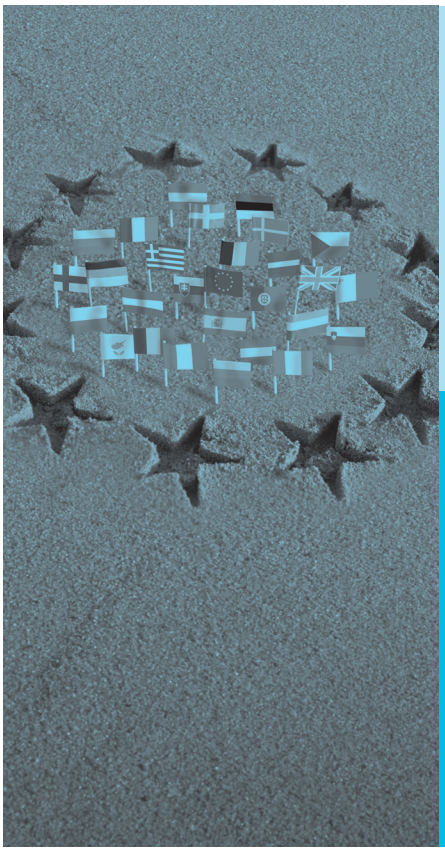
# PART II

# The microeconomics of economic integration



Chapter 4

# Essential microeconomic tools

*Everything should be made as simple as possible, but not simpler.*

Albert Einstein

## Chapter contents



## Introduction

This chapter presents the tools that we shall need when we begin our study of European economic integration in the next chapter. The tools are simple because we make a series of assumptions that greatly reduce the complexity of economic interactions. The primary simplification in this chapter concerns the behaviour of firms. In particular, all firms are assumed to be

'perfectly competitive', i.e. we assume that firms take as given the prices they observe in the market. Firms, in other words, believe that they have no impact on prices and that they could sell as much as they want at the market price. A good way of thinking about this assumption is to view each firm as so small that it believes that its choice of output has no impact on market prices.

This is obviously a very rough approximation since even medium-sized firms – the Danish producer of Lego toys or the Dutch brewer of Heineken, for example – realize that the amount they can sell is related to the price they charge. The second key simplification concerns technology, in particular scale economies. Scale economies refer to the way that average cost falls as the firm produces at higher scales of production. Almost every industry is subject to some sort of falling average cost, so considering them (in Chapter 6) will be important, but a great deal of simplification can be gained by ignoring them. This simplification, in turn, allows us to master the essentials before adding in more complexity in subsequent chapters.

## 4.1 Preliminaries I: supply and demand diagrams

To assess the economics of European integration it proves convenient to have a simple yet flexible diagram with which to determine the price and volume of imports, as well as the level of domestic consumption and production. The diagram we use – the 'import supply and import demand diagram' – is based on straightforward supply and demand analysis. But to begin from the beginning, we quickly review where demand and supply curves come from. Note that this section assumes that readers have had some exposure to supply and demand analysis; our treatment is intended as a review rather than an introduction. Readers who find it too brief should consult an introductory economics textbook such as Mankiw (2007).

Those readers with a good background in microeconomics may want to skip this section, moving straight on to the import demand and supply reasoning introduced in Section 4.2.

### 4.1.1 Demand curves and marginal utility

A demand curve shows how much consumers would buy of a particular good at any particular price. Since we assume that consumers' behaviour is driven by a desire to spend their money in a way that maximizes their material well-being, it is clear that the demand curve is based on a kind of optimization exercise. To see this, the left-hand panel of Fig. 4.1 plots the 'marginal utility' curve for a typical consumer, i.e. the 'happiness' (measured in euros) that a consumer gets from consuming one more unit of the good under study. If we are considering the demand for music CDs, the marginal utility curve shows how much extra joy a consumer gets from having one more CD. Typically the extra joy from an extra CD will depend upon how many CDs the consumer buys per year. For example, if the consumer buys very few CDs a year, say $c'$ in the diagram, the gain from buying an extra one is likely to be pretty high, for example $mu'$ in the diagram. If, however, the consumer buys lots of CDs, the gain from one more is likely to be much lower, as shown by the pair, $c''$ and $mu''$.

This marginal utility curve allows us to work out how much the consumer would buy at any given price. Suppose the consumer could buy as many CDs as she likes at the price $p^*$. How many would she buy? If the consumer is wise, and we assume she is, she will buy CDs up to the point where the last one bought is just barely worth the price. In the diagram, this level of

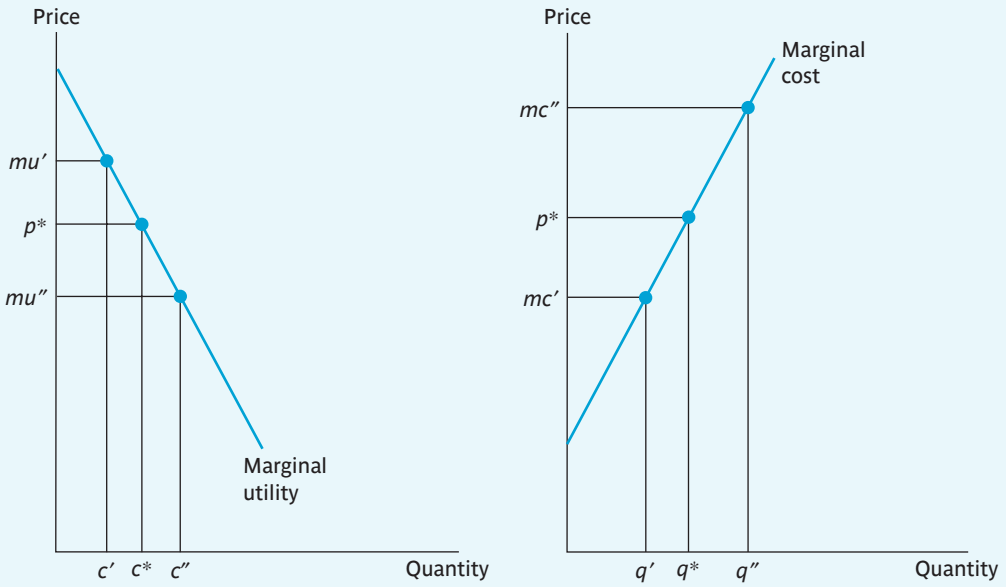



**Figure 4.1 Optimization and demand and supply curves**

purchase is given by $c^*$ since the marginal benefit (utility) from buying an extra CD exceeds the cost of doing so (the price) for all levels of purchase up to $c^*$. At this point, the consumer finds that any further CD would not be worth the price. For example, the marginal utility from buying $c^*$ plus one CD would be below $p^*$. As usual, one gets the market demand for CDs by adding all consumers' individual marginal utility curves horizontally (e.g. if the price is $p^*$ and there are 12 000 identical consumers, market demand will be 12 000 times $c^*$).

A key point to retain from this is that the price that consumers face reflects the marginal utility of consuming a little more.

## 4.1.2 Supply curves and marginal costs

Derivation of the supply curve follows a similar logic, but here the optimization is done by firms. The right-hand panel of Fig. 4.1 shows the 'marginal cost' curve facing a typical firm (assume they are all identical for the sake of simplicity), i.e. the extra cost involved in making one more unit of the good. While the marginal cost of production in the real world often declines with the scale of production, allowing for this involves consideration of scale economies and these, in turn, introduce a whole range of complicating factors that would merely clutter the analysis at this stage. To keep it simple, we assume that firms are operating at a point where the marginal cost is upward sloped, i.e. that the cost of producing an extra unit rises as the total number of units produced rises. The curve in the diagram shows, for example, that it costs $mc'$ to produce one more unit when the production level (e.g. the number of CDs produced per year) is $q'$. This is less than the cost, $mc''$, of producing an extra unit when the firm is producing $q''$ units per year.

Using this curve we can determine the firm's supply behaviour. Presuming that the firm wants to maximize profit, the firm will supply the number of goods where the marginal cost just equals the price. For example, if the price is $p^*$, the firm will want to supply $q^*$ units. Why? If the firm offered one less than $q^*$ units, it would be missing out on some profit. After all, at that level of output, the price the firm would receive for the good, $p^*$, exceeds the marginal cost of producing it. Likewise, the firm would not want to supply any more than $q^*$ since, for such a level of output, the marginal cost of producing an extra unit is more than the price. Again, we get the aggregate supply curve by adding all the firms' individual marginal cost curves horizontally.

A key point here is that under perfect competition, the price facing producers reflects the marginal production cost, i.e. the cost of producing one more unit than the firm produces in equilibrium.

### 4.1.3 Welfare analysis: consumer and producer surplus

Since the demand curve is based on consumers' evaluation of the happiness they get from consuming a good and the supply curve is based on firms' evaluation of the cost of producing it, the curves can be used to show how consumers and firms are affected by changes in the price. The tools we use, 'consumer surplus' and 'producer surplus', are described below.

Consumers buy up to the point where the marginal utility from the last unit bought just equals the price. For all the other units bought, the marginal utility exceeds the price, so the consumer gets what is known as 'consumer surplus' from buying $c^*$ units at price $p^*$ (see Fig. 4.2). How much? For the first unit bought, the marginal unit was $mu'$ but the price paid was only $p^*$, so the surplus is the area shown by the rectangle a. For the second unit, the marginal utility

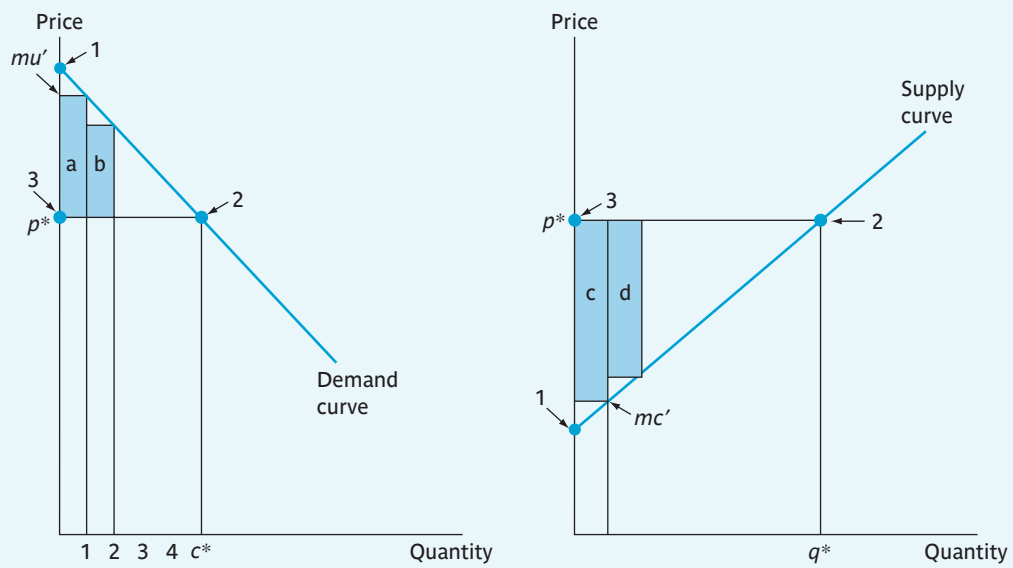



**Figure 4.2** **Deriving consumer and producer surplus**

was somewhat lower (not shown in the diagram), so the surplus is lower, specifically it is given by the area b. Doing the same for all units shows that buying $c^*$ units at $p^*$ yields a total consumer surplus equal to the sum of all the resulting rectangles. If we take the units to be very finely defined, the triangle defined by the points 1, 2 and 3 gives us the total consumer surplus.

An analogous line of reasoning shows us that the triangle formed by the points 1, 2 and 3 in the right-hand panel gives us a measure of the gain firms get from being able to sell $q^*$ units at a price of $p^*$. Consider the first unit sold. The marginal cost of producing this unit was $mc'$ but this was sold for $p^*$ so the firm earns a surplus, what we call the 'producer surplus', equal to the rectangle c in the right-hand panel. Doing the same exercise for each unit sold shows that the total producer surplus is equal to the triangle defined by the points 1, 2 and 3.

If the price changes, the size of the two triangles (consumer surplus and producer surplus) changes. By drawing similar diagrams, you should be able to convince yourself that a price rise increases producer surplus and decreases consumer surplus.

## 4.2 Preliminaries II: introduction to open-economy supply and demand analysis

This section introduces the 'workhorse' diagram in our study of the essential microeconomics of European economic integration – the open-economy supply and demand analysis. Readers who have had a good course in international trade may consider skipping this section and moving straight on to the tariff analysis in Section 4.3. The diagram, however, is used throughout this chapter and the next, so even advanced students may wish to briefly review the diagram's foundations; if nothing else, such a review will help with the terminology.

### 4.2.1 The import demand curve

We first look at where the import demand curve comes from; Fig. 4.3 facilitates the analysis.

The left-hand panel of the diagram depicts a nation's supply and demand curves. If imports were banned for some reason, the nation would only be able to consume as much as it produced. The normal market interactions would result in a market price of $P^*$ since this is the price where the amount that consumers are willing to buy just matches the amount firms want to produce. Plainly, import demand is zero at $P^*$ (for simplicity, we assume that imported and domestic goods are perfect substitutes). This zero-import point is marked in the right-hand panel as point 1.

How much would the nation import if the price were lower, say $P'$? The first thing to note is that the import price will fix the domestic price. Since consumers can always import the goods at $P'$, no consumer would pay more than $P'$ for the good. Likewise, there is no reason for domestic firms to charge anything less than $P'$, so $P'$ becomes the domestic price. At price $P'$, consumption demand would be $C'$ and domestic production would be $Z'$. Since consumers want to buy more of the good at $P'$ than domestic firms are willing to produce, the excess demand would be met by imports. That is to say, imports would be the difference between $C'$ and $Z'$ (in symbols, $M' = C' - Z'$).

What this tells us is that import demand at $P'$ is $M'$. This point is marked in the right-hand panel of the diagram as point 3. Performing the same exercise for $P''$ yields point 2, and doing

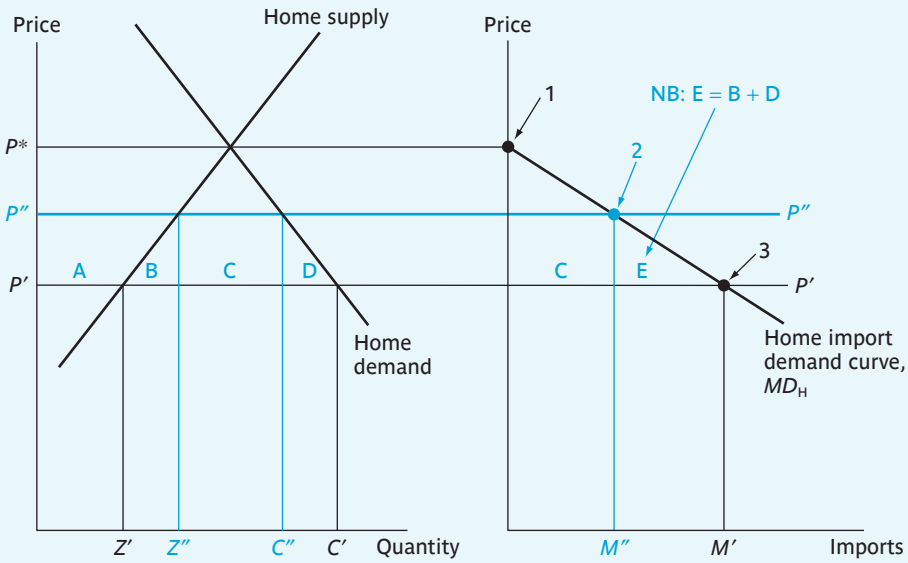



**Figure 4.3 Deriving the import demand curve and welfare changes**

*Note:* Readers who find these diagrams complicated may benefit from the step-by-step explanations available in the interactive PowerPoint presentation available on the companion website.

the same for every possible import price yields the import demand curve, i.e. the amount of imports that the nation wants at any given price of imports. The resulting curve is shown as $MD_H$ in the right-hand panel. (For convenience, we often call the nation under study the 'Home' country to distinguish it from its trade partners, what we call the 'Foreign' nations.)

### *Welfare analysis: MD curves as the marginal benefit of imports*

Welfare analysis is simple with this import demand curve. Consider a rise in the import price (i.e. the price faced by Home consumers and producers) from $P'$ to $P''$. The corresponding equilibrium level of imports drops to $M''$, since consumption drops to $C''$ and production rises to $Z''$. The welfare analysis employed in the left-hand panel involves the notions of consumer and producer surpluses (see Section 4.1 for a review of these concepts). Specifically, the price rise from $P'$ to $P''$ lowers consumer surplus by A + B + C + D. The same price rise increases producer surplus by A. The right-hand panel shows how this appears in the import demand diagram. From the left-hand panel, the import price rise means a net loss to the country of B + C + D, since the area A cancels out (area A is a gain to Home producers and loss to Home consumers). In the right-hand panel, these changes are shown as area C and E, where area E equals area B + D.

### *A powerful perspective: trade volume effects and border price effects*

It proves insightful to realize that the $MD_H$ curve shows the marginal benefit of imports to Home. Before explaining why this is true, we show that it is a useful insight. Direct reasoning

showed that Home loses areas C and E from a border price rise from $P'$ to $P''$. Area C is easy to understand. After the price rise, Home pays more for the units it imported at the old price. Area C is the size of this loss. (Say the price rise was €1.2 per unit and $M''$ was 100; the loss would be €1.2 times 100; geometrically, this is the area C since a rectangle's area is its height times its base.) Understanding area E is where the insight comes in handy. Home reduces its imports at the new price and area E measures how much it loses from the drop in imports. The marginal value of the first lost unit of import is the height of the $MD_H$ curve at $M''$, but Home had to pay $P'$ for it, so the net loss is the gap between $P'$ and the $MD_H$ curve. If we add up the gaps for all the extra units imported, we get the area E. The jargon terms for these areas are the 'border price effect' (area C) and the 'import volume effect' (area E).

To understand why $MD_H$ is the marginal benefit of imports we use three facts and one bit of logic: (i) the $MD_H$ curve is the difference between the domestic demand curve and the domestic supply curve; (ii) the domestic supply curve is the domestic marginal cost curve, and the domestic demand curve is the domestic marginal utility curve (see Section 4.1 if these points are unfamiliar); and (iii) the difference between domestic marginal utility of consumption and domestic marginal cost of production is the net gain to the nation of producing and consuming one more unit. The logical point is that an extra unit of imports leads to some combination of higher consumption and lower domestic production, and this leads to some combination of higher utility and lower costs; the height of the $MD_H$ curve tells us what that combination is. Or, to put it differently, the nation imports up to the point where the marginal gain from doing so equals the marginal cost. Since the border price is the marginal cost, the border price is also an indication of the marginal benefit of imports.

To see these points in more detail, see the interactive PowerPoint presentations available for free on http://hei.unige.ch/~baldwin/PapersBooks/BW/BW.html.

### 4.2.2 The export supply curve

Figure 4.4 uses an analogous line of reasoning to derive the import supply schedule. The first thing to keep in mind is that the supply of imports to Home is the supply of exports from foreigners. For simplicity's sake, suppose that there is only one foreign country (simply called 'Foreign' hereafter) and its supply and demand curves look like the left-hand panel of the figure. (Note that the areas in Fig. 4.4 are unrelated to the areas in Fig. 4.3.)

As with the import demand curve, we start by asking how much Foreign would export for a particular price. For example, how much would it export, if the price of its exports was $P'$? At price $P'$, Foreign firms would produce $Z'$ and Foreign consumers would buy $C'$. The excess production, equal to $X' = Z' - C'$, would be exported. The fact that Foreign would like to export $X'$ when the export price is $P'$ is shown in the right-hand panel at point 2. As the price for Foreign exports (i.e. the Home's import price) rose, Foreign would be willing to supply a higher level of exports for two reasons. The higher price would induce Foreign firms to produce more and Foreign consumers to buy less. (Note that as in the case of import demand, the export price sets the price in Foreign; Foreign firms have no reason to sell for less since they can always export, and competition among Foreign suppliers would prevent any of them from charging Foreign consumers a higher price.) For example, the price $P''$ would bring forth an import supply equal to $X''$ (this equals $Z'' - C''$); this is shown as point 3 in the right-hand panel. At price $P^*$, exports

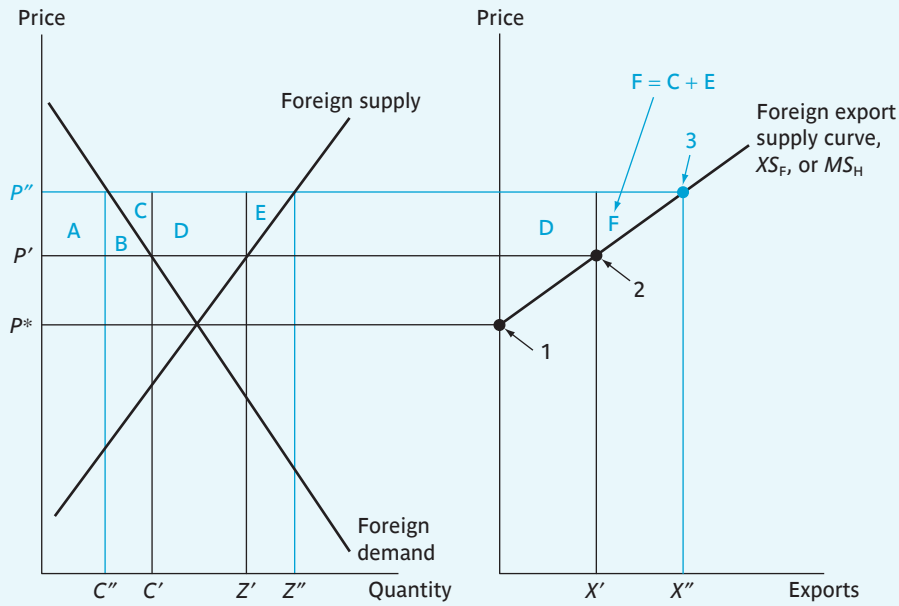



**Figure 4.4** **Deriving the export supply curve and welfare changes**

are zero. Plotting all such combinations in the right-hand panel produces the export supply curve $XS_F$. We stress again the simple but critical point that the Foreign export supply is the Home import supply, thus we also label $XS_F$ as $MS_H$.

### *Welfare*

The left-hand panel also shows how price changes translate into Foreign welfare changes. If the export price rises from *P′* to *P″*, consumers in the exporting country lose by A + B (these letters are not related to those in the previous figure), but the Foreign firms gain producer surplus equal to A + B + C + D + E. The net gain is therefore C + D + E. Using the export supply curve $XS_F$, we can show the same net welfare change in the right-hand panel as the area D plus F. Note that the insight from the $MD_H$ curve extends to the $XS_F$ curve, i.e. the $XS_F$ curve gives the marginal benefit to Foreign of exporting.

This review of import supply and demand was very rapid – probably too rapid for students who have never used such diagrams and probably too long for students who have. For those who find themselves in the first category, there are interactive PowerPoint presentations available on http://hei.unige.ch/~baldwin/PapersBooks/BW/BW.html.

## 4.2.3 The workhorse diagram: *MD–MS*

The big payoff from having an import supply curve and an import demand curve is that it permits us to find the equilibrium price and quantity of imports. The equilibrium price is found

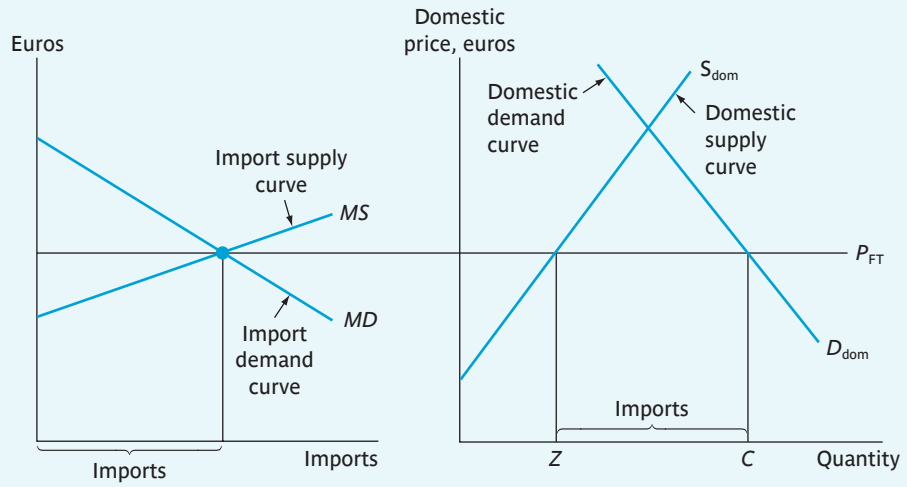



**Figure 4.5** **The *MD–MS* and open-economy supply and demand diagrams**

by putting together import demand and supply as shown in the left-hand panel of Fig. 4.5; we drop the 'H' and 'F' subscripts for convenience.

Assuming imports and domestic production are perfect substitutes, the domestic price is set at the point where the demand and supply of imports meet, namely $P_{FT}$ (FT stands for free trade). While the import supply and demand diagram, or *MD–MS* diagram for short, is handy for determining the price and volume of imports, it does not permit us to see the impact of price changes on domestic consumers and firms separately. This is where the right-hand panel becomes useful. In particular, we know that the market clears only when the price is $P_{FT}$, so we know that Home production equals $Z$ and Home consumption equals $C$. The equilibrium level of imports may be read off either panel. In the left-hand panel, it is shown directly; in the right-hand one, it is the difference between domestic consumption and production.

Having explained these basic microeconomic tools, we turn now to using them to study a simple but common real-world problem – the effects of a tax change on imports from all nations.

## 4.3 MFN tariff analysis

The principle of progressive complexity leads us to take a detour in our drive towards the analysis of preferential trade liberalization in Europe. To introduce the basic method of analysis and gain experience in using the diagrams, we first study the impact of removing the simplest type of trade barrier – a tariff. Although discriminatory liberalization is what happened in Europe, we first look at the non-discriminatory case since it is less complex. For historical reasons, a non-discriminatory tariff is called a 'most favoured nation' tariff, which provides the handy abbreviation, MFN. We also note that all European nations have undertaken substantial MFN tariff liberalizations in the context of WTO trade negotiations, such as the Uruguay Round, so the analysis has many real-world applications.

## 4.3.1 Price and quantity effects of a tariff

The first step is to determine how a tariff changes prices and quantities. To be concrete, suppose that the tariff imposed equals $T$ euros per unit.

The first step in finding the post-tariff price is to work out how the tariff changes the *MD–MS* diagram and here Fig. 4.6 facilitates the analysis. (See Section 4.2 if you are unfamiliar with the *MD–MS* diagram.) The right panel of Fig. 4.6 shows the pre-tariff import demand and import supply curves as *MD* and *MS*, respectively. The left-hand panel shows the foreign export supply curve as *XS*. Note that the vertical axis in this right-hand panel shows the domestic price, while the vertical axis in the left-hand panel shows the border price – the difference between the two is simple, but critical (see the note to Fig. 4.6).

### *A tariff shifts up the MS curve*

Imposition of a tariff has no effect on the *MD* curve in the right-hand panel since the *MD* curve tells us how much Home would like to import at any given domestic price. By contrast, imposing a tariff on imports shifts up the *MS* curve by $T$. The reason is uncomplicated. After the tariff is imposed, the domestic price must be higher by $T$ to get Foreign to offer the same quantity as it offered before the tariff. Consider an example. How much would Foreign supply before the

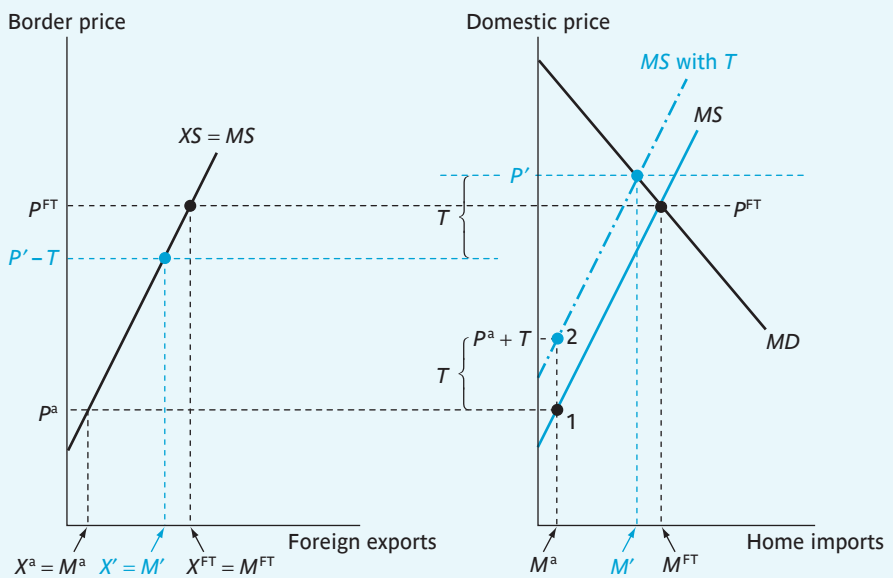



**Figure 4.6 Price and quantity effects of an MFN tariff**

*Note:* Observe the distinction between the domestic and border prices. The domestic price is the price that domestic consumers pay for the good. The border price is the price foreign producers receive when they sell the good to Home. Why can they differ? Because of the tariff (a tariff is nothing more than a tax on imports). When you buy a coffee at a café for, say, €1, the café owner does not get the full €1 because the owner has to pay a tax, called the VAT, on your purchase. As a result, the price that the café owner receives is only 80 cents (the VAT is 20 per cent in this example) even though you pay 100 cents. In exactly the same way, foreigners receive a price (the border price) that equals the domestic price minus the tariff.

tariff, if the Home domestic price before the tariff were $P^a$? The answer, which is given by point 1 on the *MS* curve, is $M_a$. After the tariff, we get a different answer. To get Foreign to offer $M_a$ after the tariff, the domestic price must be $P^a + T$ so that Foreign sees a border price of $P^a$.

So far we see that the tariff shifts up the *MS* curve. Now we consider the impact on equilibrium prices and quantities.

### *The new equilibrium prices and quantities*

Even without a diagram, readers would surely realize that a tariff raises the domestic price and lowers imports. After all, a tariff is a tax on imports and it is intuitively obvious that putting a tax on imports will raise prices somewhat and lower imports somewhat. Why do we need a diagram? The diagram helps us be more specific about this intuition; this specificity allows us to work out how much the nations gain or lose from the tariff. As we shall see, this tells us a great deal about the political economy of trade protection. Returning to our analysis, note that after the tariff, the old import supply curve is no longer valid. The new import supply curve, labelled *MS with T*, is what matters and the equilibrium price is set at the point where the new import supply curve and the import demand curve cross. As intuition would have it, the new price – marked $P'$ in the diagram – is higher than the pre-tariff price $P_{FT}$ (as already noted, FT stands for free trade). Because of the higher domestic price, Home imports are reduced to $M'$ from $M_{FT}$. To summarize, there are five price and quantity effects of the tariff:

1. The price facing Home firms and consumers (domestic price) rises to $P'$.
2. The border price (i.e. the price Home pays for imports) falls to $P' - T$; this also means that the price received by Foreigners falls to $P' - T$.
3. The Home import volume falls to $M'$.

The other two effects cannot be seen in the diagram, but are intuitively obvious and could be illustrated explicitly if we included another panel in Fig. 4.6 that resembled the right-hand panel in Fig. 4.5 (this is done explicitly in Box 4.1):

4. Home production rises since Home firms receive a higher price (they see the domestic price since they do not pay the tariffs).
5. Home consumption falls in response to the higher domestic price.

There are also production and consumption effects of the tariff inside the exporting nation. Since the border price falls, Foreign production drops and Foreign consumption rises. We could see this explicitly if we put a diagram like the left-hand panel of Fig. 4.4 to the left of the diagram in Fig. 4.6.

## 4.3.2 Welfare effects of a tariff

Having worked out the price and quantity effects, it is simple to calculate the welfare effects of the tariffs, that is to say, who wins, who loses and by how much.

Recall that the *MD* curve comes from optimization by Home consumers and producers, while the *XS* = *MS* curve reflects optimization by Foreign consumers and producers. What this means is that we can evaluate the Home welfare effects of the price and quantity changes using only the *MD* curve, and the Foreign welfare effects using only the *XS* = *MS* curve, as shown by Fig. 4.7.

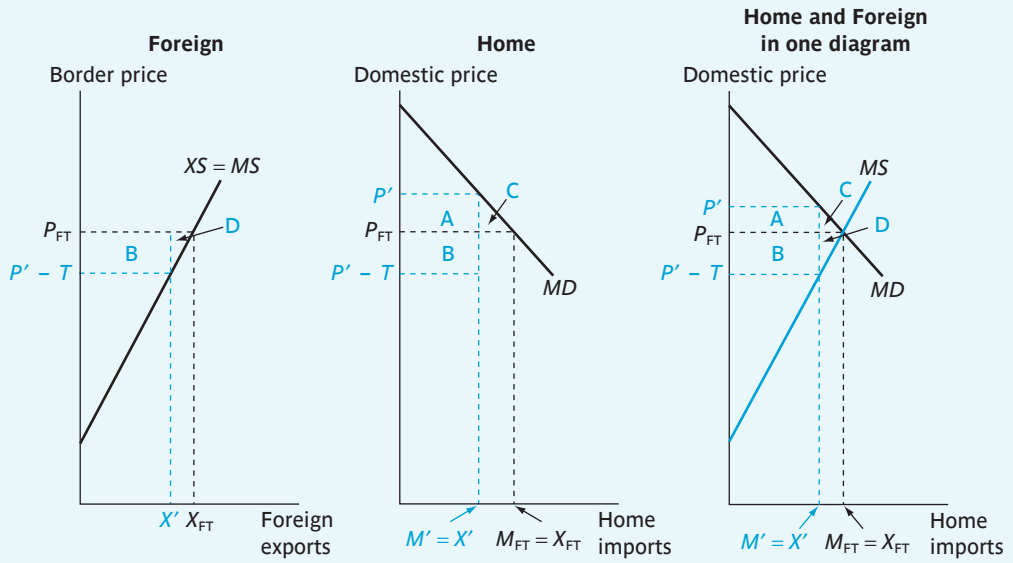



**Figure 4.7** **Welfare effects of an MFN tariff**

We start with the Foreign welfare impact since it is easier. At an intuitive level, we should expect the tariff to harm Foreigners since it means they get a lower price (the border price drops) and they export less. Using the diagram we can quantify these losses. The welfare impact is shown by the areas B and D in the leftmost panel. The area B represents the direct loss from the lower price and D represents the loss from the lower level of sales. As usual, these are the trade price effect (area B) and the trade volume effect (area D).

The diagram also shows the impact of the price change on the welfare of Home residents. Intuitively, it should be clear that Home consumers will lose from the higher domestic price and Home firms will gain from the same, but that the losers will lose more than the gainers will gain since Home consumption exceeds Home production. The diagram allows us to be more precise about these welfare effects.

As we showed in Section 4.1, the loss in the 'private surplus' (i.e. the sum of the changes in consumer surplus and producer surplus) from the price rise from $P_{FT}$ to $P'$ is given by the area A + C in the middle panel. Since a tariff is a tax, the last thing to consider is the impact on Home government revenue. Since Home collects tariff revenue equal to the tariff times the number of units imported, this gain equals the area A + B in the middle panel of Fig. 4.7. Adding up the change in private surplus (minus A and minus C) and the gain in revenue (plus A plus B), the net effect is the area C minus the area B, which we write as C – B for short.

### *A useful condensation*

The first time one works through these welfare calculations, it is useful to separate the Home and Foreign effects using separate diagrams (the left and middle panels in Fig. 4.7). This separation emphasizes the fact that Foreign welfare effect can be derived from the price and quantity

changes using only the *XS* curve, and, similarly, the Home welfare effect can be derived from the price and quantity effects using only the *MD* curve. Yet, once one is familiar with the underpinnings of the areas A, B, C and D, it is convenient to condense the analysis into a single diagram, like the right-hand panel in Fig. 4.7.

## Box 4.1 Home and foreign welfare effects: distributional consequences

The analysis in Fig. 4.7 focused on the overall welfare impact on Home and Foreign. It did not allow us to see the distributional effects of the tariffs, i.e. the impact of the tariff on different groups within Home. Since the politics of an import tariff often depend heavily on the tariff's distributional impact, it is handy to have a diagram where we can see the distributional effects and the overall effects. Figure 4.8, which is based on the open-economic supply and demand diagram, is the diagram that serves this purpose.

In both panels of the diagram, the tariff-induced changes in prices and quantities are shown. As noted in the text, the overall private surplus change – that is, the loss to Home consumers minus the gain to Home producers – is minus the areas A and C in the left-hand panel. The right-hand panel allows us to see the producer and consumer surplus components separately. The loss to consumers from the price rise (from $P_{FT}$ to $P'$) is minus the areas $E + C_1 + A + C_2$. The gain to Home producers is the area E. Note that the area C in the left-hand panel equals the sum of the two triangles, $C_1 + C_2$, in the right-hand panel. The gain in government revenue from the tax on imports is just equal to the areas A and B.

The gain to producers is, of course, the usual reason that governments impose a tariff – they want to help domestic producers. Despite the fact that this harms domestic consumers, governments often find tariffs to be politically attractive since domestic producers are often better organized politically than are domestic consumers.

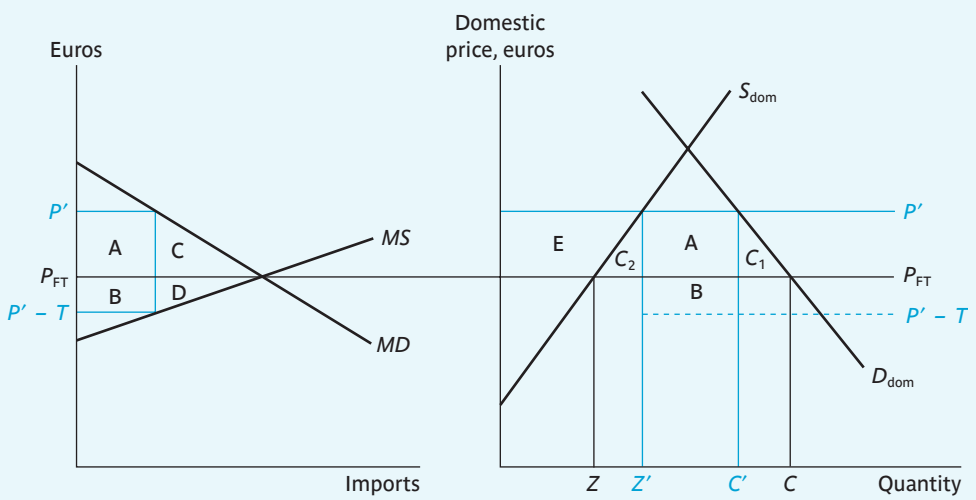



**Figure 4.8** **Distributional and over welfare effects of an MFN tariff**

To summarize, using either the two-panel analysis or the condensed analysis, we find:

- ★ The tariff reduces Foreign welfare since it means they sell less and receive a lower price. The loss in welfare, measured in euros, equals area B plus area D.
- ★ The tariff creates private-sector winners and losers (Home firms gain, Home consumers lose), but the losers (consumers) lose more than gainers (firms) gain; the net impact is –A – C.
- ★ Home collects tariff revenue equal to A + B.
- ★ The overall Home welfare change, including both revenue and the net private loss, is B – C.
- ★ The net effect, B – C, may be positive or negative; the relative sizes of B and C depend upon the slopes of the *MD* and *MS* curves and on the size of *T*.
- ★ The global impact of the tariff, adding Home and Foreign welfare changes together, is definitely negative and equal to the area –C – D.

Before moving on, note that, as in Section 4.1, we can trace through the distributional effects of the welfare changes, e.g. the loss to Home consumers and the gains to Home firms, using a diagram that resembles the right-hand panel in Fig. 4.5. This is done in Box 4.1.

### 4.3.3 Tariffs as a way of taxing foreigners

The result that a tariff might make the Home country better or worse off is worth looking at from a different angle. The two parts of Home's net welfare impact, namely B – C, represent very different kinds of changes.

- ★ The area B is the 'trade price effect', i.e. the gain from paying less for imports. We can also think of it as the amount of the new tariff revenue that is borne by foreigners. This statement requires some explaining. In the real world, the importing firm pays the whole tariff, so one might think that the importing firm bears the full burden of the import tax. This would be wrong. Part of the burden is passed on to Home residents via higher prices. How much? Well pre-tariff, the domestic price was $P_{FT}$ and post-tariff it is $P'$, so the difference shows how much of the tariff is passed on to Home residents. Since this price hike applies to a level of imports equal to $M'$, we can say that the share of the tariff revenue borne by Home residents is area A. Using the same logic, we see that some of the tariff burden is also passed back to Foreign suppliers. The before-versus-after border price gap is $P_{FT}$ minus $(P' - T)$ and this applies to $M'$ units of imports. So area B is a measure of how much of the tariff revenue is borne by foreigners.
- ★ Area C is the 'trade volume effect', i.e. the impact of lowering imports. Here is the argument. The *MD* curve shows the marginal benefit to Home of importing each unit (see Section 4.2 if this reasoning is unfamiliar to you). Given this, the gap between the *MD* curve and $P_{FT}$ gives us a measure of how much Home loses for each unit it ceases to import. The area of the triangle C is just all the gaps summed from $M'$ to $M_{FT}$.

To put it differently, area B represents Home's gain from taxing foreigners while area C represents an efficiency loss from the tariff.

Given all this, we can say that if *T* raises Home welfare, then it does so only because the tariff allows the Home government to indirectly tax foreigners enough to offset the tariff's

inefficiency effects on the Home economy. That is, *T* causes economic inefficiency at Home but *T* is also a way of exploiting foreigners. Since the exploitation gains may outweigh the inefficiency effects, Home may gain from imposing a tariff.

### 4.3.4 Global welfare effects and retaliation

The global welfare impact is simply a matter of summing up effects and it turns out to be negative. The net Home welfare effect is B – C. For foreign, it is –B – D. The global welfare change is thus a loss, namely –C – D.

Put in this way, the gains from a tariff are clearly suspect. For example, if Home and Foreign were symmetric and both imposed tariffs, both would lose the efficiency triangle C and the gain to Home of B on imports would be lost to Home on its exports to Foreign. Home would also lose the deadweight triangle D on exports, so the net loss to each of the symmetric nations would be –C – D. In short, protection by all nations is worse than a zero-sum game. It is exactly this point that underpins the economics of WTO tariff-cutting negotiations. If only one nation liberalizes, it might lose. If, however, the nation's liberalization is coordinated with its trading partners' liberalization, the zero-sum aspect tends to disappear.

## 4.4 Types of protection: an economic classification

Tariffs are only one of many types of import barriers that European integration has removed. The first phase of EU integration, 1958–68, focused on tariff removal, but the Single Market Programme that was started in 1986 focused on a much wider range of 'non-tariff barriers'.

While there are several methods of categorizing such barriers, it proves useful to focus on how the barriers affect so-called trade rents. A tariff, for instance, drives a wedge between the Home price and the border price (i.e. the price paid to foreigners). This allows someone (in the tariff case it will be the Home government) to indirectly collect the 'profit' from selling at the high domestic price while buying at the low border price. For historical reasons, economists refer to such profits (area A + B in Fig. 4.9) as 'rents'. When it comes to welfare analysis, we must watch the trade rents closely. For some import barriers, Home residents get the rents, but for others no rents are created, or foreigners get the rents. This distinction is highlighted by distinguishing three categories of trade barriers: domestically captured rent (DCR) barriers; foreign captured rent (FCR) barriers; and 'frictional' barriers.

### 4.4.1 DCR barriers

Tariffs form the classic DCR barrier. Here, the Home government gets the trade rents. From a Home nationwide welfare perspective, however, it does not really matter whether the government, Home firms or Home consumers earn these rents, as long as the rents are captured domestically. What sorts of barriers other than tariffs would lead to domestically captured rents? Some forms of quotas are DCR barriers. A quota is a quantitative limit on the number of goods that can be imported per year. To control the number of foreign goods entering the country, the government hands out a fixed number of import licences and 'collects' one licence per unit imported. The price and quantity effects of a quota that restricts imports to $M'$ in Fig. 4.9 are identical to the effects of a tariff equal to *T*. The point is that, if imports are limited

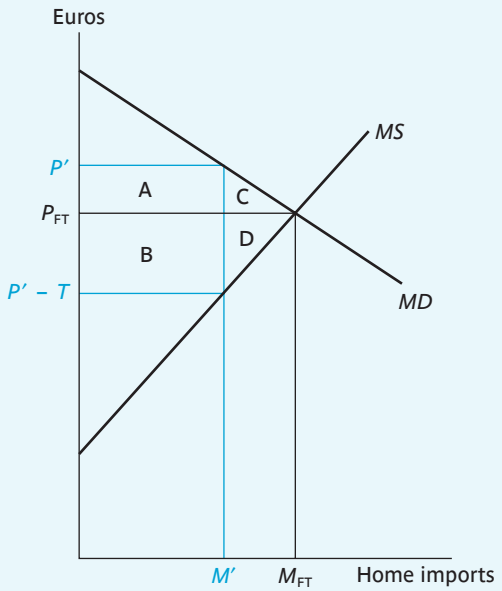



**Figure 4.9** **Home welfare effects of import protection**

to $M'$, then the gap between domestic consumption and production can be no more than $M'$, implying that the domestic price must be driven up to $P'$. Another way to say this is that $T$ is the 'tariff equivalent' of the quota. Now consider the trade rents. With a quota, whoever has the licence can buy the goods at the border price $P' - T$ and resell them in the Home market for $P'$. This earns the licence holders A + B. If the government gives the licences to Home residents, then the quota is a DCR barrier. If it gives them to foreigners, the quota is an FCR barrier.

## 4.4.2 FCR barriers

A prime example of an FCR barrier is a 'price undertaking', a trade barrier that was commonly imposed against imports from central and eastern Europe before the 2004 enlargement. In these cases, the EU strikes an agreement whereby foreign producers agree to sell their goods at a price no lower than an agreed level. For example, if the agreed level were $P'$ from Fig. 4.9, the price undertaking would have the same price and quantity effects as a tariff $T$. Importantly, however, the undertaking allows foreign producers, rather than the Home government, to garner the rents A + B. Throughout the industrialized world, and in the EU in particular, it is very common for trade barriers to be arranged so that foreigners earn the rents. One reason is that trade rents are used as a kind of gift to soothe foreign companies and governments that are likely to be angered by the imposition of a trade barrier.

More recent examples of an FCR barrier are the EU's restrictions on Chinese clothing exports. The European Commission negotiated limits on how fast Chinese exports to the EU could grow. But since it is the Chinese who control the quantity (via export licences), it is the Chinese who get the trade rents. This was done on purpose to appease the Chinese government.

The USA also imposed restraints on Chinese clothing exports but it is the US that controls the quotas, so the quota rents go to US residents. No wonder the Chinese were happier about the way the EU reacted. Note that policy in this area was evolving as this edition went to print; for the latest (click through 'Textile and footwear sector') see http://europa.eu.int/comm/trade/issues/sectoral/index_en.htm.

Finally, note that an FCR barrier harms national welfare more than a DCR barrier. Specifically, the welfare cost of an FCR is always negative, i.e. –A – C, instead of being ambiguous, i.e. B – C. Moreover, the foreign welfare impact is now A – D, so an FCR may end up helping foreigners!

### 4.4.3 Frictional barriers

The main type of trade barrier remaining inside the EU consists of what are sometimes called 'technical barriers to trade' (TBTs). Western European countries often restrict imports by subjecting them to a whole range of policies that increase the real cost of buying foreign goods.

Some examples are excessive bureaucratic 'red-tape' restrictions and industrial standards that discriminate against foreign goods. One of the most famous examples is discussed in Box 4.2.

#### Box 4.2 Cassis de Dijon: a history-making technical barrier to trade

One very common type of frictional barrier concerns health and safety regulations that have the side-effect of hindering trade. Perhaps the most famous of these was a German regulation that forbade the importation of certain low-alcohol spirits, including the sweet French liqueur, Cassis – used in making the famous white wine drink, 'Kir'. This regulation was challenged before the EU's Court of Justice as a barrier to trade. When challenged on this regulation, the German government argued that the prohibition was necessary to protect public health (since weak spirits more easily promote alcohol tolerance) and to protect consumers (since consumers might buy weak spirits, thinking they were strong). In 1979, the Court ruled that the measure was not necessary since widespread availability of low-alcohol drinks (e.g. beer) in Germany made the prohibition ineffective in furthering public health. It also found that putting the alcohol content on the label was sufficient to protect consumers, so the import ban was not necessary for the protection of consumers. This Court ruling resulted in the frictional barrier being removed. More importantly, it established the basic principle known as 'mutual recognition' whereby goods that are lawfully sold in one EU nation shall be presumed to be safe for sale in all EU nations. Exceptions to this principle require explicit motivation. By the way, the formal name for this Court case is 'Rewe-Zentral AG v. Bundesmonopolverwaltung für Branntwein'; no wonder it is called Cassis de Dijon.

Such barriers raise the cost of imports by increasing the difficulty and thereby the cost of selling to the Home market. Nobody gets the rents with such barriers since no rents are created. From the Home perspective, frictional and FCR barriers have identical effects; using the areas in Fig. 4.9, Home loses A + C. From the Foreign perspective, an FCR barrier is superior. Specifically, the Foreign welfare change is A – D for FCR, but –B – D for a frictional barrier.

Since frictional barriers are bad for a nation, one may ask why they are so prevalent. Box 4.3 provides one explanation.

## Box 4.3 Why do frictional barriers arise so often?

Government agencies charged with formulating and enforcing standards are often 'captured' by special-interest groups from the regulated industries. Moreover, the Home firms that are to be subjected to the standards often play an important role in setting the standards. For example, when regulating a highly technical field such as elevators, the government (which probably does not employ many full-time elevator experts) naturally asks the opinions of domestic firms that produce elevators. With an eye to their foreign competitors, they quite naturally push for standards that raise the cost of imported goods more than the cost of locally produced goods.

An example can be found in the paper industry. Sweden and Finland produce paper mainly from new trees, while French and German paper producers use a lot of recycled paper and rags. In the early 1990s, the EU was considering a regulation that would require all paper sold in the EU to contain a certain fraction of recycled paper. This sounds like a 'public interest' regulation. However, it also would have had the effect of eliminating the resource-based advantage of Swedish and Finnish firms, much to the joy of French and German firms. In other words, it would have raised the real cost of imports (since the Nordic producers would have had to switch to less efficient techniques). As it turns out, it is not clear which production method is 'greener'. Recycling paper requires lots of chemicals that may be released into the environment, while setting up more tree farms is, well, green – a point that was not raised by French and German paper producers.

Since Finland and Sweden joined the EU, the regulation was not adopted, but this shows the subtle mixing of public interest and protectionism that inevitably arises when nations adopt regulations and standards. Of course, nations do need health, safety, environmental and industrial standards, so we cannot eliminate frictional barriers by just abolishing all regulation. This is one of the things tackled by the EU's 1992 programme.

One important class of frictional – i.e. cost-creating – barriers involves industrial and health standards that are chosen at least in part to restrict imports. For example, some countries refuse to accept safety tests that are performed in foreign countries, even in highly industrialized nations. This forces importers to retest their products in the local country. Beyond raising the real cost of imported goods, this sort of barrier delays the introduction of new products. While this clearly harms consumers, Home producers may benefit since it may give them time to introduce competing varieties. Another example involves imposing industrial, health, safety or environmental standards that differ from internationally recognized norms. It is often difficult to objectively know whether an unusual regulation or standard represents a valid 'public interest' concern or whether it is just a protectionist device. In fact, both motives are usually behind the adoption of such measures.

Regardless of why such policies are adopted, they have the effect of protecting Home producers or service providers. Home firms design their products with these standards in mind, while foreign firms, for whom the Home market may be relatively unimportant, are unlikely to do so. Bringing imported products into conformity raises the real cost of imports.

For example, all cars sold in Sweden must have wipers for the headlights. While this policy may have some merit as a safety regulation (in the old days Sweden had lots of dusty rural roads), it also has the effect of raising the price of imported cars more than it raises the price of Swedish cars. From the drawing board onwards, all models of Volvos and Saabs – and their

production facilities – are designed with these headlight wipers in mind. For other car makers, take Renault as an example, the Swedish market is far too small to really matter. The design of Renaults and Renault's mass production facilities are not optimized for the installation of headlight wipers. Consequently, while it is expensive to put headlight wipers on both Swedish and French cars, it is much more so for French cars. This gives the Swedish car makers an edge in Sweden. Similar sorts of barriers give the French an edge in their domestic market.

Such barriers are extremely common (Box 4.3 explores why). In fact, the EU initiated the 1992 Single Market Programme with the express intent of eliminating such barriers via the mutual recognition of product standards (with minimum harmonization).

With the MFN case as background, we are ready to turn to the following chapter, namely the analysis of discriminatory trade liberalization of the types undertaken in Europe.

## 4.5 Summary

This chapter presented the essential microeconomic tools for trade policy analysis in the simplified world where we assume there is no imperfect competition and no scale economies. The two most important diagrams are the open-economy supply and demand diagram (right-hand panel of Fig. 4.5), and the *MD–MS* diagram (left-hand panel of Fig. 4.5). The *MD–MS* diagram provides a compact way of working out the impact of import protection on prices, quantities and overall Home and Foreign welfare. The open-economy supply and demand diagram allowed us to consider the distributional impact of import protection, i.e. to separate the overall effect into its component effects on Home consumers, Home producers and Home revenue.

The chapter also discussed types of trade barriers in Europe and classified them according to what happens to the trade 'rents'. Under the first type, DCR barriers, the rents go to domestic residents. For FCR barriers, the rents go to foreigners, and with frictional barriers the rents disappear. European integration consisted primarily of removing DCR barriers up until the mid-1970s. Subsequent goods-market liberalization has focused on frictional barriers.

## Self-assessment questions

1. Using a diagram like Fig. 4.8, show the full Foreign welfare effects of imposing a Home tariff equal to *T*, i.e. show the impact on Foreign producers and Foreign consumers separately.
2. In August 2005, EU clothing retailers such as Sweden's H&M complained about the new EU restrictions on imports from China that were imposed after complaints from EU clothing producers based in Italy, France, Spain, Portugal and Greece. Use a diagram like Fig. 4.8 to explain the positions of the various EU interest groups.
3. One way to think about the slope of the *MS* curve is in terms of the 'size' of the home nation. The idea is that the demand from a very small nation has a very small impact on the world price. For example, Switzerland could probably increase its oil imports by 10 per cent without having any impact on the world oil price. Using a diagram like Fig. 4.7, show that the

welfare costs of imposing an MFN tariff are larger for smaller nations, interpreting this in terms of the *MS* curve's slope. Show that when the *MS* curve is perfectly flat, the welfare effects are unambiguously negative.

4. Using a diagram like Fig. 4.7, show that a country facing an upward-sloped *MS* curve can gain – starting from free trade – from imposing a sufficiently small tariff. (Hint: The rectangle gains and triangle losses both increase in size as the tariff gets bigger, but the rectangle gets bigger faster.) Show that any level of a frictional or FCR barrier lowers Home welfare.
5. Using the results from the previous exercise, consider the impact of Home imposing a tariff on Foreign exports and Foreign retaliating with a tariff on Home's exports. Assume that the *MS* and *MD* curves for both goods (Home exports to Foreign and Foreign exports to Home) are identical. Starting from a situation where Home and Foreign both impose a tariff of $T$, show that both unambiguously gain if both remove their tariffs, but one nation might lose if it removed its tariff unilaterally. By the way, this exercise illustrates why nations that are willing to lower their tariffs in the context of a WTO multilateral trade negotiation are often not willing to remove their tariffs unilaterally.
6. Using a diagram like Fig. 4.5, show that an import tariff equal to $T$ has exactly the same impact on prices, quantities and welfare as a domestic consumption tax equal to $T$ and a domestic production subsidy equal to $T$. (Hint: A production subsidy lowers the effective marginal cost of domestic firms and so lowers the domestic supply curve by $T$.)
7. Using a diagram like Fig. 4.7, show the impact on quantities, prices and welfare when Home has no tariff, but Foreign charges an export tax equal to $T$.
8. Using a diagram like Fig. 4.5, show the impact on quantities, prices and welfare when Home has no tariff, but Foreign imposes an export quota with a tariff-equivalent of $T$.
9. Using a diagram like Fig. 4.7, show that the welfare effects of a quota that restricts imports to $M'$ are exactly the same as a tariff equal to $T$; assume that each quota licence (i.e. the right to import one unit) is sold by the government to the highest bidder.

## Essay questions

1. The concepts of consumer surplus, producer surplus and tariff revenue are meant to capture the key welfare effects of trade policy. Discuss two or three aspects of socio-economic well-being that are not captured by these concepts.
2. The welfare analysis in this chapter assumes that governments weigh one euro of consumer surplus and producer surplus equally. Find an account in a newspaper of a real-world trade policy change and summarize the analysis in the article (the basic facts, the points of view reported, etc.). Does the newspaper article make it seem as if the government cares equally about consumers and producers?
3. Go on to the European Commission's website and find an example of a frictional barrier that the Commission is trying to remove. Explain what the barrier is, how it is justified by Member States and why it was not removed during the 1992 Single Market Programme. One URL to try is: europa.eu.int/comm/internal_market/en/index.htm.

4. Write an essay describing the events that led up to the EU's and USA's imposition of new protection against Chinese clothing exports. Be sure to mention the role of the Uruguay Round agreement on the elimination of the Multifibre Agreement, the surge of exports, the Chinese export tax and reactions of buyers and makers of clothing in the EU and the USA. Use the diagrams developed in this chapter to explain the positions taken by the USA, EU and Chinese governments as well as the positions of EU and US buyers and makers of clothing.

## Further reading: the aficionado's corner

Every undergraduate textbook on international economics has a chapter on tariff analysis that covers the same material as this chapter. One particularly accessible treatment can be found in **Krugman and Obstfeld** (2005). For much more on the economics of trade protection, see **Vousden** (1990).

## Useful websites

The World Bank's website provides extensive research on trade policy analysis. This includes many papers on non-discriminatory trade policy but also a very large section on preferential trade arrangements under the heading of 'regionalism'. See www.worldbank.org.

The Commission's website on trade issues can be found at http://ec.europa.eu/trade/. It has lots of information on the latest EU trade policy changes.

## References

**Krugman, P. and M. Obstfeld** (2005) *International Economics*, 7th edition (or earlier), Harper Collins, New York.

**Mankiw, G.** (2007) *Principles of Economics*, 4th edition (or earlier), South Western Publishing, New York.

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