# International Trade Policy

*From Tariffs to the New Protectionism*

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# 6 Measuring the Effect of Tariff Barriers

Our analysis of tariff imposition/liberalisation has been entirely qualitative so far. We have simply indicated the effects which may follow restriction/liberalisation without giving any indication of the likely order or magnitude of such changes. This is an important question. The net welfare effects of a given liberalisation process may be positive in magnitude but may only amount to the smallest fraction of GNP. If so, one may consider the lengthy and often complicated process of reducing trade barriers simply not worth the effort. If, on the other hand, the welfare effects are not only positive but relatively large (when expressed as a proportion of GNP) then trade policy may be expected to figure prominently in the policy-makers' 'portfolio'.

In this chapter we will commence by reiterating the expected effects of trade liberalisation. Once we have identified what may happen we will outline in some detail the techniques currently available which can be used as a basis for quantifying these effects. Finally, a review of some existing studies of the liberalisation process will provide us with examples of applications of the methodology discussed.

## IDENTIFYING THE EFFECTS OF TARIFF LIBERALISATION

The methodology to be outlined below will be discussed in terms of quantifying the effects of tariff liberalisation. The methodology can, however, be applied just as easily to an analysis of tariff restriction.

In Figure 6.1 we outline the now familiar partial equilibrium analysis for the 'large' country case. $D_h$ and $S_h$ represent home demand and supply of commodity $y$ respectively, commodity $y$ being the import substitute. $S_{hf}$ represents the total market supply, i.e. home supply plus imports. $S_{hf}$ lies everywhere below $S_h$ because given pre-trade factor endowments, foreign producers can produce $y$ at lower unit costs than home producers. $S_{hf}{}^t$ represents a tariff-distorted market supply curve. Thus with a nominal tariff rate of $t$ on all imported units of $y$, the home market price is $Pe'$. At this





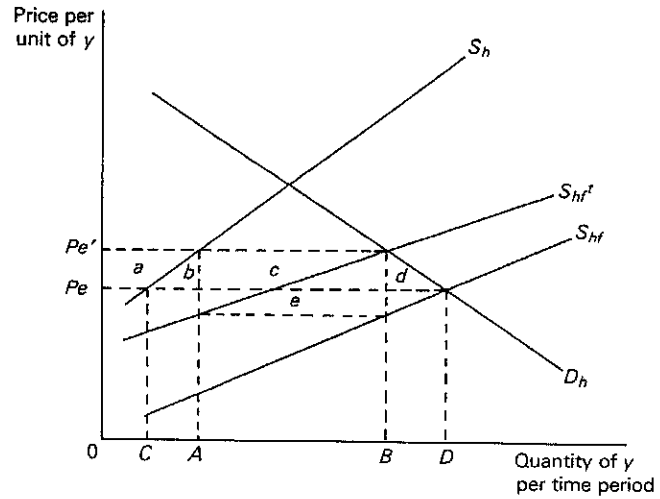


**Figure 6.1**

price $OB$ is the market clearing quantity of $y$, of which $OA$ is provided by domestic producers and $AB$ imported.

When the tariff is removed, the market clearing price falls to $Pe$, and as a consequence quantity demanded expands to $OD$. In the new equilibrium domestic producers not only supply a smaller fraction of the market, but supply less in absolute terms - $OC$ rather than $OA$. Import penetration increases from $AB/OB$ to $CD/OD$ as a result of tariff liberalisation.

These changes give rise to a number of readily identifiable effects which we now discuss.

### *Static effects*

(1) *Production effect*. Since relatively inefficient domestic producers supply fewer units, the resource misallocation loss associated with the tariff (the triangular area $b$) disappears.

(2) *Consumption effect*. As existing consumers purchase $y$ at a lower price, there is a net gain in consumer surplus equivalent to the triangular area $d$.

Most studies of the consequences of tariff liberalisation make some attempt at quantifying these 'deadweight gains'.

(3) *Revenue effect*. In the most elementary static analyses the revenue effect is viewed as a straight redistribution from government

to consumer, and the issue is given no further consideration. In reality, however, it is necessary to go further. If the revenue from a tariff is lost as a by-product of liberalisation, and if government expenditure is to be maintained, then revenue has to be raised from alternative sources. In terms of Figure 6.1 $e + c$ is 'lost'. The effects of any subsequent increases in income tax, expenditure taxes, etc., should be allowed for.

(4) *Balance-of-payments effect.* Again, elementary analyses tend to ignore this effect because they are implicitly barter models, within which balance-of-payments imbalance has no meaning. When trade flows are matched by opposite monetary flows, however, unilateral trade liberalisation could result in a tendency towards payments deficit. Policy action may be required to correct this deficit (e.g. devaluation or deflation) which in principle should be allowed for.

In the case of a 'small' country liberalising tariffs, this is as far as we would need to go. When, however, the country in question is a 'large' country we must make some allowance for:

(5) *Terms-of-trade effects.* Unilateral tariff reduction by a large country would generate an adverse shift in the international terms of trade. This is, of course, consistent with a fall in real income. In terms of Figure 6.1, this would be represented by the area $e$, and any such losses would have to be offset against the positive gains resulting from production and consumption effects.[1]

As we shall see, most empirical studies of the trade liberalisation process make some attempt to quantify some or all of these static effects. It is widely agreed that there may also be certain dynamic effects which follow the liberalisation of tariff barriers.

### *Dynamic effects*

Dynamic effects are altogether more speculative. Possible consequences would be as follows:

(1) *Economies of scale.* It is often argued that the widening of markets which follows from trade liberalisation can result in increased opportunities for exploiting scale economies, with larger output leading to reductions in unit cost. If such reductions are passed on to consumers (as they would be in competitive markets) then there would be 'second round' gains from consumption and production effects as price falls below $Pe$.

(2) *Efficiency.* Another common argument is that the widening of markets results in greater competition, which in turn results in greater efficiency.[2] This too generates further falls in unit costs and/or higher quality products. If an exhaustive investigation of the effects of a given tariff reduction were conducted, then any gains realised here would have to be offset against deadweight gains since this would result in a rightward shift of the supply curve of import substitutes.



These dynamic consequences provide the researcher with quite intractable measurement problems, in part because of their more nebulous nature, but more so because of the difficulties of extricating such influences from other influences (whether policy-induced or otherwise). It is usually the case that researchers either have to ignore these influences or make some informed 'guesstimate' of their importance.

## ESTIMATING THE STATIC CONSEQUENCES OF TARIFF LIBERALISATION

Where most policy changes are concerned, the estimation of the policy's effect(s) can be attempted prior to the policy change, or some time after, when it seems to have taken effect. If we estimate the effects of a change *ex ante*, we generally have to make certain assumptions about the behavioural relationships we are examining. If we approach the problem *ex post*, we may face difficulties in extricating the effects of the policy change we are examining from the influence of other policies and from the 'counter-factual' problem, i.e. what would have occurred if the policy was not carried out.

Empirical examination of trade policy can follow the same approaches. Thus, when a tariff is removed or reduced, we can either estimate the effects of the removal (reduction) in advance of the liberalisation, or we can wait until some time after the tariff has been removed and attempt to estimate the effects.

## *EX ANTE* ESTIMATION

The principles of *ex ante* estimation for the small-country case can be easily elaborated by reference to Figure 6.2. In panel (a) we can see that the net effects of removing tariff $t$ amount to the triangles $CDE$ and $HJK$. These we will recognise as our static production and consumption gains.

Take first of all the consumption gain. Since the demand curve for importables is linear over the relevant range, we can calculate the area $HJK$ as follows:

$$HJK = \tfrac{1}{2} t \, \Delta D \qquad (6.1)$$

where $t$ = tariff rate (= change in price) and $\Delta D$ = change in quantity demanded.

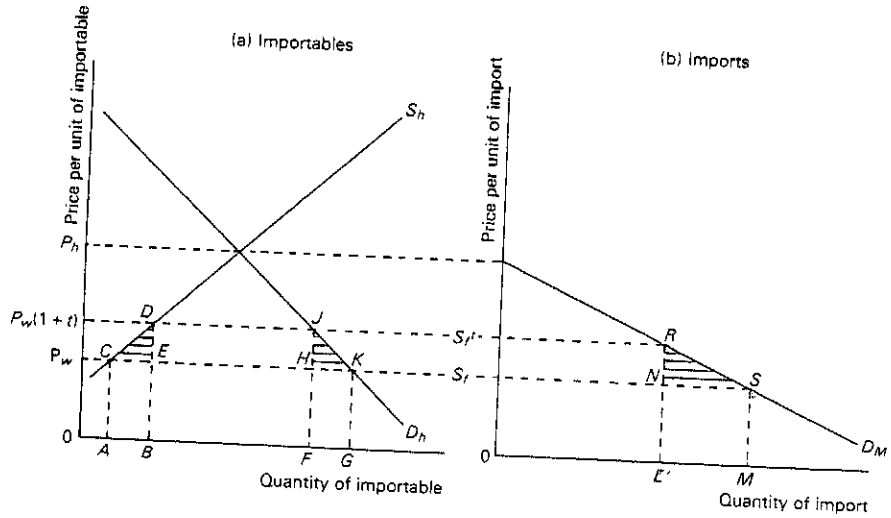


**Figure 6.2**

By definition we have information on the price change beforehand, since this is simply the tariff which previously prevailed. Since this is an *ex ante* estimate of the consumption gain, we do not have information on the change in quantity demanded; this we have to calculate. Clearly, the change in demand will depend on the change in price, and the slope of the demand curve over the relevant range; this we can approximate by arc elasticity of demand, which (ignoring signs) can be written as:

$$\epsilon = \frac{\Delta D}{\Delta P} \frac{P_o}{D_o} \tag{6.2}$$

Thus,

$$\Delta D = t\epsilon \frac{D_o}{P_o} \tag{6.3}$$

Substitution of (6.3) into (6.1) yields:

$$HJK = \tfrac{1}{2} t^2 \epsilon \frac{D_o}{P_o} \tag{6.4}$$

If, for ease of exposition, we set the price prior to tariff liberalisation equal to one, we can write:

$$HJK = \tfrac{1}{2} t^2 \epsilon D_o \tag{6.5}$$



By analogy we can derive a formula for estimating the production gain:

$$CDE = \tfrac{1}{2} t \Delta S \tag{6.6}$$

$$\Delta S = t\lambda \frac{S_o}{P_o} \tag{6.7}$$

where $\lambda = \dfrac{\Delta S}{\Delta P} \dfrac{P_o}{S_o}$

Again, setting $P_o$ equal to one and substituting (6.7) into (6.6), we obtain

$$CDE = \tfrac{1}{2} t^2 \lambda S_o \tag{6.8}$$

The total static gain ($W$) from tariff liberalisation therefore amounts to the sum of (6.5) and (6.8), i.e.

$$W = HJK + CDE = \tfrac{1}{2} t^2 (\epsilon D_o + \lambda S_o) \tag{6.9}$$

Before we proceed to an examination of some of the technical and empirical difficulties faced in this sort of exercise, we might note that the same result can be (and usually is) obtained by a slightly different route. Rather than estimating areas below the supply and demand curves for *importables*, we could estimate the total change in one calculation if we know the total change in *imports*. This is easily elaborated by reference to Figure 6.2. Imports simply represent the difference between domestic supply of importables and demand. As long as we know what this difference is, by definition we know what the volume of imports is. With the information given in Figure 6.2(a) we can derive an import demand curve.

At a price of $P_h$ domestic producers would supply the entire market, imports would be zero, and the import demand curve would intersect the price axis at $P_h$. At the tariff distorted price of $P(1 + t)$, imports amount to $BF$, which is equal to $OL$ in Figure 6.2(b). By taking a series of such prices, one can derive the import demand function $D_M$. Thus, when we eliminate the tariff, one only calculates the area under this curve, in this case the area $NRS$. Thus,

$$NRS = \tfrac{1}{2} t \Delta M \tag{6.10}$$

$$\Delta M = \Theta t \frac{M_o}{P_o} \tag{6.11}$$

where $\Theta = \frac{\Delta M}{\Delta P} \frac{P_o}{M_o}$

Setting $P_o = 1$ to simplify, and substituting (6.11) into (6.10),

$$NRS = \tfrac{1}{2} t^2 \ \Theta M_o \qquad (6.12)$$

where $\Theta$ is the price elasticity of demand for imports, and $\Delta M$, $M_o$ respectively the change in, and base level of, imports.

Estimation via the import demand curve, rather than via home supply curve of importables and the domestic demand curve for importables, is relatively common. Computationally it is very much more straightforward to work from the import demand curve, since one only has to estimate a single unknown, namely $\Theta$. Where, however, we work from domestic demand for and supply of importables, we have two unknowns, $\epsilon$ and $\lambda$.

Of course, not all tariff liberalisation takes the form of complete removal of tariffs, as Figure 6.2 implies. It is more common to find that tariffs are reduced rather than removed.

In Figure 6.3 we maintain the small-country assumption. On this occasion, however, rather than removing the tariff completely, which would reduce price from $P_2$ to $P_0$, we cut the tariff in half. As a consequence of this, price falls from $P_2$ to $P_1$. We can recognise immediately that deadweight production and consumption gains of *ABC* and *DEF* are realised. These gains can be estimated as above. In this respect the analysis is no different from the case described in Figure 6.2. Here, however, we have one important difference. Since the tariff is only reduced and not removed, any additional imports generated by tariff reduction are taxed at the new tariff rate, and thus further net gains are realised. Specifically, we have to allow for the areas *ACGH* and *DFLK*. These areas are simply the revised tariff rate ($t_2 - t_1$) times the additional units imported (*MN* and *RS*).

In the same way as we simplified the tariff removal case described in Figure 6.2, we can simplify the tariff reduction case of Figure 6.3 by deriving the import demand curve, thereby estimating the area below one curve rather than two. In Figure 6.3(b) we would therefore estimate the net welfare effects of tariff reduction as the sum of *TUV* and *TVWX*. Following from equation (6.10) *TUV* can be written as:

$$TUV = \tfrac{1}{2} (t_2 - t_1) \ \Delta M \qquad (6.13)$$

The rectangle *TVWX* can be approximated by:



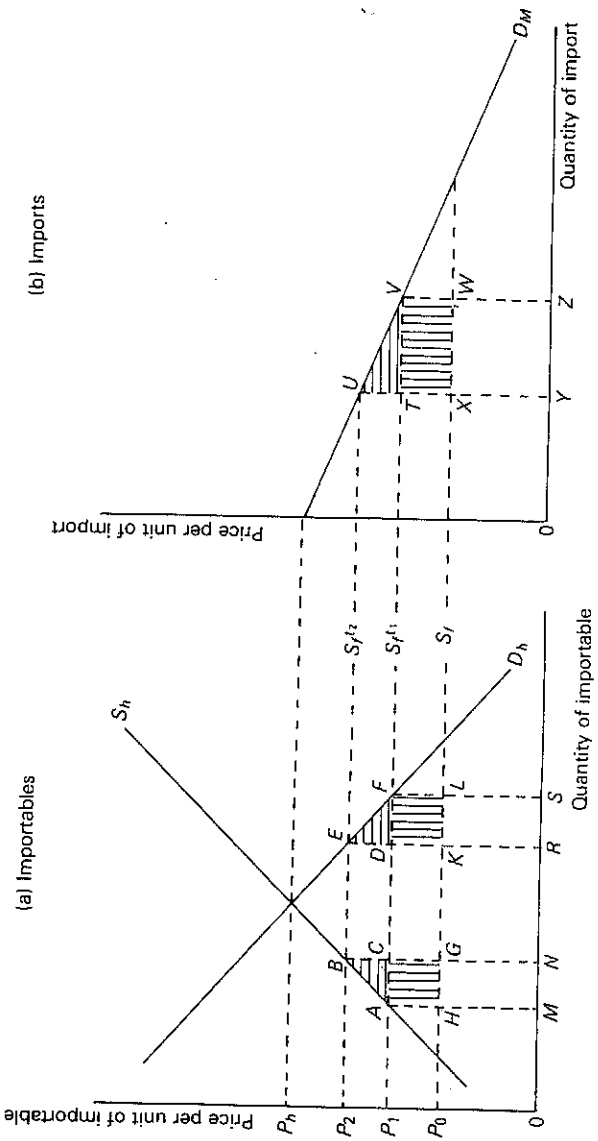


**Figure 6.3**

Thus the total welfare gain can be expressed as:

$$W = \tfrac{1}{2}(t_2 - t_1)\,\Delta M + t_1\,\Delta M$$
$$= \Delta M\,[\tfrac{1}{2}(t_2 + t_1)] \qquad (6.15)$$

$\Delta M$ we know can be estimated if we have information on the price elasticity of demand, and the initial level of imports.

## PROBLEMS WITH *EX ANTE* ESTIMATION

We will take as our point of reference the elasticity approach as outlined in Figure 6.2. This is in fact the most commonly used method of estimating the cost of protection/gains from liberalisation.

The problems associated with this type of *ex ante* estimation procedure can be grouped into technical problems and practical problems. Although the dividing line between the two may to some extent be arbitrary, the former relate to difficulties which are inherent characteristics of the methodology employed, while the latter are difficulties related to the application of the technique, and which it may be possible to correct to some extent.

### *Technical problems*

(1) *Income and substitution effects.* As most students of economics learn quite early in their studies, it is possible to separate conceptually the effects of a price change into an income effect and a substitution effect. In the case of a fall in price, the former is the result of the consumer's real income increasing and may lead to an increase in consumption of the commodity whose price has fallen and/or an increase in consumption of other commodities. The substitution effect follows from the change in relative prices which the price fall stimulates. Because one commodity becomes cheaper relative to others, the consumer will normally substitute units of the cheaper commodity for the now relatively more expensive commodity.

When we are attempting to measure changes in consumer surplus which follow from changes in prices (as we are doing in the tariff liberalisation case) we are only interested in the pure substitution effect, i.e. the substitution away from import substitutes towards imports which is stimulated by the change in relative prices. If one wished to focus unequivocally on this effect, one would have to derive a *compensated demand curve*, i.e. a demand curve for which the consumer's real income was held constant and which traced out the relationship between changes in relative prices and quantity consumed.[3]



Information on compensated demand curves is not, however, readily available; thus one simply uses the import demand curve $D_M$ in Figure 6.2(b). This involves making the implicit assumption that income effects are relatively unimportant. Corden (1975) does not seem to think that this is an implausible assumption to make. Commenting on the compensated demand curve problem he concludes (p. 56): 'In practice, when elasticity figures have such high margins of error and are often just guesses, and since income effects do not appear to be very large anyway, this is probably not worth worrying about.'

Although we must respect this judgement, it must be emphasised that the greater the change in the tariff in question, the higher the probability that the income effect will be significant. This suggests that when we are dealing with Rounds where substantial tariff cuts are made on a wide range of traded goods, we cannot simply assume away any income effects.

(2) *The nature of demand changes.* A second technical problem we face is again one which is shared with researchers analysing the implications of any price change. In estimating our triangle of consumer surplus we are making the implicit assumption that the tariff reduction results in a movement along an existing import demand curve rather than a shift of the initial curve. If in fact the demand curve shifts, then the methodology which we have outlined is inappropriate.

There is, of course, nothing that can be done to alleviate this problem. In the case of relatively small tariff reductions (however defined) it is probably reasonable to assume that we are observing different points on a given demand curve. Where, however, the tariff reduction is relatively large, it may be a more heroic assumption.

(3) *Linearity of the demand curve.* A third implicit assumption in this analysis is that the demand curve under consideration is linear. This is what makes application of the formula in equation (6.12) appropriate. The assumption is made because it is methodologically expedient - if the demand curve is non-linear and is not of a constant elasticity form, more sophisticated statistical techniques are necessary. If the relevant curve is non-linear, the area $ABC$ will provide an overestimate or underestimate of the change in consumer surplus, depending on whether the demand curve is convex or concave to the origin.[4]

(4) *Second best considerations*. The final implicit assumption behind the procedure is that we are analysing the welfare effects of a tariff reduction, when all other 'first best' assumptions hold. Thus we are moving from a position of second best to a situation of Pareto optimality. This, of course, is never the case in practice. In considering one tariff reduction with all other tariff and non-tariff barriers unchanged, we are in the indeterminate world of second best. As Lipsey and Lancaster (1956-7) demonstrate, strictly speaking we cannot conclude that reduction of this or that particular tariff necessarily results in a welfare gain!

(5) *Expectations regimes*. Saidi (1980) has recently argued that the implicit assumption made about the manner in which economic agents reach decisions is sufficient not only to create a 'technical problem', but also to make the entire exercise meaningless. The foundation to Saidi's critique is the assertion that individuals form their expectations about future events 'rationally' rather than 'adaptively'. It follows from this that the decision-making process of agents in export sectors and import substitute sectors will itself be affected by changes in commercial policy. One cannot therefore estimate the effects of the policy change *ex ante* because one is using estimates of price and income elasticities which prevailed prior to the policy change, and which will themselves alter as a consequence of the policy change. This is a fundamental criticism which calls into question the entire methodological procedure of *ex ante* estimation. The seriousness with which one views the point depends on the strength of one's faith in the underlying tenets of the rational expectations hypothesis - in particular one's view on the speed with which agents in product and factor markets react to changes in economic policy.

As we indicated above, these difficulties are all inherent in the procedure, and there is little we can do to alleviate them. They must nevertheless be borne in mind when considering the results of any particular analysis. Although it is not possible to estimate the quantitative significance of these complications, it may be possible to make some quantitative assessment, e.g. by indicating whether the results on hand are likely to be an over- or underestimate. Thus, if we follow Corden's conclusion on the income and substitution problem, we would feel that this is unlikely to distort our results unduly. Where the shift/movement problem is concerned, we would be aware of the fact that this is likely to be more of a problem where tariffs are adjusted by large, discrete amounts than where they are adjusted by small and/or continuous amounts. Linearity is something we can do little about, while second best considerations may be less important when (as is often the case) we are considering across-the-board cuts in tariffs rather than tariff reductions on individual commodities.



*Practical problems*

*1. Data*. Although it is not always explicitly recognised, empirical studies in economics invariably face data difficulties. In some studies data problems can be intractable - for instance, studies examining market power and innovation have great difficulty in obtaining economically meaningful proxies of market power and measures of innovation. In the case of the analysis of tariff liberalisation, data do not create insuperable difficulties. Referring to equation (6.12), we would require data on the tariff rate, the base level of imports and the price elasticity of demand for imports. Data are easily obtainable in the case of the first two. Price elasticity, however, is more problematic. Either one has to estimate elasticities oneself (which could in itself be a major research project) or one relies on the results of other researchers. The latter convention is usually followed. Since estimates of elasticity often have a relatively large margin of error associated with them, it is not uncommon to find calculations conducted for a range of estimates.

Another data problem which one faces is that trade data are generally classified according to the Standard International Trade Classification (which we introduced in Chapter 1). We might proceed to estimate the consequences of a reduction in tariffs on the assumption that the import and the domestically produced counterpart are perfect substitutes for each other. Within the SITC groups which we are examining, however, they may be imperfect substitutes, and effectively in different sub-markets. For example, the import may be a high quality machine tool and the import substitute a low quality machine tool used in different production processes. In such circumstances, substitution effects may be weaker, and income effects stronger than in the case of perfect substitutes.

*2. Discounting*. Often when the costs of protection of a given tariff (or the gains from liberalising a given tariff) are calculated, the calculations are conducted on a once-and-for-all basis. Thus when a tariff is imposed, a figure may be presented representing the once-and-for-all costs of imposing a given tariff, or a once-and-for-all gain from removing a given tariff.

This is not, however, a correct procedure, and is almost certain to underestimate the gains/losses associated with tariff liberalisation/imposition. This follows because once a tariff is levied, it imposes costs for the duration of its existence. Thus if the tariff is levied for, say, a period of ten years, then the calculation of any costs should take account of the length of time over which the tariff is in existence. Furthermore, these costs will vary as the growth of the economy

varies, the costs rising in absolute terms as the level of GNP rises. Similar comments apply to tariff liberalisation.

If one takes account of the time span involved, then future gains or losses have to be discounted to the present, to take account of the fact that money accruals in the future are worth less than accruals in the present. To accomplish this, a discount rate has to be chosen which suitably represents society's preferences between present and future consumption. In other words, an appropriate 'social rate of time preference' has to be applied to future gains/losses. This is not as straightforward as it first appears. For a number of years the question of what interest rate in the economy, if any, adequately represents society's rate of time preference has been the subject of heated academic debate. In principle, one should use the rate of return which the resources would gain if released for more productive employment. This is far from obvious.

*3. Non-uniform tariffs.* When researchers investigate the costs of tariff imposition or the gains from liberalisation for a system of tariffs, it is, strictly speaking, necessary to make allowance for any variation which may exist between rates. Typically, analyses of the tariff structure focus on the costs of some average rate of tariff across all commodities - the uniform tariff equivalent. As Johnson (1960) pointed out some years ago, however, there may be an aggregation problem here. The cost of protection is not dependent solely on the uniform tariff equivalent but also on the dispersion of tariff rates. The responsiveness of resources into and out of different activities is never likely to be equal across all activities. Thus the dispersion of tariff rates could have an important bearing on the costs associated with the tariff system. The problem has been recognised for some time, and a few investigators have made some allowance in their calculations.

*4. Balance of payments effects.* If the net trade effects of a given tariff change are non-zero, then payments imbalance must result. Other things being equal, adjustment forces will be set in motion to correct the imbalance. Thus, under a fixed exchange rate regime, expenditure-reducing policies might be used to reduce import demand. A tendency towards deficit under floating exchange rates would stimulate exchange rate depreciation. The effects of tariff liberalisation/imposition-induced changes in the balance of payments, and their effects on trade flows, should be allowed for. In practice, however, the exchange rate is a notoriously difficult variable to forecast, and often researchers simply ignore such effects, or assume that the trade policy change results in a balance expansion (or contraction) of trade.



Such practical problems relate to the application of the methodology rather than the methodology itself, and can prove soluble to some degree or other.

## *EX POST* ESTIMATION

*Ex post* estimation is somewhat different from *ex ante* estimation. As the title implies, *ex post* analysis attempts to assess the impact of tariff liberalisation some time after the tariffs have been reduced or eliminated.

The principles behind *ex post* estimation can be readily understood by reference to Figure 6.4, in which we plot the growth of imports against time. Suppose tariffs are removed in time period $t_4$ and we are investigating the effects of tariff liberalisation in $t_{12}$. By first examining the trend rate of growth of imports over the period $t_0$ to $t_4$ (when tariffs were in force) and projecting this forward, we can get some idea of expected imports over the period $t_4$ to $t_{12}$. Thus we are assuming that import volume would have continued to grow along the path $m_1$ had tariffs remained unchanged. Upon examination of the trade data for the period $t_4$ to $t_{12}$, in $t_{12}$ we might discover, however, that in actual fact imports had grown along a path $m_2$ rather than $m_1$. The difference between what was expected to occur and what actually occurred can be attributed to the elimination of tariffs in $t_4$. The same principle applies to the so-called 'reduced group-non-reduced group' method. Here the growth paths $m_1$ and $m_2$ would refer to different groups of commodities, rather than the same com-

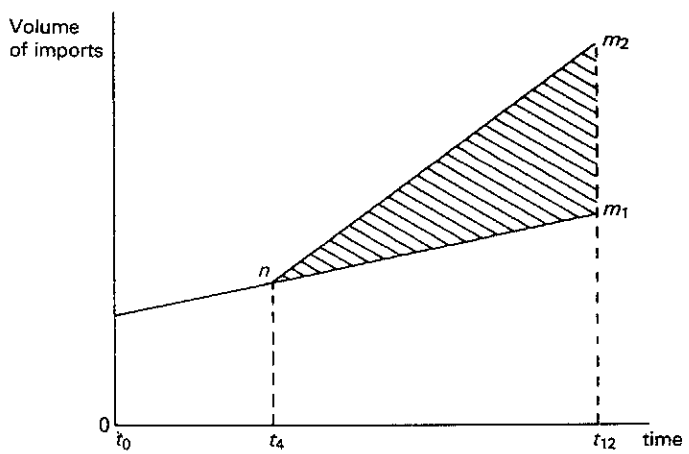


**Figure 6.4**

modity group. For instance, $m_2$ may be a group of commodities for which tariffs have been reduced, while $m_1$ are a similar group of commodities for which tariffs have not been reduced. On *ceteris paribus* assumptions the difference between the two in $t_{12}$ compared with $t_4$ is taken as the outcome of trade or tariff liberalisation.

This is, in simplistic terms, how the *ex post* methodology operates. In practice one does not simply conduct an exercise of linear extrapolation, i.e. projecting the trend line forward. We have drawn our trends as linear for expositional convenience. In practice techniques are somewhat more sophisticated, the expected volume of imports being determined by careful perusal of income elasticities of demand for imports and detailed examination of the trade matrix. Ultimately, however, we would still end up with an area equivalent to $nm_2m_1$ in our diagram. On the assumption that the demand for imports is linear, we could then include this figure for $\Delta M$ in formula (6.10) above and proceed to estimate the welfare effects of the liberalisation.

This methodology has one broad advantage over the *ex ante* methods. As long as $t_{12}$ is selected such that all of the liberalisation effects have worked themselves out, the area $nm_2m_1$ provides an estimate of the total static effects of liberalisation. There is no need to estimate the 'deadweight' effects, balance-of-payments effects and terms-of-trade effects separately, since we have a global figure which includes all of these. It is also possible that the impact of some of the dynamic effects is included. For instance, if the liberalisation results in, a reduction of X-inefficiency and increased competitiveness of import substitutes, then this will also show up in the volume of imports demanded.

Against this, however, there are two major drawbacks to using this methodology. First, there is a technical consideration. The volume of imports observed at $t_{12}$ may not just be the outcome of a change in tariffs which occurred in $t_4$. Other policy changes may have taken place between $t_4$ and $t_{12}$ which influenced the demand for imports. Some changes might be obvious and it may be possible to make some allowance for them. For instance, it may be possible to make some allowance for imports of a completely new product which appears between $t_4$ and $t_{12}$ and which would have been imported whether or not any tariff liberalisation took place in $t_4$. Even here, however, there may be an element of arbitrariness in that one has to draw a line between those which would have been imported anyway, e.g. some revolutionary petroleum substitute due perhaps to a technological breakthrough abroad, and those that are tariff-induced, e.g. new varieties of existing products. At the other extreme it may be very difficult to allow for obvious changes like a movement towards the greater use of non-tariff barriers following the liberalisation of tariffs; or less obvious policy influences like regional incentives to encourage industrial development which subsidise the production of import substitutes. In other words, one cannot 'control' for all other influences in order to extricate the effects of tariff liberalisation from other policy changes.



The second difficulty associated with *ex post* studies is more subtle, but no less important. By definition if one wishes to conduct an *ex post* analysis one has to wait until after the event. In order to ensure that the effects have worked themselves out fully, this may have to be a considerable time after the event. In the case of the Tokyo Round tariff reductions, for example, we have the introduction of the reductions on 1 January 1980, and there is then up to an eight-year phasing-in period! Presumably some further time would have to elapse before any *ex post* calculations could be made. Apart from the obvious point that the longer the time lag, the more likely it will become that other influences will play a significant role, there is the very pertinent consideration that such calculations may be of little value to the policy-maker. After all, when one is involved in negotiations on tariff reductions, one would wish to have some idea of the anticipated effects of the change. Of course, one could refer to *ex post* studies of previous cases of tariff liberalisation for guidance. Ultimately, however, the information which would be given greatest weight in the policy-makers' 'calculations' is information on the matter at hand. It is this consideration which is predominant in explaining the more general use of *ex ante* methods.

We have dwelt at some length on an examination of the principal methods used in assessing welfare changes which may follow from trade liberalisation. It is important that the uses and limitations of these techniques are clearly understood, since these provide the basis for empirical analyses of protection and liberalisation. A clear understanding of the principles involved is important since, in the last analysis, even using imperfect techniques, trade policy prescriptions should be guided by empirical findings rather than any blind faith in free trade or protectionism. We will now turn our attention to some of the results of research in this area.

## EMPIRICAL STUDIES OF THE EFFECTS OF TARIFF BARRIERS

### *Ex ante studies*

One of the earliest applications of the *ex ante* methodology discussed above was Stern's (1964) attempt to evaluate the deadweight gains