model was Baldwin and Murray (1977). A more explicit version was provided by Rouslang and Suomela (1988).

The imposition of a specific tariff T on imports of good Z causes the supply curve of this good to shift upward by the amount of the tariff, raising the domestic price of the imported good along the demand curve. The increase in the price of good Z affects the demand for good D , shifting the curve out as households substitute towards the domestic good. This increases the domestic price of good D , which in turn causes a substitution towards good Z and a shift out of the demand curve for imports. These two substitution effects are *simultaneous*, and the resulting, new prices are P_{Z2} and P_{D2} .

We next consider the welfare effects of the tariff in this imperfect substitutes framework. In the market for the domestic good, there is an increase in producer surplus along the supply curve equal to trapezoid A (extending from the vertical price axis all the way to the supply curve). This entire area, however, comes as a cost to the consumers, with the producer gain and the consumer loss exactly offsetting each other. In the market of the imported good, there are no domestic producers to account for. The estimation of the consumer welfare effect is troubled by the fact that both the supply curve and the demand curve in the market for good Z have shifted. The standard approach to this is to measure the change in consumer surplus along the presumed path between the initial and final equilibria points. The resulting consumer surplus loss is the trapezoid B+C. Rectangle B represents an increase in tariff revenue, so the entire net welfare effect in Figure 2 is just triangle C.

Figure 6.5. The Imperfect Substitute Model



One important aspect of Figure 6.5 is that, discounting for the effect of the shift of the demand curve, the rise in the domestic price of the imported good is less than the tariff. This is because there is a movement in world quantity supplied down S_Z and a resulting decline in the border price of the imported good. This is the terms-of-trade effect we discussed in this chapter. The terms-of-trade effect has the property of reducing the height of the net welfare triangle C and is present unless the import supply curve S_Z is horizontal or infinitely elastic.

This might seem to be a more complicated approach to trade policy analysis than the perfect-substitutes case of Figures 6.2 and 6.3. However, the approach is *widely used*, particularly in the analysis of AD and CVD cases by national governments. For this reason, it is very much worth understanding.

Appendix: A Tariff Rate Quota

In Chapter 7, we will discuss the Uruguay Round of multilateral trade negotiations and its Agreement on Agriculture. One implication of the Agreement on Agriculture is that many developed countries and some developing countries now impose **tariff rate quotas** on imports of agricultural goods.¹⁶ A tariff rate quota involves two tariff levels: a lower tariff for levels of imports within the quota and a higher tariff for levels of imports above the quota. Suppose Japan were to impose a tariff rate quota on imports of rice. This policy can be stated as follows. Up to the quota amount Z^{JQ} , Japan applies a *within-quota tariff rate* of T^{IN} . Above the quota amount Z^{JQ} , Japan applies a larger, *out-of-quota tariff rate* of T^{OUT} . To analyze this policy, it is best to consider three cases:

Case I: $Z^J < Z^{JQ}$

Case II: $Z^J = Z^{JQ}$

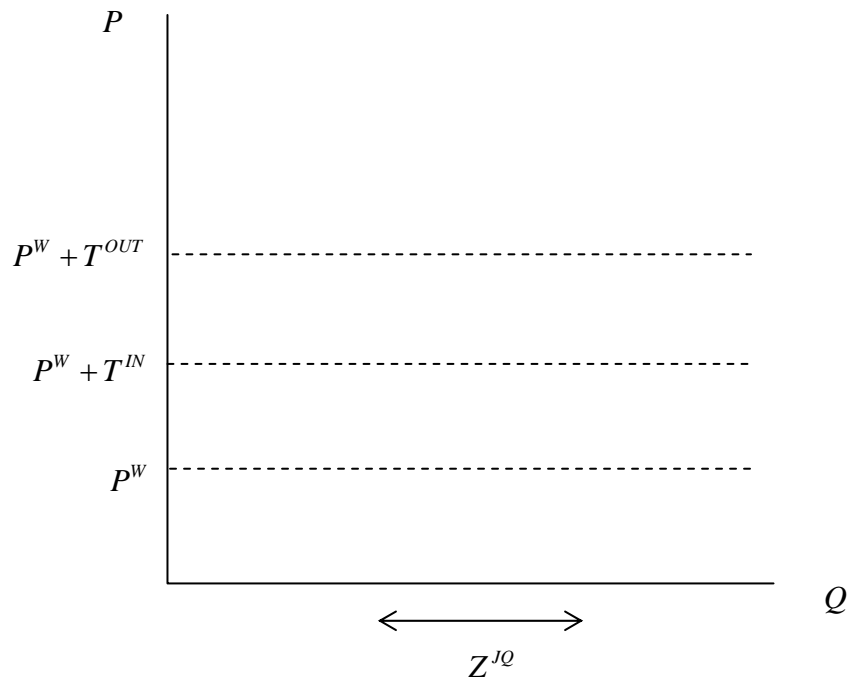
Case III: $Z^J > Z^{JQ}$

We are going to consider each of these three cases in turn. For each, we are going to use a diagram set out along the lines illustrated in Figure 6.6. The quota amount, Z^{JQ} , is plotted along the horizontal axis, and this distance is indicated with a double-headed arrow. Along the vertical axis, there are three prices indicated. The first, lowest price is the world price of imported rice, P^W . To simplify our analysis here, we assume that Japan cannot affect this world price. That is, there are none of the terms of trade effects we discussed in this chapter. The second, higher price is the world price plus the within-

¹⁶ See Hertel and Martin (2000) and de Gorter (2009).

quota tariff rate of T^{IN} . The third, higher price is the world price plus the out-of-quota tariff rate of T^{OUT} .

Figure 6.6. Framework for Analyzing Japan's Tariff Rate Quota on Rice



We are going to use the framework depicted in Figure 6.6 to analyze the three cases mentioned above. Case I is presented in Figure 6.7. Here the level of rice imports is within the quota amount. Therefore, the domestic price P is determined by the lower tariff value, T^{IN} , and the tariff revenue collected by the government is area A.

Case II is presented in Figure 6.8. Here the level of rice imports is exactly equal to the quota amount. In this case, the domestic price is somewhere between the two tariff-inclusive prices. That is, $P^W + T^{IN} \leq P \leq P^W + T^{OUT}$. As in Case I, the tariff revenue collected by the government is area A. However, if the positions of the Japanese supply and demand curves for rice cause the domestic price P to be above $P^W + T^{IN}$, then there are also quota rents equal to area B.

Figure 6.7. Case I of Japan's Tariff Rate Quota on Rice

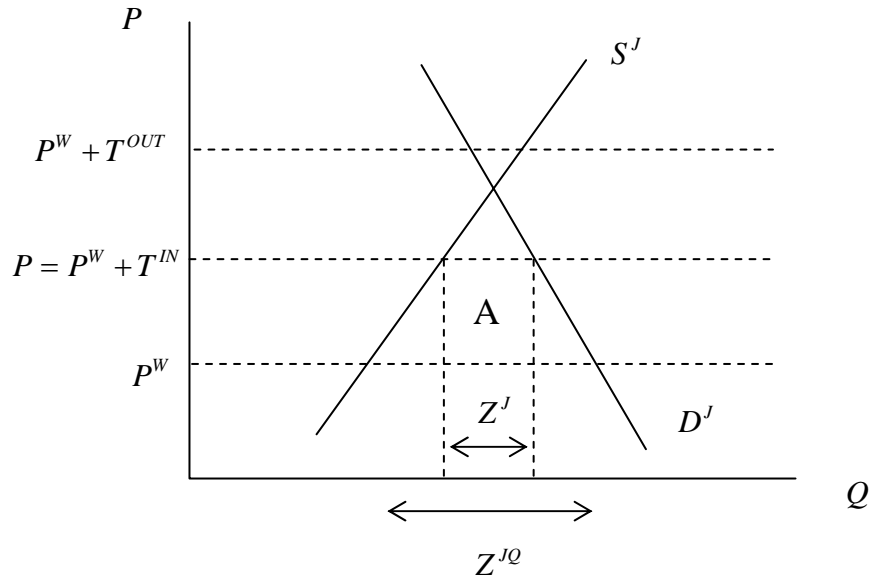
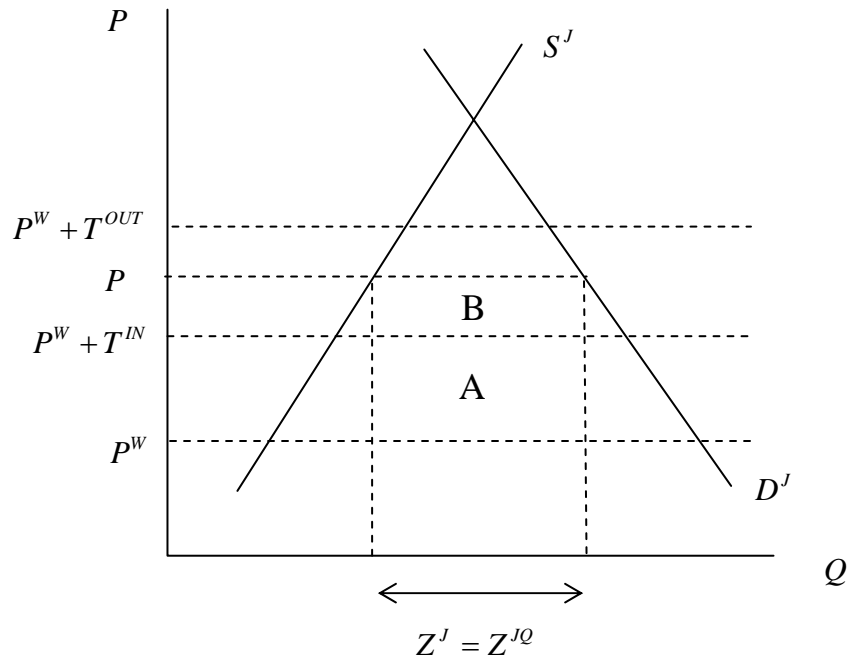
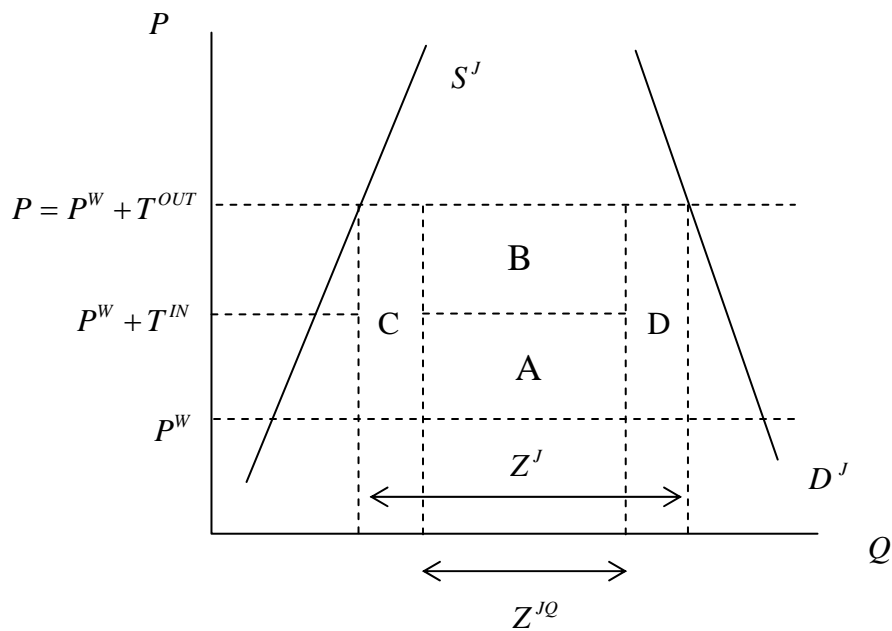


Figure 6.8. Case II of Japan's Tariff Rate Quota on Rice



Case III is presented in Figure 6.9. Here the level of rice imports exceeds the quota amount. Therefore, the domestic price P is determined by the higher tariff value. The total tariff revenue collected by the government is composed of three areas. Area A represents the tariff revenue collected on the imports that are within quota. Areas C and D represent the additional tariff revenue collected on the imports that are above quota. In addition, as in Case II, there are quota rents on the quota amount equal to area B.

Figure 6.9. Case III of Japan's Tariff Rate Quota on Rice



Readers of this appendix will no doubt get the impression that the analysis of tariff rate quotas is a bit complicated. Unfortunately, it is simply a reality of the modern world trading system and requires some patience and persistence on the part of the student or professional. The world is a complex place, and our analysis of it often needs to be complex as well.