VOUSDEN

CHAPTER 5

Monopoly

To this point we have assumed that all of the relevant markets are competitive. In this and the following two chapters we shall relax this assumption and turn our attention to cases in which firms possess some market power. Such cases should be of considerable interest to any student of protectionist regimes, many of the more notable examples of protection being industries such as steel, automobiles and electronic goods, in which a small number of firms produce under conditions of economies of scale. Even agricultural trade, apparently closest to the competitive model, is frequently conducted through government marketing boards and international trading companies and is therefore likely to involve some elements of imperfect competition. A further aspect of trade which has received increasing attention in recent years is intra-industry trade associated with product differentiation – such trade is frequently non-competitive. Given the range of cases to be considered, the extent of the recent literature in this area and the undeniable empirical importance of trade and protection in imperfectly competitive industries, we shall spend some time developing and exploring the models. In this chapter we shall deal with the simplest non-competitive market structure: monopoly. This leads naturally into the treatment of oligopoly in Chapter 6. The case of trade in differentiated products is considered in some detail in Chapter 7.

Throughout much of these three chapters we shall be analysing industries which are characterized by significant economies of scale. It can be argued that these are the most likely industries to exhibit non-competitive market structures. Nevertheless, certain insights are obtained by looking at the (frequently simpler) case in which unit costs of production are an increasing function of output. Among other things, this case offers a particularly convenient framework for demonstrating the non-equivalence of tariffs and import quotas (and highlighting the shortcomings of the latter) when the protected sector is non-competitive. In addition, the increasing-costs case may correspond to the actual situation in industries in which the firms form a cartel or when the government superimposes a marketing board on otherwise competitive producers. We shall therefore start with the case of increasing average costs and then move on to consider potentially more interesting situations involving economies of scale. For the bulk of the chapter, we shall be considering an industry in which there is a single domestic producer; however, in Section 5.3 we shift our attention to the

case in which there is no domestic production of the good, and the domestic market is supplied entirely by a foreign monopolist. Throughout the chapter we shall maintain the small-country assumption so as to abstract from terms-of-trade effects of the kind considered in the previous chapter.

5.1. Increasing costs

In this section we consider the case of an industry in which there is a single domestic firm producing under conditions of increasing cost. We begin by considering the effects of tariffs in such an industry and then examine import quotas in the same framework. An important result to emerge from this analysis is that tariffs and quotas differ markedly in their effects in the presence of domestic monopoly. This non-equivalence is a consequence of the greater monopoly power conferred on the producer by a quota.

(a) Tariffs and monopoly

As we shall see later, it is quite possible that an import-competing monopolist may become an exporter if given sufficient tariff protection in the home market. However, because this case is rather more complicated, we rule it out for the time being by assuming that the f.o.b. export price is too low for exporting of the good to be profitable.[1] Both cases are considered in detail by Fishelson and Hillman (1979), and we follow their approach here. The effect of a tariff on the behavior of a monopolist supplying the domestic market in a small country is illustrated in Figure 5.1.

The existence of a domestic monopoly in the good means that for prices between the c.i.f. import price (p_M) and that price plus the tariff ($p_T \equiv p_M + T$ where the tariff is T per unit) the firm faces a downward-sloping demand curve for its product. Thus, in Figure 5.1, the average revenue curve facing the monopolist is $p_T ABD$. DD is the underlying demand curve for the product. If the marginal revenue curve derived from DD is mm, then the marginal revenue curve facing the monopolist is $p_T ACm$. MC is the (assumed upward sloping) marginal cost curve for the good.

Clearly this case differs from the competitive case solely because there is a range of prices (p_M to p_T) in which the monopolist faces the downward-sloping demand curve DD (and the associated marginal revenue curve mm). If there were no tariff, this would collapse to the competitive case with the producer being forced to charge p_M. It is the protection afforded by the tariff which gives the monopoly the prospect of regaining some of the market power it would have in the absence of imports.

Let us now consider what happens as the tariff-inclusive price ($p_M + T$) is gradually increased above p_M by raising the tariff.

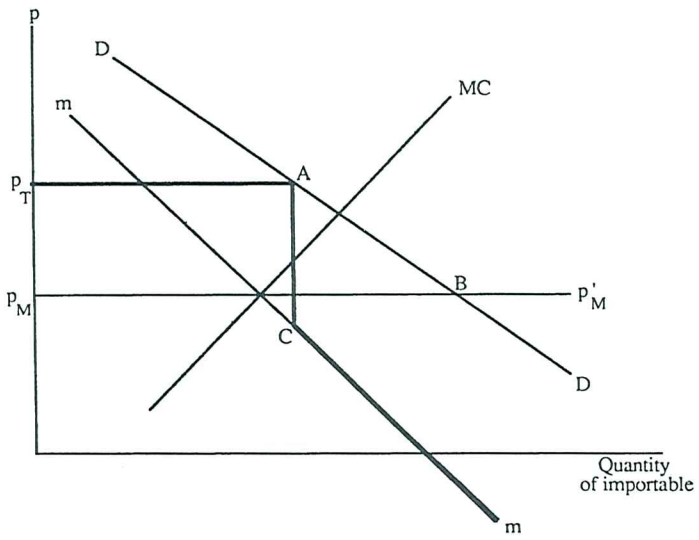

Figure 5.1

In Figure 5.2a, a tariff of $p_M p_T^1$ per unit is imposed. The firm maximizes profits where its MR curve ($p_T^1 ACm$) cuts MC at B. It produces Q_1 and charges p_T^1, consumers demand C_1 and $Q_1 C_1$ is satisfied by imports. This is the same outcome which would occur if the industry were competitive. The tariff-inclusive price is sufficiently low to prevent the producer having any usable monopoly power. This is the case so long as a tariff does not completely prohibit imports (i.e. tariffs up to $p_M p_C$ per unit, where p_C is the competitive autarky price).

When the tariff-inclusive price is increased above p_C (to, say, p_T^2 in Figure 5.2b), the monopoly supplies the whole market, producing at F in Figure 5.2b where the MC curve passes through the vertical discontinuity in its MR curve.[2] It produces Q_2 and charges p_T^2, using all of the protection afforded. In this case the tariff is high enough to prohibit imports (and thus give the producer some market power), but not high enough to remove the threat of imports (which forces the monopoly to produce Q_2 rather than its unconstrained preferred output $\hat{Q}_2$).

Figure 5.2c illustrates the case in which the tariff-inclusive price is p_T^3, above the producer's unconstrained profit-maximizing price $\hat{p}_T$. In this case the MC curve cuts the downward-sloping segment of the MR curve at G, resulting in production of Q_3 and a price of $\hat{p}_T$. $\hat{p}_T p_T^3$ of the tariff is unused or redundant protection (or *water-in-the-tariff*). Since $\hat{p}_T$ is the producer's absolute optimum, it does not pay him to charge a higher price, even if a high tariff offers

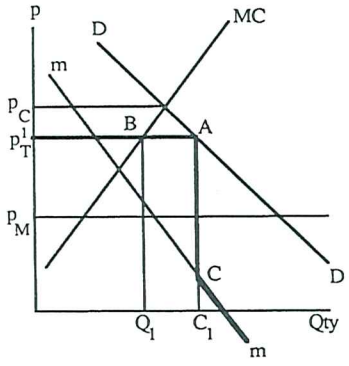

Figure 5.2a

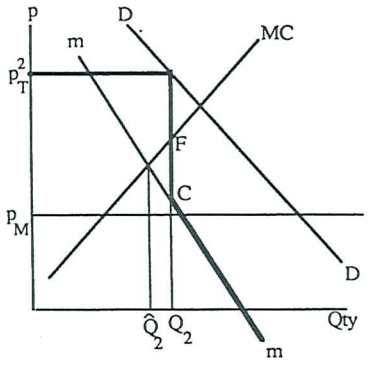

Figure 5.2b

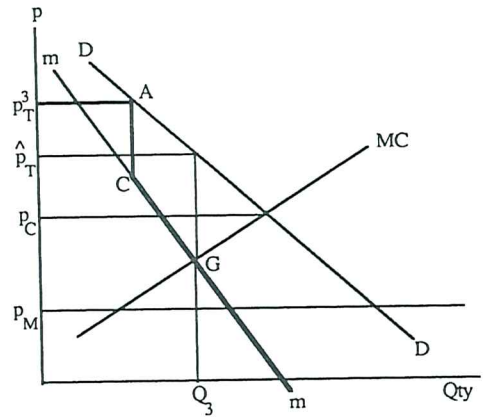

Figure 5.2c

him that possibility. In this case the tariff is sufficiently high to effectively remove any threat from imports so that the monopolist can act as if unconstrained.

We conclude that any tariff above $p_M\hat{p}_T$ per unit is redundant. This contrasts with the case of a competitive industry in which any tariff above p_Mp_C is redundant (because any price above p_C involves an excess supply which could only be disposed of at the f.o.b. export price; accordingly, the price would be driven down to the equilibrium price p_C). The fact that a monopolist is able to use more protection than an equivalent competitive industry is hardly surprising, given a monopolist's natural tendency to restrict output and raise price relative to their competitive levels.

Let us now introduce the possibility of exporting into the model. Let p_E

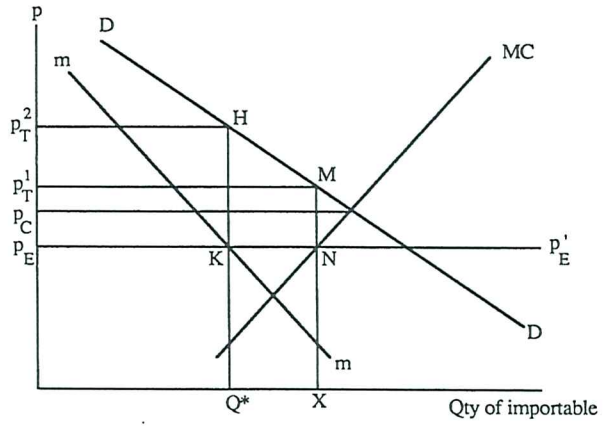

Figure 5.3

denote the f.o.b. export price and assume that it lies above the intersection of the MC curve and *mm* in Figure 5.3 (to keep the diagram simple, p_M is not shown in Figure 5.3, though we shall refer to it in defining the various tariff levels). Given the possibility of earning additional revenue by exporting marginal units at price p_E, the MR curve facing the monopolist will not fall below p_E. He will produce where MR = MC and then act as a two-market monopolist, allocating sales between the markets by equating MR from exporting (p_E) to MR from domestic sales (a curve like p_TACm in Figure 5.1). Tariff-inclusive prices up to p_C (Figure 5.3) yield the competitive outcome with positive imports. For prices between p_C and p_T^1 (MR curve for p_T^1 is $p_T^1MNp'_E$), the monopolist supplies the whole domestic market (producing where the MC curve passes through the vertical discontinuity in the MR curve) and makes full use of the tariff.

For prices between p_T^1 and p_T^2 (MR curve for p_T^2 is $p_T^2HKp'_E$), the MR curve cuts the MC curve on the horizontal p_E segment, so that X is produced. The domestic market is supplied at the tariff-inclusive price (p_E passes through the vertical discontinuity in the domestic MR schedule), the remainder being exported. If the domestic firm were not faced with import competition (but could still export), it would still choose to produce X (where MC = MR = p_E) but would equate p_E to *mm* (at K) to determine domestic sales of Q^* sold at price p_T^2, Q^*X being exported. This is its absolute profit maximum, and it follows that the part of any tariff above $p_Mp_T^2$ is redundant. Note that the maximum usable protection in this case ($p_Mp_T^2$) exceeds the maximum usable protection when exports were excluded. Given the presence of a profitable export market separated from the domestic market by the tariff (and transport costs), the monopolist price-discriminates between markets, with increased opportunity to

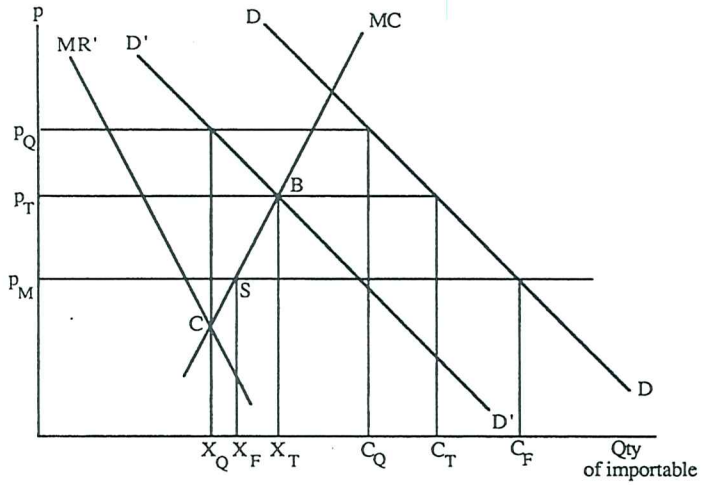

Figure 5.4

restrict sales and raise price in the domestic market (when compared with the no-exports case).

This type of price discrimination has traditionally been described as *dumping* (Viner, 1923); however, there are various other definitions of dumping which do not involve international price discrimination (see, in particular, Ethier, 1982).

(b) *Tariffs versus quotas under monopoly*

In the previous chapter, we saw how tariffs and import quotas would differ in their effects in the presence of changing parameters and rent or revenue seeking. We now consider a different source of non-equivalence of these two policies: monopoly in the protected sector. We begin by considering quotas on their own and then proceed to compare them with tariffs. For simplicity, we assume no exports of the good in question (sufficiently low p_E), though this assumption is in no way crucial to the results.

The basic difference between tariffs and quotas in the presence of monopoly is that a tariff permits a perfectly elastic supply of imports at the world price plus the tariff, whereas a quota renders the supply of imports inelastic at the level prescribed by the quota. Thus monopoly power is limited for all tariffs (except those which are high enough to be redundant), whereas a quota allows the monopolist unrestricted movement along his demand curve (the market demand curve net of imports) so that he is free to set price and output much as he would in a closed economy (Figure 5.4). DD is the total demand for the importable, $D'D'$ is demand net of the quota, and MR′ is the marginal revenue

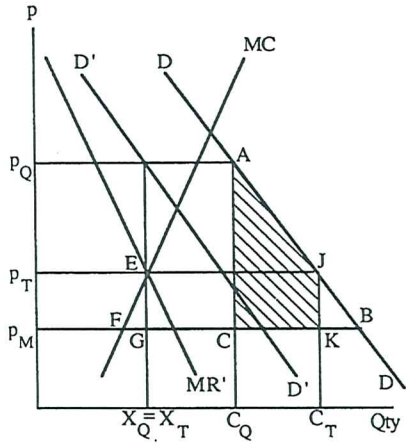

Figure 5.5a

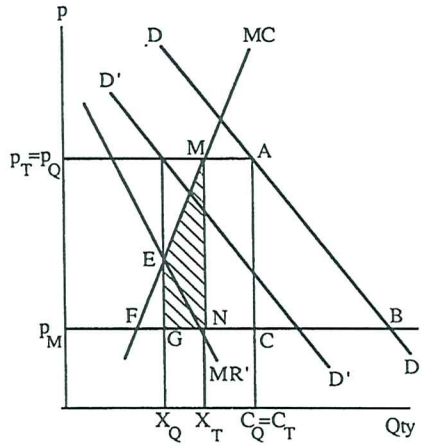

Figure 5.5b

curve derived from $D'D'$. The monopolist maximizes profits where MR′ intersects MC at C with output X_Q, price p_Q and consumption C_Q. As drawn, this involves a lower output than free trade ($X_Q < X_F$), so the quota has been anti-protective. This is because the monopoly power conferred by the quota creates a tendency towards output contraction. In the case drawn in Figure 5.4 this tendency is dominant. On the other hand, MR′ could have intersected MC to the right of the free-trade point (S), in which case the quota would have offered some protection to domestic output. The anti-protective effect is more likely to dominate, the less elastic is the demand curve $D'D'$ faced by the monopolist.

Figure 5.4 also shows the effects of a tariff ($p_M p_T$ per unit) which allows the same level of imports as the quota. The tariff, being non-prohibitive, forces the monopolist to act in the same manner as a competitive industry with a lower price ($p_T < p_Q$) and higher output ($X_T > X_F > X_Q$) than under the quota. We should also note that this "import-equivalent" tariff is less than the implicit tariff (the tariff which yields the same price as the quota, $p_M p_Q$ per unit), and it can be shown to involve a lower deadweight loss than the quota (see McCulloch, 1973). In addition, unlike the quota, the tariff never causes output to fall below the free-trade level. It is thus clear that when the import-competing sector consists of a single producer there is no full equivalence of tariffs and quotas; if we wish to compare the two policies, we must specify the basis for comparison. The simplest such basis is the achievement of some common non-economic objective.

In Figure 5.5a, we compare a tariff and a quota which yield the same output ($X_Q = X_T$) of the monopolist's good. p_T denotes the tariff-inclusive price. The quota involves a higher price (p_Q) and lower consumption of the good ($C_Q < C_T$) than

the tariff; this is no more than a reflection of the firm's increased monopoly power under the quota. The deadweight loss areas under the two policies are as follows:

DWL of tariff relative to free trade = $EFG + JKB$.
DWL of quota relative to free trade = $EFG + ABC$.
Excess DWL of quota over tariff = $ABC - JKB = AJKC$ (shaded).

In other words, because both policies yield the same output (by assumption), they both have the same production DWL, but the higher price under the quota implies a higher consumption DWL. Thus the quota is inferior to the tariff as a means of protecting output.

Although the attainment of a target output is a plausible objective, a protectionist government may also be persuaded to maintain the price of the protected good at some target level. Accordingly, in Figure 5.5b we compare a tariff and a quota which yield a common price ($p_T = p_Q$). Because both policies involve the same price, their consumption-side deadweight losses are the same. On the other hand, because the domestic firm is a price-taker under the tariff, it will produce more at the given price under the tariff (X_T) than under the quota (where it uses its monopoly power to restrict output to X_Q). The deadweight loss from the production distortion is therefore smaller under the quota. Thus the quota is superior to the tariff as a means of achieving the target price. This may be readily verified in terms of the areas of Figure 5.5b as follows:

DWL of tariff relative to free trade = $MNF + ABC$.
DWL of quota relative to free trade = $EFG + ABC$.
Excess DWL of tariff over quota = $MNF - EFG = MNGE$ (shaded).

The implication of this analysis seems to be that, in the context of domestic monopoly, a quota may be superior to a tariff or vice versa depending on the policy maker's underlying objective. Nevertheless, it is common to regard the monopoly case as further evidence of the shortcomings of quotas as instruments of trade policy. They confer monopoly power on a producer who would otherwise have to compete with imports at a fixed price (give or take a tariff) and for this reason are seen as undesirable. Certainly, they entail higher deadweight losses than tariffs if the underlying objective is either domestic output or import restriction [see McCulloch (1973) for the further case of profit equivalence].

In this analysis we have implicitly assumed that the policy maker knows the monopolist's responses to changes in the level of each instrument; that is, we have assumed the government to be a *Stackelberg leader*, using its knowledge of the monopolist's reaction function to set the relevant instrument at the level necessary to achieve its objective. If, on the other hand, the monopolist knows the government's policy objective (e.g. price or market share), the firm becomes the Stackelberg leader, and the government is the follower. The firm then maximizes profits subject to the government policy objective (however

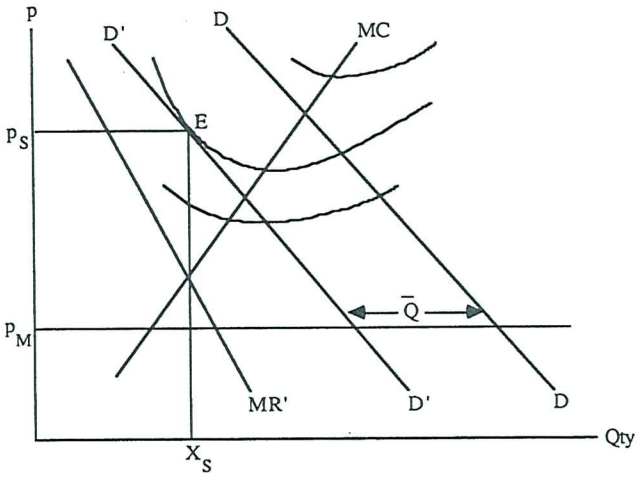

Figure 5.6

achieved). Clearly, in this case it is immaterial to the outcome whether a tariff or a quota is used, because the firm views the tariff or quota as a variable, the value of which will be determined by the firm's behaviour subject to the overriding government policy target. *It follows that, when the monopolist knows the government's objective, the equivalence of tariffs and quotas is restored.* This quite general result is illustrated for the case of an import objective in Figure 5.6.

As before, DD is the total demand for the good, whereas $D'D'$ is demand net of $\bar{Q}$, the government's target level of imports. $D'D'$ is both the demand curve facing the firm and the reaction curve of the policy maker. MR′ is the marginal curve derived from $D'D'$. In addition, we can draw iso-profit curves for the firm. These are downward sloping to the left of the MC curve (to the left of the MC curve, price exceeds marginal cost so that an increase in output means higher profits; to keep the firm on the same iso-profit contour, higher output would have to be accompanied by a lower price). They are upward sloping to the right of the MC curve (by a symmetrical argument) and horizontal where they cross the MC curve. Higher iso-profit contours are associated with higher profits (higher price at the same output). The firm, acting as a Stackelberg leader, wishes to attain the highest iso-profit curve subject to the government's reaction function $D'D'$. This is at the point of tangency E in Figure 5.6. Output and price are X_S and p_S, respectively, regardless of whether a tariff or a quota is used to achieve the import target.[3] X_S can also be derived as the intersection of MC and MR′. This is no coincidence: the firm knows that the government wishes to restrict imports to a certain level, so that it is essentially facing a

quota, even though a tariff may be the means used to enforce the objective.[4] The quota and the tariff are equivalent instruments in this case. The case of a target market share can be treated similarly to this and was the context in which Sweeney, Tower and Willett (1977) advanced the preceding equivalence proposition.

5.2. Economies of scale

Although the increasing-costs case provides a simple framework in which to consider certain aspects of protection of monopolistic industries (e.g. comparison of tariffs and quotas), many of the more interesting questions involve industries in which there are significant economies of scale. Indeed, the presence of fixed costs which are large relative to the size of the market is an important reason why some industries only support a small number of firms. The case of natural monopoly, in which only one firm can earn positive profits, is a special case of this phenomenon. Of course, competition from imports also affects the viability of domestic production in such an industry. In the case of a small economy, a firm which would be a natural monopolist in the absence of international trade may be unable to make a profit at the price determined by a perfectly elastic supply of imports. However, a sufficiently high tariff enables the domestic firm to enter the industry.[5] Here, we shall begin our analysis of the economies-of-scale case by considering the implications of using a tariff in this way.

We suppose that there is a domestic firm which would be the single domestic producer of a particular good if there were no import competition (i.e. a natural monopolist). The firm faces a U-shaped average cost curve for producing a good which is a perfect substitute for the imported good. Although the assumption that domestic and imported goods are perfect substitutes has been made throughout the book to this point, it is worthy of emphasis here because it has special implications in the presence of decreasing-costs or economies-of-scale. In particular, it implies that the domestic market is supplied either entirely by imports or entirely by the domestic producer. This can be seen as follows. If the firm makes a profit by producing some units of the good, then its average costs are reduced and its profits increased by producing all units of the good. In such a case, imports are completely displaced by the domestic firm's product.[6] The only other possibility is that the firm cannot produce any units at a profit, in which case domestic output is zero, and the market is supplied entirely by imports. While this all-or-nothing outcome may seem at odds with a world in which many importables are sourced both domestically and abroad, it is a logical consequence of the perfect-substitutes assumption. If we depart from the case of a single homogeneous good and allow domestic and foreign firms to produce goods which are imperfect substitutes for each other, then a more

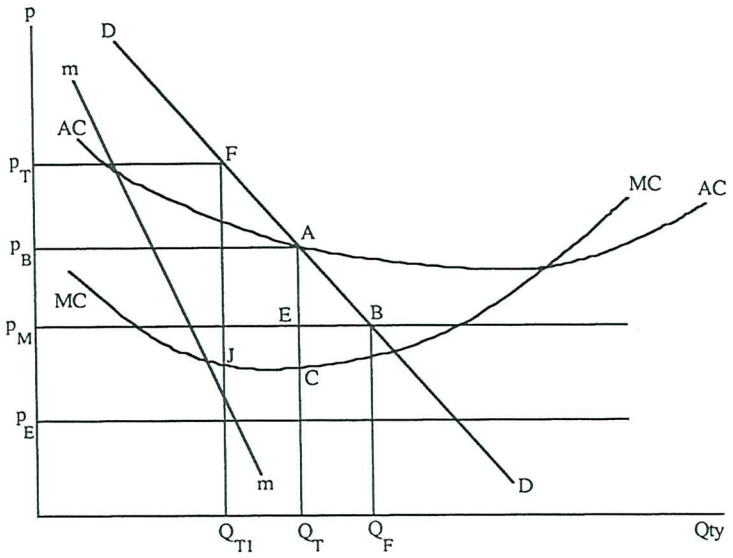

Figure 5.7

"usual" outcome can be observed. If one of the goods is supplied to the home market entirely by the domestic industry while the other is supplied entirely by imports, it will appear as though the "good" is simultaneously produced domestically and imported. The case in which a large number of differentiates of a particular product are available (each produced under economies of scale) is a well-documented example of this sort of thing. For our present purposes, the case of a single homogeneous good is quite adequate. However, in the next chapter, the case of two imperfect substitutes is analysed in an oligopoly framework; product differentiation is considered in detail in Chapter 7. We now examine the effects of various protection policies in the presence of scale economies. As before, it is convenient to start with tariffs.

(a) Tariffs

Suppose that the c.i.f. import price p_M lies below the price at which the domestic firm would earn zero profits (the *break-even price*, p_B). For the time being, we also assume that both the average and marginal cost curves (AC and MC) are everywhere above the f.o.b. export price p_E, so it will never pay the producer to export (see sub-section d for a case with exporting). Thus, in the absence of protection, the domestic industry will not produce at all (Figure 5.7). The domestic market is satisfied by Q_F units of imports supplied at price p_M.

Now suppose the government imposes a tariff on imports of $t_B = p_M p_B$ per unit, enabling the domestic producer to produce Q_T at zero profit. This tariff, which is just sufficient to ensure viability of the domestic industry, is frequently referred to as the *made-to-measure tariff* (see Corden, 1966a). Any tariff above t_B results in the entire market being supplied by the monopolist. For tariff t_B, consumers pay p_B for quantity Q_T, and the cost to the community relative to free trade is the area $p_B ABp_M$ (Figure 5.7). Note that unlike the increasing-costs case, there is no offsetting tariff revenue (since imports are zero) and no transfer to rents in the protected sector (since p_B = average cost). For a given marginal cost curve, the deadweight loss is greater the larger the fixed cost associated with domestic production (implying a higher average cost curve). For example, for the special case in which the marginal cost of domestic production is constant and equal to p_M, fixed costs would equal the area $p_B AEp_M$, a simple illustration of how the protective effect of a tariff may be dissipated by the firm's costs of entry. We shall return to this theme when we consider inefficient entry of oligopolistic firms in the next chapter.

Insofar as comparisons with the increasing costs model are meaningful, it would appear, on the basis of this case, that tariff protection is rather more costly in the presence of economies of scale. Certainly, on the basis of the static model used here, there is no case for using a made-to-measure tariff to establish an otherwise non-existent domestic industry. Moreover, tariffs above the made-to-measure tariff simply lead to increased monopoly power for the domestic firm reflected in reduced output (and consumption), a higher unit cost of production and a higher price to the domestic consumer. For example, a tariff of $p_M p_T$ would induce the monopolist (who supplies the whole domestic market) to move up his demand curve to point F, reduce output to Q_{T1} (with an associated rise in his average cost) and charge the full tariff-inclusive price p_T. The reader may wish to check that there would be a rise in the deadweight loss (relative to that under the made-to-measure tariff) equal to the area $FACJ$. These results do not sit well with the claims of some politicians and pressure groups that tariff protection enables decreasing-cost industries to achieve longer production runs and pass on the resulting lower unit costs to the domestic consumer. Whether such claims have more substance under slightly different market structures (e.g. oligopoly) is a matter for consideration in subsequent chapters.

(b) *Subsidies*

Although the previous analysis shows that the economy is worse off under a tariff, Corden (1967) raises the interesting possibility that the economy may gain by using a production subsidy to establish the industry in question so that it produces where price equals marginal cost. His argument is illustrated in Figure 5.8 in which we compare the free-trade point M with the economy's production

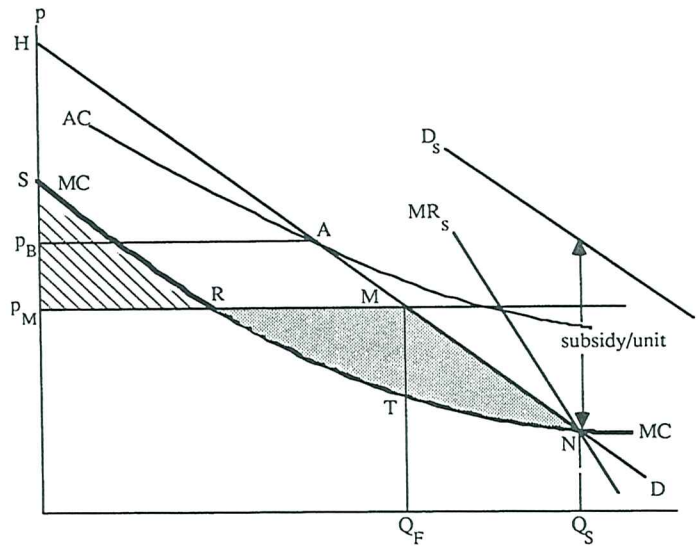

Figure 5.8

point if a subsidy is used to achieve marginal cost pricing (i.e. point N, the intersection of the demand and marginal cost curves).

In each situation, the consumer surplus measure of the net benefit to the economy is the area under the demand curve and above the relevant marginal cost curve (i.e. total benefit of the quantity consumed minus the cost of producing that quantity). When all of the good is supplied by imports, the marginal cost is the price of a unit of imports (p_M); so if the economy is at M,

$$\text{net benefit} = HMp_M.$$

On the other hand, if all of the good is produced domestically at N, then the relevant marginal cost is the producer's MC curve. In this case,

$$\text{net benefit} = HNS = HMp_M + RMN - SRp_M.$$

Therefore, the excess gain from producing at N relative to free trade at M is $RMN - SRp_M$. The two areas in question are shaded in Figure 5.8. Clearly, for some values of p_M, $RMN > SRp_M$, and it is then optimal to induce domestic production at N. Moreover, the values of p_M in question are less than p_B since, for $p_M = p_B$, profits are zero at output Q_F; so $RMT = SRp_M$ and N is better than M by area MTN.

It follows that there is a range of values of the c.i.f. import price below p_B for which it is socially desirable to have this industry producing at N, even though the industry is not viable under free trade. This outcome can be induced by

means of a production subsidy (financed by a lump-sum tax) which shifts the demand curve up (to D_s) so that its associated MR curve (MR_s) intersects MC at N. The minimum value of p_M (say p^*) for which such intervention is desirable is that which yields

$$RMN = SRp_M.$$

This analysis suggests that there may be a case (when $p^* < p_M < p_B$) for using a subsidy to establish an otherwise non-existent industry, but that use of a tariff for the same purpose always makes the community worse off. Of course, other difficulties are associated with use of a subsidy. In particular, a made-to-measure subsidy of this kind offers the monopolist little incentive to produce output at minimum cost – indeed, there would appear to be considerable scope for the firm to mislead the policy maker about its true costs and to "cost-pad" at the taxpayer's expense. For this reason, we should be wary about recommending subsidized establishment of industries.

(c) Quotas

The role of quotas in the present case is much the same as it was in the increasing-costs case; that is, a quota confers monopoly power on the domestic firm by rendering its demand curve less elastic. In addition, in the presence of decreasing costs, quotas are a means of offering some protection to the domestic industry without eliminating imports entirely. Beyond these simple observations, it is difficult to say much of interest. In particular, it is not possible to provide the clear ranking of quotas vis-à-vis tariffs that was offered in part (b) of Section 5.1. This is partly because, with economies of scale, it is difficult to find a common basis for comparing the two policies. For example, there can be no import equivalence between a tariff and a non-zero import quota because imports are zero for all tariffs above the made-to-measure tariff, whereas under the quota they equal the (non-zero) amount of the quota. Furthermore, it is often true that a tariff which appears to be output-equivalent to a given quota has water in it [see Section 5.1, part (a)], so that it actually results in a higher output than that prevailing under the quota. Apart from these problems, the ranking of policies in this case all too often depends on the values of key parameters (e.g. cost and demand curves). For these reasons, we shall not consider quotas further in this section.

(d) Tariff-induced exporting

So far in this section we have assumed that the protected industry supplies the domestic market only. However, if the f.o.b. export price p_E is not too low, it is possible that the tariff can also make exporting profitable. This possibility,

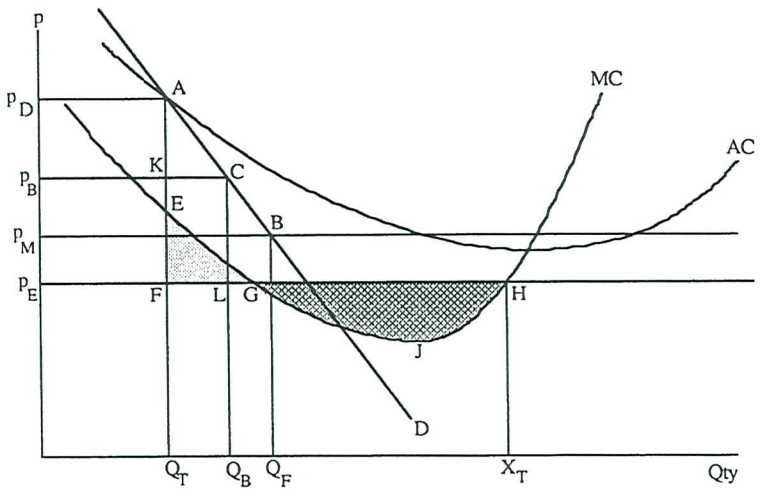

Figure 5.9

often promoted in various guises by protectionist lobbies ("import protection is export promotion"), has been analysed by several academic economists, in particular Wonnacott and Wonnacott (1967) and Pursell and Snape (1973). It relies on the export price lying below the AC curve but intersecting the MC curve (Figure 5.9).

In free trade, the economy imports Q_F at price p_M. Now suppose a tariff of p_Mp_D per unit (just sufficient for the producer to break even on domestic sales) is imposed on imports. It is then possible that the producer may find it optimal to produce X_T (at H where MC intersects p_E), selling Q_T to the domestic market at price p_D and exporting Q_TX_T at price p_E. This outcome occurs if shaded area $GHJ >$ shaded area EFG (i.e. if there are marginal profits in exporting). If such exporting turns out to be profitable, it is because the tariff provides a "protected base", enabling the firm to price-discriminate between domestic and foreign consumers and to cover its overheads in the domestic market. In the case illustrated in Figure 5.9, the DWL measure for the tariff must be modified by allowing for the profits from exporting; the cost is now

$$p_DABp_M + EFG - GHJ.$$

If a tariff (say p_Mp_B per unit in Figure 5.9) is applied which is just sufficient for the producer to earn zero profits taking the net profits from exporting into account, then the deadweight loss will be, as in Section 5.2, part (a), the loss to domestic consumers, area p_BCBp_M in Figure 5.9 (output X_T, domestic sales Q_B). This is the best the economy can do using a tariff to establish its industry. A

higher tariff would occasion further distortion. For example, the tariff $p_M p_D$ per unit would involve an additional deadweight loss (over that of the tariff $p_M p_B$ per unit) equal to the area $ACLF$.[7] It is therefore clear that, even if a tariff induces exporting, it still imposes a net cost of at least $p_B CBp_M$ on the community, so it cannot be justified as a means of promoting entry of a domestic firm or of offering further assistance to an existing firm. On the other hand, a case for a production subsidy can be made along the lines of the argument in Section 5.2, part (b) (see Pursell and Snape, 1973).

This completes our analysis of protection of domestic monopoly. To be sure, many other issues could be considered here, but most of these are better dealt with in a framework in which there is more than one firm and/or a domestic firm with international market power, cases which are the concern of the next two chapters. In the final section of this chapter we consider a quite different aspect of monopoly in the domestic market: the case in which the entire domestic market is supplied by a foreign multinational firm. This case, analysed in an elegant and influential paper by Katrak (1977), provides an argument for protection which is both interesting and novel. It also anticipates the more recent developments of the rent-shifting argument for protection which is discussed at length in the next chapter.

5.3. The optimal tariff for extracting foreign rents

Suppose that the domestic market for a good is supplied entirely by a foreign monopolist which sends the profits back to its own country. In such a situation, the home country may gain by using a tariff as a means of extracting these foreign rents. Although we continue to assume that the home country is small in world markets, the argument for a tariff in this case closely resembles the optimal tariff argument for a large country. In essence, the country is using a tariff to influence the price at which the monopolist supplies the good, in the same way as a tariff is used to improve a large country's terms of trade. Indeed, the only formal difference between the two problems is that the price response of a foreign monopoly to a fall in demand for its good may differ from the price response of a competitive world market in the standard optimal tariff problem.

The argument is presented in Figure 5.10, in which p^* is the (constant) c.i.f. cost to the monopolist of bringing a unit of the good into the home country, DD the domestic demand curve for the good as a function of the good's domestic price p and MR the marginal revenue curve derived from DD. Under free trade, the monopolist's marginal cost of providing a unit of the good to the domestic market is p^*. Thus, in the absence of tariffs and other taxes or subsidies, the foreign firm supplies Q_F units of the good (determined by the intersection of p^* and MR at A). Domestic consumers pay price p_F with the resulting profits (area $p_F PAp^*$) being remitted to the foreign country. This represents an additional

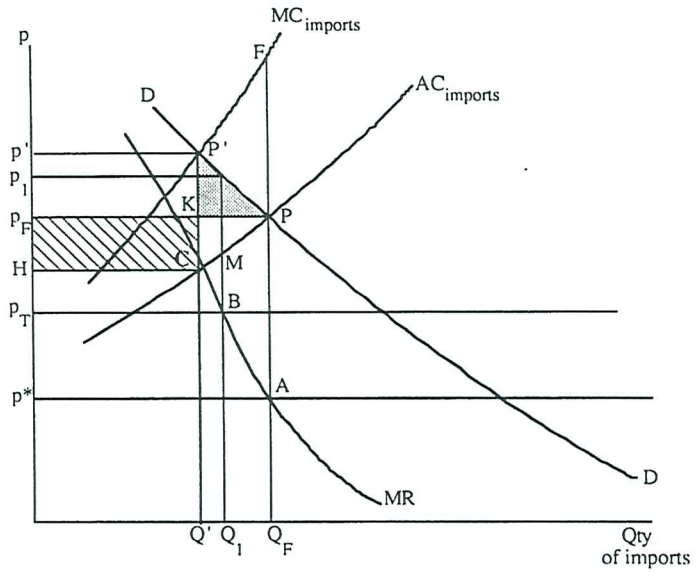

Figure 5.10

cost per unit of imports of p^*p_F to the home country. The average cost of imports to the home country (its effective terms of trade) under free trade is therefore p_F.

Now suppose that the home country imposes an arbitrary tariff of p^*p_T on imports of the good. The monopolist's marginal cost curve is shifted up from p^* to p_T, with equilibrium moving to the intersection of p_T and MR at B; imports fall to Q_1 and domestic price rises to p_1. The average cost of imports to the economy is now equal to the sum of p^* and the monopolist's repatriated profits per unit. This is

$$p_F + (p_F p_1 - p^* p_T)$$

which is less than p_F if the expression in parentheses is negative (i.e. if the increase in the domestic price is less than the tariff per unit). It is possible to show (see Brander and Spencer, 1984) that this condition is satisfied if the demand curve DD is not too convex. If this is the case, then the foreign firm is responding to the tariff by reducing its supply price, and the economy's average cost of imports (its effective terms of trade) has accordingly been reduced (to $Q_1 M$) by the imposition of the tariff. This appears to be not significantly different from the use of a tariff by a large country to improve its terms of trade. The different element here is that a tariff-induced fall in demand for the good does not necessarily reduce the average cost of imports. The movement up the

DD curve implies a leftward shift of the monopolist's demand curve when it is expressed as a function of her supply price. Whether the monopolist responds to this leftward shift by reducing her supply price (the case illustrated) or raising it depends on how the elasticity of demand changes as the curve shifts in. If the curve becomes sufficiently less elastic as it moves inwards, the monopolist increases her supply price (see Jones, 1987). The Brander and Spencer condition that the *DD* curve be "not too convex" is equivalent to the requirement that the elasticity of the monopolist's supply-price demand curve not fall too much as the curve shifts leftward. Here we shall assume this requirement to be satisfied. The average cost-of-imports curve would then be upward sloping like $AC_{imports}$ in Figure 5.10, with point P corresponding to a zero tariff, points below P on the curve (e.g. M) corresponding to positive tariffs (higher tariffs as we move down the curve) and points beyond P to the right being associated with an import subsidy.

From this point, the analysis follows the large-country optimal tariff derivation exactly. $MC_{imports}$ is the marginal cost-of-imports curve for the economy, and it is derived from $AC_{imports}$ in the usual way (see Chapter 4). In particular, recall that $MC_{imports}$ must lie above $AC_{imports}$ because that curve is upward sloping. We then see that at the free-trade point p, the economy's valuation of a marginal unit of imports (as read off DD) is less than their marginal cost (at F). The economy can gain (the area $FP'P$) by using a tariff to restrict imports to the point (P') where their marginal cost to the economy equals their marginal value. The gain is realized by trading off a higher domestic price against the foreign rents captured from the monopolist by means of the tariff. The optimal tariff for this purpose is $P'C$, the difference between the good's domestic price and its supply price (the vertical difference between the demand curve and the $AC_{imports}$ curve) at optimal imports Q'. Relative to free trade, consumers lose $p'P'Pp_F$ against which the economy gains tariff revenue equal to $p'P'CH$, yielding a net gain equal to the rents shifted from the foreign firm to the domestic taxpayer (p_FKCH) minus the domestic distortion cost of the tariff ($P'PK$). The former can also be interpreted as the gain from an improved effective terms of trade.

Having drawn the full parallel between this problem and the standard optimal tariff problem, we note the following points:

i. If the demand curve is "too convex", a tariff will *increase* the monopolist's supply price to the home country. This would imply a downward-sloping $AC_{imports}$ curve with the $MC_{imports}$ curve lying below it; the optimal point would then be located further down DD to the right of P, implying that in such a case the optimal trade policy is an import subsidy rather than a tariff. This possibility is absent in the normal optimal tariff problem where it is assumed that the world market is competitive. With competitive foreign markets, any fall in demand must, ceteris paribus, reduce the foreign supply price.[8]

ii. Although we have referred to an optimal tariff (mainly to emphasise the parallel with the standard optimal tariff problem), in fact a tariff is not the first-best policy here. Given that the primary objective is to capture foreign profits, the first-best policy would be a profits tax (see Katrak, 1977). However, governments are often severely constrained in their use of such taxes because of the need to keep their rates roughly in line with those of similar countries (otherwise they risk being impoverished by international tax arbitrage). For this reason, a tariff may not be a bad policy, not least because it can be precisely applied to specific goods or industries.

iii. The argument for a tariff as a means of capturing foreign rents for the domestic taxpayer is interesting because it is a rare instance of a small country being able to gain by using a tariff. On the other hand, it can be readily generalized to the case of a large country. It is also possible to broaden the model to accommodate domestic production of the good, the role of the tariff in such a model being to shift foreign rents from the foreign firm to both domestic taxpayers and domestic firms (see Brander and Spencer, 1984). This possibility will be explored further in the next chapter.

5.4. Summary

It is well known that in a small open economy, a firm which has a domestic monopoly in production has no real monopoly power unless its costs are particularly low relative to world price. Competition from a perfectly elastic supply of imports tends to make the domestic monopolist into a price-taker. However, protection of such an industry by means of tariffs or import quotas may confer some monopoly power on the firm. This tendency is particularly marked in the case of quota protection: import quotas make the supply of imports inelastic, enabling the monopoly to set price by moving along its domestic demand curve net of the quota. Tariffs can also give the monopolist some ability to raise price and restrict output, but unless the tariff is very high, this ability is limited by competition from a perfectly elastic supply of imports (at the world price + the tariff). Moreover, if the tariff is below the prohibitive level, the monopolist has no monopoly power at all. These considerations highlight another important area of non-equivalence between tariffs and quotas. Given such non-equivalence, the two policies can be ranked on the basis of how efficiently they achieve whatever non-economic distributional goal the government has in mind. The ranking of policies to emerge from such a comparison tends to vary depending on the underlying objective. Nevertheless, it is gener-

ally felt that in the presence of domestic monopoly, tariffs are to be preferred because they represent more of a constraint on monopoly power.

An important element of most monopolistic industries is the presence of substantial economies of scale. When a monopolistic industry exhibits decreasing average costs of production, use of tariffs to render the industry viable implies a substantial deadweight loss to the community, not least because of the higher cost of the inframarginal units which displace imports. Moreover, increased tariff protection to an established industry confers further monopoly power on the producer, making it possible to increase price to the home market and move further up the average cost curve, sacrificing economies of scale. A production subsidy would appear to be a preferable instrument to a tariff for establishing a domestic "natural monopoly".

It may be that a particular good is not produced domestically at all but is supplied from abroad by a foreign monopolist who repatriates any profits earned. Then, if the domestic government is constrained in its use of a profits tax, there may be an argument for using a tariff to transfer some of the foreign firm's rents from domestic sales to government revenue. Under reasonable assumptions about the form of the demand curve, there is a positive (and non-prohibitive) optimal tariff which trades off the gains in captured foreign rents against the domestic distortion cost. Because the gains from such a tariff are the result of a fall in the foreign firm's supply price of imports, this argument is formally identical to the standard large-country terms-of-trade argument for a tariff. However, the suggestion that a small country can gain by imposing a tariff on a foreign monopolist is quite novel.