THE IMPACT OF CUSTOMS UNIONS ON TRADE IN MANUFACTURES

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1. Introduction

Both the EEC and EFTA were founded over a decade ago and have now established internal free trade in industrial products. One would therefore expect to be able to reach a reasonably well-informed judgment of their effects on trade flows. There are a number of studies that have reported on attempts to construct such estimates. Individually the various methods must be judged unreliable, and the same is true of a new method developed in the present paper. But collectively the available evidence is capable of indicating conclusions of about the same degree of reliability as is customary in applied economics. That is to say, there is a wide margin of uncertainty about the correct figure, but the order of magnitude can be established with reasonable confidence.

The plan of the present paper is as follows. Section 2 develops an analytical framework to clarify precisely what it is that one wishes to measure. Section 3 contains a critical survey of the principal previous published studies and a collation of their results. Section 4 describes the new approach and Section 5 presents the results that it has yielded. A concluding Section is devoted to utilising the assembled evidence to form a judgment of the effects that the EEC and EFTA have had on trade flows.

2. An Analytical Framework

The world is divided into three mutually exclusive and collectively exhaustive blocs: the EEC, EFTA, and the rest of the world (ROW). The object of the exercise is to contrast the world trade matrix Y as it appears in year t (indicated by a superscript) with the situation that would have materialised in year t if the EEC and EFTA had not been formed. The latter is referred to as the hypothetical or non-integration position. The differences between this hypothetical position and the actual one can be attributed to:

a. trade creation; i.e., the replacement of domestic production by imports from a partner country;

b. trade diversion; i.e., the replacement of imports from non-partners by imports from a partner country;

c. external trade creation; i.e., the replacement of domestic production by imports from a non-partner country (on account of a change in the external tariff);

d. supply-side diversion; i.e., the replacement of exports to non-partners by exports to partners; and

e. balance-of-payments reactions induced by attempts to adjust the payments imbalances caused by the foregoing changes.

We adopt the following notation:

c_{ii} = intra-ith bloc trade creation;

d_{ij} = diversion of the ith bloc's imports from bloc j ;

$d_{ii} = \sum_{j \neq i} d_{ij}$ = diversion of ith bloc's imports (to bloc i);

e_{ij} = increase in i's imports from j caused by external trade creation;

$e_i = \sum_j e_{ij}$ = total external trade creation of bloc i ;

r_{ij} = increase in i's imports from j caused by payments reactions;

s_{ij} = reduction in j's exports to i caused by supply constraints;

x_{ij} = hypothetical (non-integration) imports of bloc i from bloc j ;

$x_i = \sum_j x_{ij}$ = hypothetical imports of bloc i ;

y_{ij} = actual imports of bloc i from bloc j ;

$y_i = \sum_j y_{ij}$ = actual imports of bloc i .

The world trade matrix Y is:

		Exports by EEC	EFTA	ROW	Total
Imports of	EEC	y_{11}	y_{12}	y_{13}	y_1
	EFTA	y_{21}	y_{22}	y_{23}	y_2
	ROW	y_{31}	y_{32}	y_{33}	y_3

This matrix can be broken down to exhibit the various changes that followed the creation of the EEC and EFTA. Both these blocs produced

internal trade creation and both diverted imports from non-member countries. In addition, the EEC may have been responsible for external trade creation in those members that levelled their tariffs down to the common external tariff, and for its converse (external trade destruction) in the former low-tariff members who raised their external tariffs to the common level. The attractions of partners' markets may have directed some EEC and EFTA exports away from non-partners' markets, but this effect may have been partially, wholly, or more-than-fully offset by the greater competitiveness of exports from these blocs resulting from the advantages of a larger "home" market. Finally, every flow in the matrix may have been affected by reactions designed to re-equilibrate payments positions. A breakdown of the Y matrix designed to show all these effects would be as follows:

$$(1)\quad \begin{bmatrix} y_{11} & y_{12} & y_{13} \\ y_{21} & y_{22} & y_{23} \\ y_{31} & y_{32} & y_{33} \end{bmatrix} = \begin{bmatrix} x_{11}+c_{11}+d_{11}+r_{11} & x_{12}-d_{12}+e_{12}-s_{12}+r_{12} & x_{13}-d_{13}+e_{13}+r_{13} \\ x_{21}-d_{21}-s_{21}+r_{21} & x_{22}+c_{22}+d_{22}+r_{22} & x_{23}-d_{23}+r_{23} \\ x_{31}-s_{31}+r_{31} & x_{32}-s_{32}+r_{32} & x_{33}+r_{33} \end{bmatrix}$$

Most investigators have implicitly assumed quite a few of these effects to be zero. Perhaps the most difficult problem is posed by supply constraints. It is possible that the fast growth of EEC and EFTA intra-trade in the years immediately following their formation (and also of EEC intra-trade in 1969) was partially at the expense of slower growth in exports to the ROW; this would have depressed their shares in the control market and so resulted in some over-estimation of the integration-induced growth in intra-trade. There is no conclusive evidence as to whether this was an important factor. In the longer run, however, one would expect supply bottlenecks to be overcome, and one might also expect their effect to be counteracted by the greater competitive strength resulting from a larger "home market". We therefore follow a well-established precedent in assuming $s_{ij}=0$. The possibility that payments-induced adjustment measures might introduce distortions does not seem to have been recognised in previous work. For the time being we join previous authors in postulating $r_{ij}=0$, but in due course (Section 5) we analyse whether this is a reasonable assumption. Until that time we work with the simplified framework (2) in place of (1):

$$(2)\quad \begin{bmatrix} y_{11} & y_{12} & y_{13} \\ y_{21} & y_{22} & y_{23} \\ y_{31} & y_{32} & y_{33} \end{bmatrix} = \begin{bmatrix} x_{11}+c_{11}+d_{11} & x_{12}-d_{12}+e_{12} & x_{13}-d_{13}+e_{13} \\ x_{21}-d_{21} & x_{22}+c_{22}+d_{22} & x_{23}-d_{23} \\ x_{31} & x_{32} & x_{33} \end{bmatrix}$$

This implies, of course: $y_i = x_i + c_{ii} + e_i$.

3. A Survey of Previous Studies

The problem is to estimate the various flows distinguished on the right-hand side of (2). The most interesting magnitudes are the total sizes of creation, diversion, and external creation (i.e., c_{11}, d_{11}, e_1, c_{22} and d_{22}), but there is also a certain interest in the geographical impact of diversion and external trade creation (i.e., d_{ij}, e_{1j}, for $j \neq i$).

Perhaps the most general distinction between alternative approaches to the estimation of integration-induced changes in trade flows is the ex ante / ex post dichotomy. Ex ante estimates are those that rely solely on the sort of a priori knowledge that a planner might command before integration commenced, while ex post estimates are based on some form of analysis of the historical experience of integration. The most important recent study to have utilised ex ante methods is that of Krause [5], who predicted the trade diversion that would be caused by the EEC and EFTA on the basis of assumptions about demand elasticities. This type of approach is of rather limited interest, however, because it does not provide a method of enabling one to improve previous estimates on the basis of new historical experience. For that, one must use ex post estimates. The major problem this poses is to construct a hypothetical non-integration position (the X matrix). The published studies discussed below are grouped according to the assumptions they employ for this purpose.

a. Shares Analyses

An early attempt to measure the impact of the Common Market on trade was made by Major [9] in 1962. The method consisted of an inspection of changes in market shares over the period 1958-61. It concluded that the EEC did not have much effect during this early period.

Major's analysis of market shares was subsequently developed by Verdoorn and Meyer zu Schlochtern [15]. In terms of the present notation, their measure of the "Apparent Effect of Integration", A_{ij}, in year t, was:

$$A_{ij} = \frac{(2 - y^o_{ij}/y^o_i - y^o_{ij}/y^o_j)\, y^t_{ij}/y^o_{ij}}{(1 - y^o_{ij}/y^o_j)y^t_i/y^o_i + (1 - y^o_{ij}/y^o_i)y^t_j/y^o_j}$$

where y_j^t = total exports of bloc j in year t and where year zero is a pre-integration base year. If imports of i from j develop in a manner that is typical of i and j's total trade, then A_{ij} will approximate unity; while if this trade develops particularly rapidly (slowly), A_{ij} will exceed (fall short of) unity. It seems that, for example, $(A_{11} - 1)$ is interpreted as a measure of the trade creation attributable to the EEC. In Table 1 this has been taken as their estimate of c_{11}/x_{11}. Similarly, $(1 - A_{12})$ is taken to be a measure of EEC trade diversion from EFTA as a proportion of hypothetical EEC imports from EFTA (d_{12}/x_{12}). But it is not at all certain that this is a correct interpretation, and there are passages in their text that suggest these understate their actual estimates. More serious, the formula for A_{ij} does not seem to be based on any coherent theory of the non-integration position (the X-matrix). And a high value for A_{ii} could in fact reflect trade diversion rather than creation. We would hazard the guess that A_{ij} gives a good ordinal ranking of the importance of integration effects in total but a poor cardinal measure of either creation or diversion.

b. Import Propensity

Walter [16] calculated a value of x_{11} by assuming that each member's hypothetical import propensity from its partners in 1963 could have been inferred from the actual behaviour of its import propensity over the years 1953-57. A first calculation took the hypothetical 1963 propensity as equal to the average of that actually recorded in the years 1955-57. Since this assumed that the volume of imports can normally be expected to rise at the same rate as the volume of GNP, it is not surprising that this method yielded a very large EEC effect. A second calculation estimated the hypothetical 1963 propensity by extrapolating the 1953-57 trend in the propensity. This still gave a large EEC effect, which is recorded in Table 1. (It should be noted that Walter's calculation covered total trade rather than only manufactures.)

c. Share in Total Apparent Consumption

One of the more detailed analyses has been developed by Truman [12]. His fundamental assumption is that in the absence of the EEC the shares in total apparent consumption of domestic production, imports from the rest of the EEC and imports from the rest of the world would have been constant. He found that the share of imports from non-EEC sources had

risen (though not as much as that from EEC sources); this was interpreted as the result of external trade creation, itself the result of tariff-cutting by the former high-tariff countries to the level of the common external tariff, exceeding trade diversion, which occurred largely in the former low-tariff countries. The calculations were performed for individual member countries using both aggregate data for all manufacturing and data disaggregated by broad industry groups, and taking both 1958 and 1960 as base years to compare with the "final" year of 1964. Truman's principal results are presented in Table 1.

The biggest doubt aroused by Truman's work is the basic assumption that the share of imports in total apparent consumption would remain unchanged in the absence of tariff changes. This is, seemingly, strongly at variance with the general belief that income-elasticities of demand for imports are typically well above unity. Truman himself challenges this belief, citing Maizels' study [8] which suggested that the long-run trend in the ratio of imports to domestic production is downward. In fact Truman's assumption is consistent with an aggregate income elasticity above one to the extent that imports constitute an above-average proportion of the total supply of income-elastic products. Despite this, there must remain a strong suspicion that his estimates for trade creation are biased upwards. This is especially true of external trade creation, since Truman attributes all the increase in share of extra-EEC imports to the levelling toward the common external tariff. In fact, the dollar liberalisation of the late fifties and early sixties and the Dillon Round must have been significant contributory factors, and these are not genuine "EEC effects". But one should also note that his estimates of both trade diversion and external trade creation must be subject to an (equal) downward bias caused by off-setting changes within aggregates. Finally, Truman himself judges that the use of 1958 as base year tends to overstate trade creation as a result of the fact that 1958 was a recession year which depressed imports more than production, while the 1960 base may have underestimated trade creation. These considerations suggest that the most reliable of Truman's estimates are those using disaggregated data and 1960 as base year, but that even this basis substantially overestimates EEC-induced external trade creation.

A recent updating of some of Truman's calculations to 1968 has been done by Major and Hays [11]. Their work shows that the share of

non-EEC sources in total apparent consumption has risen relatively little (from 7.5% to 7.9%) since 1964, which suggests that there has not been much additional external trade creation. In contrast, the share of EEC intra trade has continued to rise strongly, from 6.2% in 1958 to 9.9% in 1964 and to 12.3% in 1968. If one follows Truman's assumption that the total rise in consumption shares can be attributed to the EEC, this provides two estimates for 1968 corresponding to Truman's aggregate estimates for 1964. These are shown in Table 1.

d. Constant Import Elasticities

There are several ways of overcoming the fundamental defect of Truman's approach: the assumption that the share of imports in total apparent consumption would show no tendency to increase through time in the absence of customs unions. The first is to assume that the income elasticity of demand for imports would be constant through time if there were no integration, even though it may exceed unity. This approach has been explored by Balassa [1], who calculated ex post income elasticities over the periods 1953-59 and 1959-65 for intra-EEC and extra-EEC imports. If these elasticities would have remained unchanged in the absence of integration, it follows that:

i. A rise in the total import elasticity is evidence of trade creation.

ii. A rise in the intra-elasticity offset by a fall in the extra-elasticity is evidence of trade diversion.

iii. A rise in the extra-elasticity indicates external trade creation.

Balassa did not go beyond calculating the changes in income elasticities, so that it has been necessary to infer the trade changes shown in Table 1. The aggregate figure (for total trade, not manufactures) was calculated by assuming that the recorded rise in the intra-elasticity from 2.4 to 2.8 was caused by the Common Market, while the rise in the extra elasticity from 1.6 to 1.7 reflected external trade creation. The figure for manufactures was constructed from Balassa's elasticities for 1-digit SITC manufacturing industries by assuming that in each case the elasticity would have remained the same in the second period as it was in the first in the absence of the EEC.

It has been argued by Clavaux [3] that there are compelling reasons for believing that the procedure used by Balassa produces unduly

conservative estimates. The main source of downward bias arises from the fact that the intra-EEC elasticity for the early 1950s was boosted by the liberalisation of intra-European trade. On sub-dividing the period 1952-59 he found that the intra-EEC elasticity fell from 2.6 in the years 1952-55 to 1.9 during 1956-59. He argues that the latter is a more reasonable estimate of the elasticity that could have been expected in the absence of the EEC. That would imply that the trade creation attributable to the EEC needs to be revised upwards from Balassa's $2b to some $5b by 1966.

e. Extrapolation

An alternative way of overcoming the central weakness in Truman's approach is to extrapolate the rate of change of share of imports in total apparent consumption that was observed prior to the start of integration in order to construct the hypothetical non-integration position. This approach has been used by the EFTA Secretariat in order to form an estimate of the effects that EFTA has had on its members' trade [4]. This study disaggregated to a 2-digit SITC level and made free use of supplementary information regarding particular commodities, as well as changing the estimation technique where the standard procedure led to a priori absurd results. No doubt there are dangers of bias in such ad hoc procedures, but they would seem to be worth accepting in order to get the best possible estimate of the hypothetical position. A more serious criticism is that extrapolation of the import share change in the base period (1954-59) may over-estimate X and therefore underestimate the effects of EFTA since the base period was one which included substantial liberalisation. There is also the disadvantage that the method makes no attempt (other than ad hoc corrections) to normalise for exogenous changes that could be expected to alter past trends, e.g., changes in competitiveness that were not maintained throughout the period 1954-65. Nevetheless, the thoroughness of this study means that it provides a valuable addition to knowledge.

f. Import Functions

In principle a very appealing way of constructing the hypothetical position is to estimate a set of import functions, which could then be used to generate predictions of the X-matrix. (This requires the assumption that the feedback effect of integration-induced trade on growth is a second-order effect that can be ignored, so that observed

values of income can be inserted in the estimated functions.) Unfortunately, the only study that has exploited this possibility carries very little conviction. Kreinin [6] calculated import functions for the EEC and EFTA countries over the period 1953-61. The volumes of total (not manufactured) imports from partner and non-partner countries were made separate functions of real income and relative prices. The estimated equations were strikingly unsatisfactory: for example, no less than 23 of the 51 price elasticities have the wrong sign. And the use of data from as late as 1961 to estimate a hypothetical position is more than questionable (see Figure 1 below). Most important, it is not clear that the price variable ("the ratio of the import price index to the domestic wholesale price index ... in logarithm form" [6] p.275) was handled appropriately. Unless tariff changes were reflected in the import price index, it is likely that the effects of intra-European liberalisation during the base period were absorbed in the income term. And if they were reflected there, then it would have been necessary to use separate import price indices for partners and non-partners in the post-integration period and to have calculated a hypothetical non-integration price index for imports from partners. Since there is no indication that this was done, Kreinin's results must be heavily discounted. For this reason they are not shown in Table 1. (All Kreinin's estimates are of negligible effects, under $100m.)

4. A New Shares Analysis

It was argued in the previous section that little confidence can be placed in the results of the best-known existing share analysis [15], because of its apparent lack of a coherent theoretical basis. Nevertheless, the idea of using share performance to estimate what trade would have been in the absence of integration remains attractive. This is partly because there is some evidence to indicate that, in the absence of preferential tariff changes, shares tend to display a useful degree of constancy [14]; and partly because the use of share performance automatically normalises for changes in competitiveness and income. The present section therefore explores, from first principles, the possibilities of utilising data on trade shares. We are mainly interested in estimating trade creation (c_{11} and c_{22}), total trade diversion (d_{11} and d_{22}), and the EEC's external trade creation (e_1).

A subsidiary problem to which we return subsequently is whether we can also break down diversion and external creation between the two other blocs of suppliers.

In addition to the previous notation, define:

$u_{ij} = x_{ij}/x_i$ = hypothetical (non-integration) share of bloc j in i's imports;

$v_{ij} = y_{ij}/y_i$ = actual share of bloc j in i's imports.

If one were able to estimate the hypothetical shares, u_{ij}, this would be a major step toward constructing the X-matrix. It would not suffice, because $x_i = y_i$ only if $c_{ii} + e_i = 0$; but the area of ignorance would be substantially narrowed. It is therefore natural to enquire as to how one might plausibly estimate u_{ij}.

We suggest the following hypothesis.[2] The share performance of the jth supplier in markets where he neither gains nor loses preferential advantages gives a good indication of his hypothetical performance in markets which were in fact being affected by integration. In terms of the present analysis, the rest of the world provides a control which indicates what share performance would have been in EEC and EFTA markets if those two organisations had not been formed. For example, the actual change in v_{31} (the EEC's share in ROW imports) over some period indicates the simultaneous change in u_{11} (the share of intra-trade in EEC imports) that could have been expected in the absence of the EEC. A rough idea of the reliability of this hypothesis can be gained by inspecting Figure 1, which compares the values of u_{11} predicted from v_{31} with actual values of v_{11}. Prior to 1961 the differences were relatively small and unsystematic; since then, of course, the effects of the EEC have led to a large and growing divergence.

A more systematic examination of the hypothesis is undertaken in Appendix 1. This Appendix also compares the merits of different ways of formalising the assumption that u_{ij} moves in a similar way to v_{3j}, on the basis of their success in predicting share changes between 1954 and 1959. Eventually two methods were selected. One is an <u>a priori</u> formula[3] for u_{ij}:

$$(3) \quad u^t_{ij} = v^o_{ij} + \frac{v^o_{ij}(1-v^o_{ij})}{v^o_{3j}(1-v^o_{3j})}(v^t_{3j} - v^o_{3j}).$$

This formula ensures that the predicted gain in market share will be small if the previous market share was either very small (suggesting a low level of potential trade between the two blocs) or very large (suggesting that there is little scope for gaining share at the expense of other blocs). It has the disadvantage that the predicted shares may not sum to unity, but this was overcome by multiplying the u_{ij} given by (3) by $1/\Sigma_j u_{ij}$, so as to constrain the predicted shares to sum to to one.

The second method of predicting u_{ij} was to regress u_{ij} on v_{3j} over the years 1954-59, and then to use the resulting equations to predict the u_{ij}s during the 1960s. It was again decided to constrain $\Sigma_j u_{ij}$ to sum to unity.

A third set of calculations were also performed, based on the assumption that in the absence of integration the shares would have remained as they were in 1959 throughout the 1960s. This is a somewhat crude hypothesis, but it provides a check that our results are not due to spurious fluctuations in third markets [4] or to supply constraints.

As already noted, the construction of the U-matrix does not enable one to proceed directly to the estimation of trade creation and diversion. In the EEC case, one has two independent equations that will assist in the estimation of c_{11}, d_{11} and e_1 :

$$(4)\quad y_{11} = x_{11} + c_{11} + d_{11} = u_{11}x_1 + c_{11} + d_{11}$$

$$(5)\quad y_1 = x_1 + c_{11} + e_1 .$$

These two equations contain a fourth unknown, x_1 . The matrix equation (2) yields two further equations containing x_1 , d_{1j} and e_{1j}, but since these introduce a further two unknowns (the geographical breakdown of diversion and external creation) they are of no assistance in solving the primary problem. A solution therefore requires the introduction of two further assumptions or relationships.

We believe that the best available way of completing the system is to draw on existing estimates of the relative size of creation, diversion, and external creation. This has the disadvantage that our method is unable to cast new light on this important aspect of the problem. Hence the method's value is confined to estimating the total

size of integration effects, for a given assumption about their composition. At this stage we simply specify that we close the system by postulating:

(6) $d_{11} = \alpha\, c_{11}$,

(7) $e_1 = \beta\, c_{11}$.

Substitution in (4) and (5) then yields:

(8) $$c_{11} = \frac{y_{11} - u_{11}y_1}{1 + \alpha - u_{11}(1+\beta)} .$$

(6) and (7) can then be solved for d_{11} and e_1.

The two independent equations for EFTA are:

$$y_{22} = x_{22} + c_{22} + d_{22} = u_{22}x_2 + c_{22} + d_{22} ,$$

$$y_2 = x_2 + c_{22} .$$

These contain only three unknowns (c_{22}, d_{22} and x_2), so it is only necessary to introduce one additional assumption. We again select the size of diversion relative to creation:

$$d_{22} = \gamma\, c_{22} .$$

This enables one to solve for c_{22} (and hence d_{22}):

(9) $$c_{22} = \frac{y_{22} - u_{22}y_2}{1 + \gamma - u_{22}} .$$

Having thus solved the problems of primary interest, one may proceed to the secondary problem of splitting the diversion and external creation caused by one bloc between the other two blocs. This is simple in the EFTA case, since there is no external creation. Since x_2 is determined simultaneously with c_{22} ($x_2 = y_2 - c_{22}$), (2) gives immediately:

(10) $d_{21} = u_{21}x_2 - y_{21}$

(11) $d_{23} = u_{23}x_2 - y_{22}$.

Similar extraction of the EEC equations from the first row of (2) yields only:

$$(12) \quad d_{12} - e_{12} = u_{12}x_1 - y_{12}$$

$$(13) \quad d_{13} - e_{13} = u_{13}x_1 - y_{13}.$$

An additional assumption would therefore be required to obtain the geographical breakdown of gross trade diversion and external trade creation for the EEC.[5] The results given by (12) and (13) are, however, adequate for the purpose of relaxing the assumption that $r_{ij} = 0$, which is a subject taken up at the end of the next section.

5. The Results of the New Analysis

The foregoing analysis was initially applied by using the data on exports of manufactures periodically published (for example) by the Department of Trade and Industry in [2] and by the UN in [13]. While in any one of these publications the series contained are, so far as possible, on consistent definitions and coverage and are also without any significant element of estimation, the extraction of a long series spanning a period from 1954 to 1969 from a sequence of publications reveals important discontinuities. The analysis was therefore repeated using a specially-constructed series prepared by the Department of Trade and Industry. This series is presented and briefly discussed in Appendix III. (Use of the original uncorrected data results in somewhat lower estimates of integration effects, but the general picture is not changed.) The base year (year zero) used in applying (3) was 1959.

We first present (Table 2) the hypothetical shares given by our two approaches for the years 1954-69. This will permit the reader to insert his own preferred assumptions about the relative importance of creation and diversion, rather than being tied to our assumptions. Examination of Table 2 reveals that the hypothetical shares of both EEC and EFTA intra-trade began lagging behind their actual shares from 1961 on. The effect grew fairly steadily and is pronounced in recent years.

In order to translate these share changes into estimates of creation and diversion, it is necessary to select values for α, β and γ. The only studies that have attempted the necessary sub-division of integration effects are the disaggregated studies of Truman and Balassa (for α and β) and that of the EFTA Secretariat (for γ). Bearing in mind the probable overestimation of external trade creation in Truman's results (see Section 3 above), the orders of magnitude suggested by these studies are:

Truman:	$\alpha = \beta = .25$
Balassa:	$\alpha = \beta = .5$
EFTA Secretariat:	$\gamma = 1.25$

Table 3 shows the estimates of creation and diversion that result from inserting these values, and the figures for u_{ij} from Table 2, into equations (8) and (9). So far as the EEC is concerned, the first thing to note is that the "total EEC effect on intra-trade" (i.e., $(c_{11} + d_{11})/x_{11}$) is virtually unaffected by the values chosen for α and β, so long as they are assumed to be equal. Second, and equally reassuring, is that the results do not vary greatly with the chosen method of estimating hypothetical shares: the total EEC effect only varies between 53% and 60% in 1969. One may therefore use the a priori preferred approach, Method I, without the fear that the results would be drastically different if one had chosen some alternative method. Unfortunately there is a third consideration that is not illustrated in Table 3: the fact that the total EEC effect is fairly sensitive to differential changes in α and β. (Increases in α tend to decrease the total EEC effect and increases in β to raise it.) For example, a value for α of .5 and for β of .25 reduces the total EEC effect for 1969 estimated by Method I from 53% to 39%. Values of $\alpha = .25$ and $\beta = 0$ give a total EEC effect of 36%. Given the lack of evidence that diversion has greatly outweighted external creation, it is difficult to attach much weight to these lower estimates. But there must remain a significant element of doubt until such time as a more satisfactory study of the relative sizes of the different EEC effects becomes available. (The EFTA Secretariat are working on an extension of their published study that will also cover the EEC, so this may well solve the problem in due course.)

In contrast to the EEC case, the EFTA results do depend significantly on the method of prediction that is chosen. Specifically, the assumption that shares would have remained unchanged in the absence of integration yields markedly lower estimated integration effects, since EFTA was tending to lose ground in ROW markets during the 1960s. The first two methods take this as evidence that EFTA's share of EFTA markets would also have declined in the absence of integration, while the third method ignores it. EFTA experience during the 1950s, and the superior performance of Method I to Method III reported in Appendix I, suggest that the

first approach is to be preferred. Method I is again adopted as the preferred estimate: the similarity of the results yielded by Method II is reassuring.

Table 3 does not show the effect of varying γ, because the published evidence only provides a single estimate. However, we have recently learned of the preliminary results of the revised EFTA Secretariat study.[6] The latest estimates indicate a larger EFTA effect in 1965, principally as a result of more trade creation, so that γ may be close to one. This would imply a total EFTA effect, $(c_{22}+d_{22})/x_{22}$, of 26%, only 1% larger than that with $\gamma = 1.25$. The preliminary results for 1967 suggest that γ may have been falling over time, perhaps to a figure in the region of .7. That would imply a total EFTA effect of 53%, as against the 51% with $\gamma = 1.25$. Since the size of the total EFTA effect is so insensitive to large changes in γ, one may place reasonable confidence in the results in Table 3.

At the end of Section 4, equations (10) to (13) showed how it should be possible to utilise the hypothetical shares to estimate the geographical breakdown of net trade diversion. The results of solving these equations with the figures presented in Tables 2 and 3 are shown in Table 4. So far as the EEC is concerned, the assumption that $\alpha = \beta$ implies that net trade diversion for EFTA and the ROW together is zero; what one bloc gains, the other loses, and the only problems are to decide which bloc is the gainer and what is the extent of its gain. According to the results of Method I, EFTA was the loser in the early years but became a substantial net gainer from the mid-1960s onwards. According to Method II, EFTA's early losses were converted to a gain during the mid-1960s, which has recently been lost again to the ROW. The results for EFTA are even less consistent. Not only do both methods yield negative trade diversion in some years (which is implausible with EFTA since there is no external trade creation), but Method II contradicts the conventional wisdom that the EEC has been the major sufferer from EFTA-induced trade diversion, while Method I supports it. The inconsistency of these results is not such as to inspire confidence, and it would seem impossible to utilise them at the present juncture.

It had been hoped to draw on these results in order to estimate whether significant distortions in the estimates might be produced by the repercussions of attempts to neutralise the balance-of-payments

impacts of integration (see Section 2). Since this is not feasible, it is necessary to adopt a more informal approach to this question. The previous Section concluded that diversion and external creation had been roughly equal for the EEC, so that their net effect on the balance of payments was zero. Hence both the EEC and the ROW experienced a payments change only to the extent that they suffered from the effects of EFTA diversion. Clearly these effects were proportionately far smaller than they were for EFTA, so one may concentrate on studying the effects on EFTA itself. According to our estimate, EFTA's trade balance in 1969 was something over $1 billion stronger than it would have been in the "anti-monde" (i.e., if integration had not occurred). Suppose that $400 millions of this increase were neutralised by lesser exports, $400 millions by higher imports, and the remainder by capital movements or reserve changes. If the effects on exports and imports were distributed in proportion to the value of trade with each region, r_{22} would be close to zero since the increased imports would cancel out the fall in exports. The value of r_{32} would be about - $200 millions. This would mean that $x_{32} > y_{32}$, so that the use of v_{32} in predicting u_{22} would bias u_{22} down and therefore bias c_{22} and d_{22} upwards. But the effect is quantitatively trivial: substitution of the amended value of x_{32} merely increased u_{32} from .212 to .213. Since this is the largest repercussion that one could expect to find, one may safely follow the custom of ignoring balance-of-payments reactions.

6. The Stylized Facts

It is of interest to compare the results of our method shown in Table 3 with those of previous studies that were shown in Table 1. (The following comparison is confined to $(c_{11} + d_{11})/x_{11}$ and to the results of Method I.) The Verdoorn-Schloctern study appears to have given exaggerated results: in view of the criticisms made in Section 3, the inaccuracy is not surprising. Walter's very high estimate of 43% in 1963 is much more puzzling: this is double our estimate and there is no obvious explanation for the discrepancy. It is true that Walter worked in volume terms, whereas our analysis is conducted in value terms, and he included total trade, whereas our analysis is restricted to manufactures. In view of the small movements in the prices of internationally-traded manufactures during the 1960s, it is difficult to attach much significance

to the first of these differences; and since the common agricultural policy had not been launched by 1963, there is no obvious reason as to why the second difference should produce a larger EEC effect. This discrepancy therefore remains an unsolved problem. Fortunately there is much better agreement with the other studies. Our estimate agrees with Truman's preferred estimate of 31% in 1964. Balassa's results appear unduly conservative, which accords with the a priori expectation. Clavaux's figure is in close agreement. Major and Hay's figure is, of course, far too large, but this is to be expected in view of the comparison between Truman's aggregated result on a 1958 base of 57% and his preferred result of 31%, as well as the ever-growing upward bias implicit in Truman's assumption that the share of imports in total apparent consumption would not grow in the absence of integration.

Despite the vast range of variation in the results of published studies, the previous paragraph suggests that there is only one study (that of Walter) whose inconsistency with our results is at all disturbing. Once allowance is made for their inadequacies, the other studies tend to confirm our own results. Hence we conclude that intra-EEC trade in 1969 was something like 50% greater than it would have been if the EEC had not been created. Most of this rise appears to be attributable to trade creation rather than diversion, while the harm done to other countries' exports by diversion was largely offset by positive external trade creation.

Although our figure of a 25% EFTA effect in 1965 is greater than the 18% of the EFTA Secretariat reported in Table 1, it is probable that the difference will be much reduced when the revised study by the EFTA Secretariat becomes available. If, as expected, this leads to an increase in the ratio of creation to diversion in EFTA, one would expect to end up with a total EFTA effect rather higher than the EEC effect, say 60%, as a result of a higher rate of trade diversion coupled with a rate of trade creation only marginally less.

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Table 1 - Estimates of Integration Effects

EEC

Year	Author	Source	Trade creation c_{11} ($b.)	c_{11}/y_{11}	c_{11}/x_{11}	Trade diversion d_{11} ($b.)	d_{11}/y_{11}	d_{11}/x_{11}	External trade creation e_1 ($b.)	$\frac{c_{11}+d_{11}}{x_{11}}$
1962	Verdoorn & Schloctern	[15]	n.a.	.18	.22	0	0	0	-	.22
1963	Walter* †	[16]p.86								.43
1964	Truman: aggregated, 58 base	[12]p.222	4.93	.36	.57	0	0	0	1.73	.57
	" 60 "	"	2.93	.21	.27	0	0	0	.13	.27
	disaggregated, 58 "	[12]p.224	4.54	.33	.51	.18	.01	.02	1.76	.53
	" 60 "	"	2.60	.19	.25	.63	.05	.06	.97	.31
1965	Balassa: aggregate1*†	[1]p.8	1.90	.12	.14	0	0	0	.91	.14
	Balassa: disaggregated†	[1]p.8	1.90	.12	.15	1.13	.07	.09	1.06	.24
1966	Clavaux	[3]p.612	5	.29	.41	-	-	-	-	.41
1968	Major & Hays updating of Truman: aggregated 58 base	[11]p.33	10.77	.50	.98	0	0	0	2.89	.98
EFTA			c_{22}	c_{22}/y_{22}	c_{22}/x_{22}	d_{22}	d_{22}/y_{22}	d_{22}/x_{22}		$(c_{22}+d_{22})/x_{22}$
1965	EFTA Secretariat	[4]	.37	.07	.08	.46	.08	.10		.18

* indicates total trade, rather than just manufactures

† indicates constant-price calculation

Table 2 - Predicted and Actual Shares 1954-69

	1954 Base						1959 Base									
	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
u_{11} Formula ROW (3)		.535	.527	.539	.563	.571	.580	.580	.571	.567	.569	.575	.580	.592	.595	.589
v_{11} Actual ROW (3)	.526	.542	.543	.539	.543	.573	.569	.585	.594	.615	.635	.655	.663	.670	.679	.687
u_{11} Regression ROW (T)							.511	.509	.502	.499	.500	.503	.506	.512	.514	.510
v_{11} Actual ROW (T)	.473	.488	.486	.491	.495	.519	.518	.536	.549	.571	.590	.602	.605	.613	.618	.625
u_{12} Formula ROW (3)		.292	.288	.277	.273	.269	.262	.260	.258	.260	.245	.241	.234	.222	.214	.217
v_{12} Actual ROW (3)	.298	.280	.286	.281	.274	.268	.240	.242	.237	.226	.215	.206	.198	.189	.179	.174
u_{12} Regression ROW (T)							.242	.239	.237	.237	.227	.225	.220	.212	.208	.209
v_{12} Actual ROW (T)	.269	.252	.256	.256	.250	.243	.218	.222	.219	.210	.200	.191	.180	.172	.163	.158
u_{13} Formula ROW (3)		.173	.185	.184	.165	.159	.158	.160	.171	.174	.186	.184	.186	.186	.191	.195
v_{13} Actual ROW (3)	.176	.178	.171	.180	.183	.158	.191	.173	.169	.159	.150	.139	.139	.141	.142	.139
u_{13} Regression ROW (T)							.247	.252	.261	.264	.273	.272	.275	.275	.278	.281
v_{13} Actual ROW (T)	.258	.260	.258	.253	.255	.239	.264	.242	.232	.219	.210	.207	.215	.215	.219	.217
u_{21} Formula ROW (3)		.526	.519	.530	.554	.563	.563	.563	.554	.549	.551	.558	.563	.576	.579	.572
v_{21} Actual ROW (3)	.517	.514	.529	.536	.551	.556	.541	.553	.549	.537	.517	.515	.503	.481	.480	.484
u_{21} Regression ROW (T)							.491	.485	.471	.466	.461	.465	.466	.473	.474	.468
v_{21} Actual ROW (T)	.443	.440	.454	.470	.488	.487	.480	.491	.487	.473	.457	.454	.440	.425	.419	.427
u_{22} Formula ROW (3)		.310	.306	.295	.290	.286	.277	.275	.273	.274	.260	.255	.248	.235	.227	.230
v_{22} Actual ROW (3)	.316	.293	.293	.285	.288	.283	.262	.281	.289	.303	.302	.311	.323	.336	.332	.345
u_{22} Regression ROW (T)							.242	.238	.235	.234	.223	.221	.215	.208	.203	.204
v_{22} Actual ROW (T)	.271	.251	.251	.250	.255	.248	.232	.249	.256	.267	.267	.274	.283	.297	.290	.304
u_{23} Formula ROW (3)		.164	.176	.175	.156	.151	.160	.162	.173	.176	.189	.187	.189	.189	.194	.198
v_{23} Actual ROW (3)	.167	.192	.178	.179	.161	.161	.197	.166	.162	.161	.181	.175	.174	.182	.188	.170
u_{23} Regression ROW (T)							.267	.277	.294	.300	.316	.314	.319	.319	.323	.328
v_{23} Actual ROW (T)	.287	.309	.295	.280	.256	.265	.288	.259	.257	.261	.276	.272	.277	.279	.291	.269
v_{31} Actual ROW (3)	.265	.274	.264	.274	.301	.310	.317	.316	.304	.298	.295	.302	.306	.317	.318	.310
v_{31} Actual ROW (T)	.236	.244	.235	.244	.269	.277	.281	.275	.261	.255	.251	.256	.257	.266	.267	.260
v_{32} Actual ROW (3)	.292	.287	.280	.270	.271	.269	.264	.261	.257	.257	.241	.237	.230	.219	.210	.212
v_{32} Actual ROW (T)	.260	.256	.249	.240	.242	.240	.233	.227	.221	.220	.204	.201	.193	.183	.176	.177
v_{33} Actual ROW (3)	.443	.439	.456	.456	.428	.420	.419	.423	.440	.440	.464	.460	.464	.464	.472	.478
v_{33} Actual ROW (T)	.504	.500	.516	.516	.489	.482	.486	.498	.518	.525	.545	.543	.550	.551	.556	.562

Table 3 - New Estimates of Integration Effects, 1960-69 ($ billions or ratio)

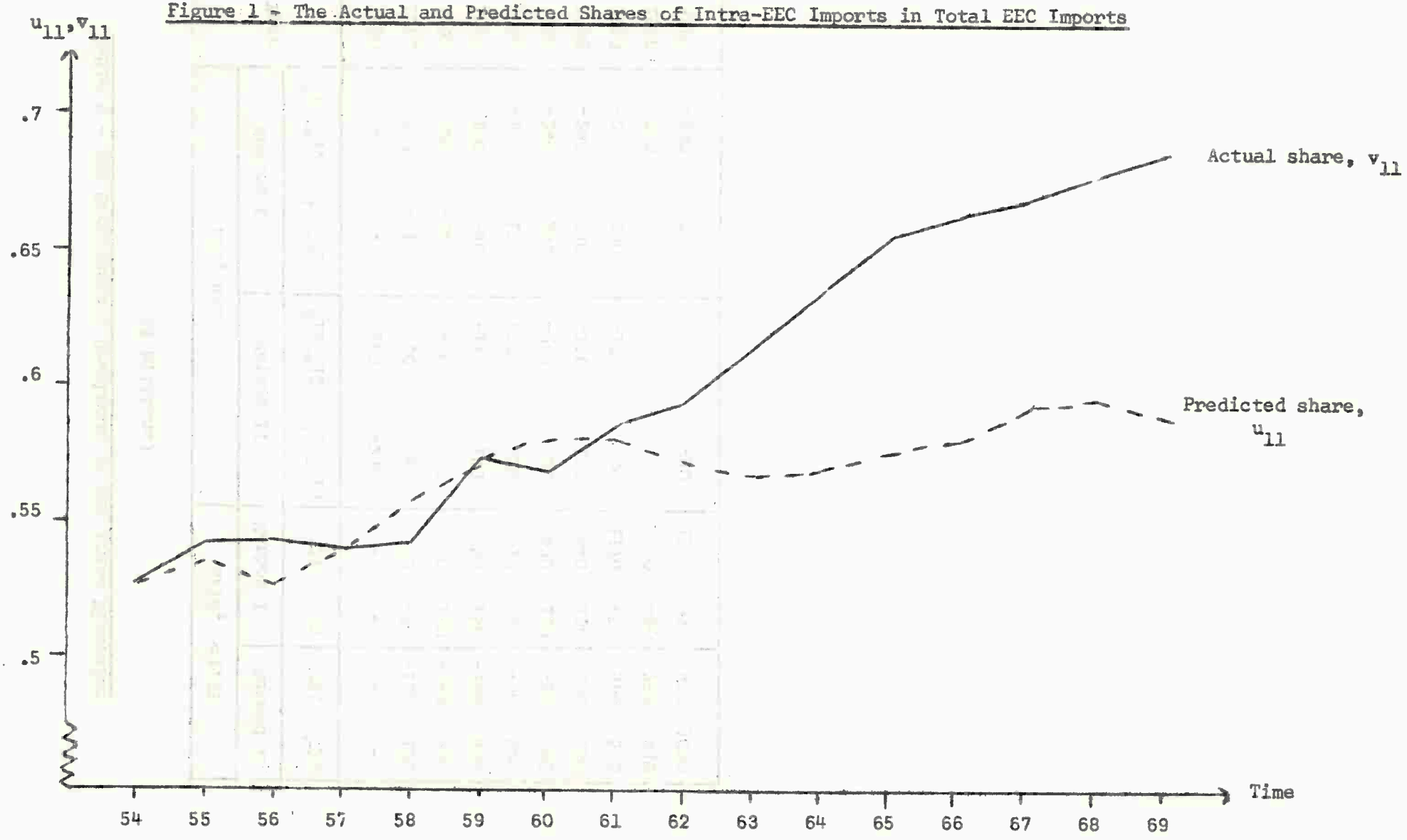
Year Area & Assumptions	Method I: Formula D, Row (3) to ROW (inc. OSA)					Method II : Linear Regression, ROW(T) to ROW (inc. OSA)					Method III: $u^t_{ij}=v^{59}_{ij}$, ROW(T) to ROW (inc. OSA)				
	c_{11}	c_{11}/x_{11}	$d_{11}(=e_{11})$	d_{11}/x_{11}	$\frac{c_{11}+d_{11}}{x_{11}}$	c_{11}	c_{11}/x_{11}	$d_{11}(=e_1)$	d_{11}/x_{11}	$\frac{c_{11}+d_{11}}{x_{11}}$	c_{11}	c_{11}/x_{11}	$d_{11}(=e_1)$	d_{11}/x_{11}	$\frac{c_{11}+d_{11}}{x_{11}}$
1960 EEC: $\alpha=\beta=.25$	-	-	-	-	-	.2	.02	-	-	.02	-	-	-	-	-
1961	.1	.02	-	-	.02	.7	.09	.2	.02	.11	.4	.06	.1	.01	.07
1962	.7	.08	.2	.02	.10	1.3	.17	.3	.04	.21	.9	.10	.2	.03	.13
1963	1.7	.17	.4	.04	.21	2.3	.27	.6	.07	.34	1.8	.19	.4	.05	.24
1964	2.6	.25	.7	.06	.31	3.3	.38	.8	.09	.47	2.7	.27	.7	.07	.34
1965	3.4	.31	.9	.08	.39	4.0	.39	1.0	.10	.49	3.5	.32	.9	.08	.40
1966	4.2	.34	1.0	.09	.43	4.6	.39	1.2	.10	.49	4.1	.33	1.0	.08	.41
1967	4.2	.32	1.0	.08	.40	4.9	.41	1.2	.10	.51	4.7	.37	1.2	.09	.46
1968	5.3	.35	1.3	.09	.44	6.0	.42	1.5	.11	.53	5.8	.40	1.4	.10	.50
1969	7.7	.42	1.9	.11	.53	8.3	.48	2.1	.12	.60	7.8	.44	2.0	.11	.55
1960 EEC: $\alpha=\beta=.5$	-	-	-	-		.1	.02	.1	.01	.03	-	-	-	-	-
1961	.1	.01	.1	.01	.02	.6	.08	.3	.04	.12	.4	.05	.2	.02	.07
1962	.6	.07	.3	.03	.10	1.1	.14	.6	.07	.21	.7	.09	.4	.04	.13
1963	1.4	.14	.7	.07	.21	1.9	.22	1.0	.11	.33	1.5	.15	.7	.08	.23
1964	2.2	.21	1.1	.11	.32	2.8	.29	1.4	.15	.44	2.3	.22	1.1	.11	.33
1965	2.9	.26	1.4	.13	.39	3.4	.33	1.7	.16	.49	2.9	.27	1.5	.13	.40
1966	3.5	.29	1.7	.14	.43	3.8	.33	1.9	.16	.49	3.4	.28	1.7	.14	.42
1967	3.5	.27	1.7	.13	.40	4.1	.34	2.1	.17	.51	3.9	.31	1.9	.16	.47
1968	4.4	.29	2.2	.15	.44	5.0	.35	2.5	.18	.53	4.8	.33	2.4	.17	.50
1969	6.4	.35	3.2	.18	.53	6.9	.40	3.5	.20	.60	6.5	.37	3.3	.18	.55
	c_{22}	c_{22}/x_{22}	d_{22}	d_{22}/x_{22}	$(c_{22}+d_{22})/x_{22}$	c_{22}	c_{22}/x_{22}	d_{22}	d_{22}/x_{22}	$\frac{(c_{22}+d_{22})}{x_{22}}$	c_{22}	c_{22}/x_{22}	d_{22}	d_{22}/x_{22}	$\frac{(c_{22}+d_{22})}{x_{22}}$
1960 EFTA $\gamma=1.25$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1961	-	.01	-	.01	.02	.1	.02	.1	.03	.05	-	-	-	-	-
1962	.1	.03	.1	.04	.07	.1	.05	.2	.06	.11	.1	.02	.1	.02	.04
1963	.2	.05	.2	.07	.12	.2	.07	.3	.09	.16	.1	.04	.2	.05	.09
1964	.3	.08	.4	.11	.19	.3	.10	.4	.13	.23	.2	.04	.2	.05	.09
1965	.4	.11	.5	.14	.25	.5	.12	.6	.15	.27	.2	.05	.3	.07	.12
1966	.6	.16	.8	.20	.36	.6	.16	.8	.20	.36	.3	.07	.4	.09	.16
1967	.9	.23	1.1	.28	.51	.9	.22	1.1	.27	.49	.5	.10	.6	.13	.23
1968	1.0	.24	1.3	.30	.54	.9	.22	1.2	.27	.49	.5	.09	.6	.11	.20
1969	1.3	.26	1.6	.33	.59	1.2	.25	1.6	.32	.57	.7	.12	.9	.15	.27

Table 4 - The Geographical Breakdown of Net Trade Diversion

($ millions)

Year	EEC, $\alpha=\beta$				EFTA, $\gamma=1.25$			
	Method I		Method II		Method I		Method II	
	$d_{12}-e_{12}$	$d_{13}-e_{13}$	$d_{12}-e_{12}$	$d_{13}-e_{13}$	d_{21}	d_{23}	d_{21}	d_{23}
1960	-	-	280	-290	-	-	-	-
1961	210	-210	60	-60	90	-50	-110	190
1962	120	-120	-70	80	10	100	-260	420
1963	100	-80	-140	140	50	150	-190	460
1964	-170	170	-320	320	310	60	-90	520
1965	-240	240	-280	280	430	110	-10	580
1966	-280	280	-130	150	640	130	190	590
1967	-250	250	-130	100	1170	-50	560	530
1968	-310	310	0	0	1340	-90	760	410
1969	-340	380	70	-80	1230	370	470	1090

Figure 1 - The Actual and Predicted Shares of Intra-EEC Imports in Total EEC Imports



Footnotes

1. This paper arose from work undertaken while both authors were members of the Government Economic Service. They wish to express their appreciation to H.M. Treasury and to the Department of Trade and Industry for permission to draw on this work in writing the present paper. They are greatly indebted to several members of the Government Economic and Statistical Services for valuable help and criticism. It remains the case that judgments and opinions are strictly the responsibility of the authors alone.

2. Since this was first written, we have discovered that this hypothesis was developed and utilised by Lamfalussy [7] as early as 1963. Although Lamfalussy did not fully formalise the hypothesis and can be criticised for implicitly assuming that the sole effect of integration was trade diversion (since he did not allow for any change in the total level of imports), the subsequent neglect of his pioneering approach is surprising.

3. We are indebted to Professor A.B. Atkinson for suggesting this formula.

4. We also considered adding a fourth set of calculations, based on the assumption that u^t_{ij} could be predicted by extrapolating the change in v_{ij} between 1954 and 1959. However, we previously argued that share changes during the 1950s were strongly influenced by differential trade liberalisation, and so this approach would tend to reproduce the errors for which we criticised Balassa and Kreinin.

5. The reader may be tempted to try further substitutions to solve these equations. There are insufficient degrees of freedom to permit this: further manipulations only lead to identities.

6. We are indebted to Mr. J. Lanner and the EFTA Secretariat for permission to quote these very preliminary results of their revised study.

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Appendix I

Alternative Formulations of the Share Hypothesis

The hypothesis to be formalised is that the share performance of the jth supplier in markets where there are no preferential tariff changes gives a good indication of the jth supplier's hypothetical performance in markets that were in fact being affected by integration. Four formulae were considered.

$$\text{A.} \quad u^t_{ij} = \frac{v^t_{3j}}{v^o_{3j}} v^o_{ij} .$$

This says that if the actual proportion of ROW imports supplied by bloc j rose by 10% of its initial level (e.g. from .2 to .22), then the hypothetical proportion of i's imports supplied by j would also have risen by 10% of its initial value. A disadvantage of the formula is that it gives implausible results when v_{ij} is large, since there is then little scope for j to expand its sales in the ith market.

$$\text{B.} \quad \frac{(1 - u^t_{ij})}{(1 - v^o_{ij})} = \frac{(1 - v^t_{3j})}{(1 - v^o_{3j})}$$

This says that if bloc j gains 10% of the potential market share it could gain in the ROW, one would also expect it to gain 10% of that part of the bloc i market that it does not already supply. This rectifies the defect in formula A, but at the cost of giving implausible values when v_{3j} is small. For example, suppose that j initially had only 1% of the ROW market. A doubling of that market share would suggest a stronger performance than implied by the gain of 1.01% of the potential market, which is what formula B takes to be the relevant figure.

$$\text{C.} \quad u^t_{ij} = v^o_{ij} + (v^t_{3j} - v^o_{3j}).$$

A possible compromise between A and B is to assume that a gain of 1% of the absolute market share in the ROW would indicate a hypothetical gain of 1% of the absolute market share in bloc i.

D. $$v^t_{ij} = v^o_{ij} + \frac{v^o_{ij}(1 - v^o_{ij})}{v^o_{3j}(1 - v^o_{3j})} (v^t_{3j} - v^o_{3j}).$$

This is an alternative compromise between formulae A and B. It involves weighting the observed change in share in ROW imports so as to reduce the predicted share in the ith bloc's imports if v_{ij} is either very large or very small, while magnifying the effect if v_{3j} is either very large or very small.

Of these four formulae, only C gives predicted shares which in general sum to unity. It was therefore decided to see whether constraining the shares given by the other formulae so that they summed to one would improve performance. This was found to result in a definite improvement, so all shares were constrained.

The data used are shown in Appendix III. There is a certain amount of freedom about how one should choose to interpret "the ROW". In particular, it seems reasonable to consider excluding OSA imports from ROW imports, on the grounds that the Sterling Area is a former preferential trading bloc which was rapidly eroding during the period under study. However, data limitations prevent one extracting the OSA unless one also restricts the coverage of ROW exports to those originating from the USA, Canada and Japan (designated "ROW (3)").

Hypothetical shares were calculated by all four methods for 1958 and 1959 on a 1954 base (see Table I.1). There were three objects in mind in studying how well the technique would have performed if it had been used to predict trade developments in the 1950s. The first was to assess whether the general approach is of significant predictive value. The second was to determine which of the four formulae gave the best predictions. The third was to assess which of the three alternative data sets enabled the best predictions to be made. (The first data set takes ROW (3) as the ROW for purposes of exports and includes the OSA in ROW on the import side; the second takes ROW (3) on the export side but excludes OSA imports from the analysis altogether; the third takes the total ROW on both export and import sides.)

In order to answer these questions it is helpful to develop measures of the size of the prediction errors. Two ad hoc measures were devised. The first was called the "proportionate error", PE, and is defined as

$(u^t_{ij}/v^t_{ij} - 1) \times 100$. The second was called the "absolute error", AE, and is defined as $(u^t_{ij} - v^t_{ij}) \times 100$. The absolute values of these two measures were summed over the six u_{ij} cases involved in each prediction (i.e., each application of one of the formulae to a particular data set for a particular year). The results are displayed in Table I.1 in the rows labelled "sum of |PE|" and "sum of |AE|".

To assess whether the approach is of significant predictive value it is possible to observe that the errors did not seem to be unreasonably large and that there was no indication that they were systematically increasing as the year being predicted was pushed further back from the base year (see figure 1). A more systematic procedure is to calculate the errors that would have occurred if one had adopted the naive hypothesis that 1954 shares could have been expected to remain unchanged. This hypothesis produced errors that are shown in the appropriate rows of Table I.1 and in the columns headed "v_{ij}". It will be found that the naive hypothesis produced unambiguously larger errors in 16 of the 24 cases, while in a further 3 cases the comparison was ambiguous since the PE and AE comparisons showed opposite results. There were 5 cases where the naive hypothesis performed better. Since the naive method is itself one that can be defended as a plausible first approximation (see Section 4), these results are not discouraging.

Of the four formulae, it is clear that B performed least well. There is little to choose between the other three, but D appears to be marginally preferable. Since this also appears the most attractive on a priori grounds, it was adopted for the work reported in the main paper.

Of the three data sets, the first gave the best predictions. The work reported in the text therefore restricts the ROW on the export side to the three major countries of the USA, Canada and Japan, but the OSA countries were not extracted from the ROW on the import side. Our work did not suggest that the results are particularly sensitive to the data set employed.

Regression Analysis

An alternative way of formalising the hypothesis that u_{ij} varies with v_{3j} is to calculate a regression equation using the data from the years 1954-59. Each equation is based on only six observations, which means that the results cannot command great confidence and are quite

likely to be less reliable than those based on the a priori approach; but, at the very least, this alternative approach provides a useful check.

Six sets of equations were calculated, based on the three sets of data and utilising both log and linear forms. The results are shown in Table I.2. The values of the various statistical measures calculated did not suggest that there was a lot to choose between the alternative specifications. In fact the linear regression employing data from ROW (T) to ROW (inc. OSA) was chosen, partly on the grounds that this had all the t-values close to being significant and partly so as to provide an additional check on the previous results by using a different data set.

Table I.1

A Comparison between Actual and Predicted Share Performance

Data Set		1954	1958					1959				
		v_{ij}	v_{ij}	A	B	C	D	v_{ij}	A	B	C	D
ROW (3) to ROW (inc.OSA)	u_{11}	.526	.543	.572	.560	.562	.563	.573	.582	.570	.571	.571
	u_{12}	.298	.274	.265	.283	.277	.273	.268	.260	.283	.276	.269
	u_{13}	.176	.183	.163	.157	.161	.165	.158	.158	.146	.153	.159
	u_{21}	.517	.551	.563	.551	.553	.554	.556	.573	.561	.562	.563
	u_{22}	.316	.288	.282	.301	.295	.290	.283	.276	.302	.293	.286
	u_{23}	.167	.161	.155	.148	.152	.156	.161	.150	.137	.144	.151
Sum of |P.E|			35.2	27.5	33.2	23.0	18.2	53.1	17.0	35.4	21.9	9.9
Sum of |A.E|			11.6	8.2	7.8	6.2	4.9	17.3	5.2	7.8	4.8	2.4
ROW (3) to ROW (exc.OSA)	u_{11}	.526	.543	.552	.562	.554	.549	.573	.557	.581	.566	.555
	u_{12}	.298	.274	.290	.310	.301	.296	.268	.295	.324	.310	.304
	u_{13}	.176	.183	.158	.128	.145	.155	.158	.148	.094	.125	.141
	u_{21}	.517	.551	.543	.553	.545	.540	.556	.547	.573	.557	.545
	u_{22}	.316	.288	.307	.329	.319	.313	.283	.313	.343	.328	.321
	u_{23}	.167	.161	.150	.118	.136	.147	.161	.140	.084	.116	.134
Sum of |P.E|			35.2	36.1	88.0	63.3	43.8	53.1	44.7	134.8	82.9	59.5
Sum of |A.E|			11.6	8.8	16.4	13.8	10.6	17.3	11.3	28.2	17.3	14.7
ROW (T) to ROW (inc.OSA)	u_{11}	.473	.495	.518	.504	.506	.510	.519	.529	.513	.514	.519
	u_{12}	.269	.250	.240	.255	.250	.246	.243	.226	.255	.249	.244
	u_{13}	.258	.255	.241	.241	.244	.243	.239	.235	.232	.237	.237
	u_{21}	.443	.488	.487	.473	.475	.480	.487	.497	.482	.484	.490
	u_{22}	.271	.255	.243	.256	.252	.248	.248	.240	.256	.251	.246
	u_{23}	.287	.256	.269	.270	.272	.271	.265	.263	.261	.265	.264
Sum of |P.E|			40.8	24.1	22.6	16.7	19.5	55.1	55.6	44.1	39.1	46.0
Sum of |A.E|			13.6	7.3	5.8	5.4	6.1	18.0	19.6	15.1	12.0	16.2

Table I.2 Alternative Regression Equations

Data Set	Dependant variable	log regressions						linear regressions						Independent variable
		Constant term	Coefficient of V_{3j}	S. E.	t-value	Correlation coefficient	S.E. estimate	Constant term	Coefficient of V_{3j}	S. E.	t-value	Correlation coefficient	S. E. estimate	
ROW (3) to ROW (inc. OSA)	V_{11}	-.087	.322	.130	2.47	.78	.009	.369	.624	.248	2.52	.78	.011	V_{31}
	V_{12}	-.084	.841	.312	2.69	.80	.011	.044	.853	.314	2.71	.81	.007	V_{32}
	V_{13}	-.520	.670	.720	.93	.42	.023	.066	.245	.281	.87	.40	.009	V_{33}
	V_{21}	-.045	.412	.120	3.45	.87	.008	.316	.776	.218	3.57	.87	.009	V_{31}
	V_{22}	-.026	1.006	.275	3.66	.88	.009	-.006	1.076	.297	3.62	.88	.006	V_{32}
	V_{23}	-.306	1.283	.831	1.54	.61	.027	-.043	.491	.339	1.45	.59	.011	V_{33}
ROW (3) to ROW (exc. OSA)	V_{11}	-.102	.317	.158	2.00	.71	.010	.368	.574	.275	2.09	.72	.012	V_{31}
	V_{12}	-1.242	-.975	.622	-1.57	-.62	.014	.552	-1.386	.898	-1.54	-.61	.009	V_{32}
	V_{13}	-.561	.651	.494	1.32	.55	.021	.068	.215	.145	1.23	.52	.009	V_{33}
	V_{21}	-.085	.366	.182	2.01	.71	.011	.336	.645	.305	2.11	.73	.013	V_{31}
	V_{22}	-1.220	-.968	.717	-1.35	-.56	.016	.578	-1.459	1.096	-1.33	-.55	.011	V_{32}
	V_{23}	-.469	.966	.616	1.57	.62	.027	.007	.334	.225	1.49	.60	.011	V_{33}
ROW (T) to ROW (inc. OSA)	V_{11}	-.079	.380	.110	3.47	.87	.007	.306	.742	.211	3.51	.87	.008	V_{31}
	V_{12}	-.183	.680	.348	1.95	.70	.012	.080	.704	.356	1.98	.70	.007	V_{32}
	V_{13}	-.390	.686	.437	1.57	.62	.012	.085	.336	.219	1.53	.61	.007	V_{33}
	V_{21}	.005	.565	.169	3.34	.86	.011	.205	1.033	.301	3.43	.86	.012	V_{31}
	V_{22}	-.206	.642	.344	1.87	.68	.012	.087	.674	.357	1.89	.69	.007	V_{32}
	V_{23}	-.101	1.499	.994	1.51	.60	.027	-.127	.817	.569	1.44	.58	.018	V_{33}

Appendix II

Application of the Analysis to UK Exports

The assumption that export performance in third markets permits a prediction of hypothetical trade performance at unchanging levels of preference can also be used to analyse the recent performance of UK exports. We adopt the following notation, which is consistent with that used previously:

	UK Exports	Total Imports	UK Share	UK Exports	Total Imports
EEC	y_{14}	y_1	v_{14}	$x_{14}-d_{14}+e_{14}$	$x_1+c_{11}+e_1$
Cont. EFTA	y_{54}	y_5	v_{54}	$x_{54}+c_{54}+d_{54}$	x_5+c_5
OSA	y_{64}	y_6	v_{64}	$x_{64}-d_{64}$	x_6
ROW	y_{74}	y_7	v_{74}	x_{74}	x_7

It has to be admitted that the use of the ROW (excluding the OSA) as a control group gives extremely bad predictions of the changes that were actually realised during the 1950s. The UK share in this market actually rose (from 11.1% to 12.2%) between 1954 and 1959, while it fell substantially in the EEC (from 14.4% to 11.9%), EFTA (from 18.9% to 14.5%), and the OSA (from 56.6% to 47.3%). One gets much better predictions if one uses the ROW <u>including</u> the OSA as the control group. Nevertheless, it was decided to use the ROW excluding the OSA as the control group for the calculations. This is partly because we wished to obtain an estimate of the effect of the erosion of Commonwealth ties on exports to the OSA, but primarily because we judged that the contradictory performance of UK exports to the ROW and elsewhere during the 1950s was a fluke.

Since the application of the analysis to a single country's exports does not permit one to constrain the shares to sum to unity, it was decided to predict the hypothetical share vector (u_{i4}) by formula C.

In order to close the system, it is again necessary to introduce certain additional assumptions. The following were chosen:

$c_{11}+e_1$ = EEC trade creation
= the estimates given by Method I, $\alpha=\beta=.25$, of Table 3;

c_5 = increase in Continental EFTA imports caused by trade creation
= $.8\ c_{22}$ (since the UK has only 72/373 of the EFTA trade creation in Table 6 of [4]; and where c_{22} is given by Method I of Table 3).

The results of these calculations are shown in Table II.1. The first row suggests that EEC diversion was slightly greater than external creation in recent years, but that in comparison to the anti-monde the loss of exports has been modest. This is consistent with the apparent experience of extra-EEC imports as a whole. The second row suggests that the effects of EFTA in stimulating exports to Continental EFTA have been rather less than would be indicated by the preceding analysis and [4], although the discrepancy is marked only for the post-devaluation year of 1968. The third row suggests that there has been a striking export loss in the OSA. The size of this loss may well have been exaggerated by the use of Method C (in view of the fact that the initial share in OSA markets was several times that in the control group), so the loss was recalculated using Method A (row 4). The loss is still very substantial.

A decade ago, Major concluded ([10], p.27):

> "Britain's falling share in world trade in manufactures is not explained, to any great extent, by changes in the pattern of world trade; ... a good deal of it is due to her falling share in sterling markets; and ... this has probably been associated ... with the reduced protection which she has enjoyed in these markets".

The present analysis suggests that the second of these conclusions remained valid throughout the 1960s, and that it is a factor of considerable force. In contrast, the view is sometimes expressed that "geographical factors" account for very little of the slow growth of UK exports. (See, for example, Table 1 and the comments thereon in [4a].) This conclusion comes from automatically assuming that it is reasonable to expect the UK to maintain a constant share in OSA markets. In fact, given the very high initial share of the UK and the erosion of the preferences and historical ties that were responsible for that share performance, it is entirely natural for the British share to decline. In this sense, the geographical distribution of UK exports was a major determinant of their slow growth during the 1960s.

It is only proper to stress that the poor predictive performance of the underlying hypothesis during the 1950s means that these results should be treated with considerable caution.

Table II.1

Estimated Effects of Preferential Tariff Changes on UK Exports

($ billions)

		1966	1967	1968	1969
Loss of exports to EEC caused by net trade diversion	$d_{14}-e_{14}$	.01	-.05	.07	.10
Additional exports to EFTA caused by trade creation and diversion	$c_{54}+d_{54}$	.15	.22	.12	.24
Loss of exports to OSA caused by post-1959 erosion of Commonwealth preference and other ties	d_{64}	1.47	1.82	2.22	2.38
Ditto, using Method A	d_{64}	1.05	1.13	1.47	1.58

Appendix III*

The Data

While efforts are usually made to ensure that significant discontinuities of definition and coverage are removed from series published at any one time, it is likely that there will be discontinuities if a long series has to be compiled from a sequence of publications issued at different dates. The final estimates were therefore based upon a special series, which is shown below, in which adjustments were made to eliminate so far as possible the effects of the discontinuities.

Trade flows cover SITC 5-8 and are measured from the export side. Blocs are defined as follows:

a. The EEC consists of all EEC countries.

b. EFTA consists of all EFTA countries (including Finland) except Iceland, except that exports from the ROW to Finland are not included in y_{23}.

c. ROW 3 consists of USA, Canada, and Japan.

d. The ROW covers all non-EEC, non-EFTA countries, except that intra-trade of the Sino-Soviet bloc and the estimated effects of the US-Canadian automotive agreement are excluded so far as possible from y_{33}.

e. The OSA consists of the non-OECD Sterling Area, in which Rhodesia is included only for 1954-65.

These data differ from series compiled from a sequence of the annual articles on world trade in manufactures published by the Department of Trade and Industry (for example, in [2]) in the following ways:

a. Several minor discontinuities have been eliminated. For instance, estimates of trade in pearls and diamonds have been included in and re-exports excluded from the UK export series throughout.

b. Finland is included with EFTA throughout.

c. Approximate estimates of the effects of the US-Canadian automotive agreement have been applied to the original published data to obtain the corrected value of y_{33}.

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*We are extremely grateful to the Department of Trade and Industry for permission to use and publish the adjusted series given in this Appendix.

d. An approximate adjustment has been made to the figures of ROW exports from 1954 to 1961 in order to remove as far as possible the discontinuity due to the change in the treatment of US special category exports. The adjustment is somewhat uncertain on the limited statistical information available.

e. The exporting countries have been supplemented to include all EFTA countries instead of simply the UK, Sweden and Switzerland, and the coverage of exporting countries in the ROW has been extended from the three countries included in ROW 3. (Some of the minor trade flows in the extended ROW data have been partially estimated for 1969, since full data were not available.

World Exports of Manufactures, 1954-69

($ millions)

		Exports from EEC	EFTA	ROW	Total	of which ROW 3
1954	EEC	2832	1607	1544	5983	947
to	EFTA	2489	1523	1612	5624	804
	ROW	5677	6252	12100	24029	9479
of which,	OSA	828	3126			1109
1955		3512	1819	1873	7204	1154
		2936	1675	2060	6671	1097
		6560	6882	13444	26836	10504
		1005	3377			1418
1956		4114	2166	2186	8466	1298
		3272	1810	2130	7212	1101
		7202	7641	15849	30692	12448
		1184	3445			1549
1957		4585	2390	2364	9339	1535
		3649	1943	2179	7771	1222
		8288	8167	17569	34024	13779
		1360	3617			1735
1958		4550	2299	2342	9191	1535
		3740	1956	1962	7658	1094
		8894	8002	16192	33088	12653
		1405	3536			1561
1959		5454	2553	2510	10517	1505
		4293	2184	2331	8808	1240
		9675	8391	16834	34900	13095
		1386	3397			1736
1960		7055	2972	3605	13632	2374
		5320	2574	3199	11093	1942
		10699	8889	18554	38142	14145
		1643	3666			2364
1961		8403	3479	3800	15682	2486
		5851	2969	3088	11968	1755
		10790	8907	19513	39210	14415
		1564	3581			2255
1962		9779	3898	4134	17811	2788
		6064	3195	3205	12464	1792
		10745	9087	21338	41170	15566
		1608	3444			2749
1963		11648	4291	4478	20417	3022
		6324	3567	3489	13380	1896
		11196	9661	23059	43916	16683
		1777	3715			3250

/continued

World Exports of Manufactures, 1954-69 ($ millions) - continued

		Exports from EEC	EFTA	ROW	Total	of which ROW 3
1964	to EEC	13627	4625	4848	23100	3214
	to EFTA	7191	4209	4350	15750	2515
	to ROW	12577	10255	27315	50147	19750
	of which, OSA	2058	3956			4036
1965		15335	4873	5281	25489	3304
		7873	4756	4726	17355	2673
		14488	11365	30674	56527	22043
		2448	4269			4317
1966		17434	5204	6201	28839	3640
		8251	5297	5185	18733	2852
		16308	12280	34934	63522	24755
		2517	4143			4266
1967		18311	5151	6418	29880	3857
		8586	5994	5635	20215	3253
		18011	12414	37302	67727	26382
		2706	3925			4687
1968		21716	5744	7686	35146	4544
		9269	6411	6423	22103	3641
		20652	13622	42930	77204	30640
		2815	3862			5226
1969		27677	7001	9587	44265	5616
		10851	7733	6840	25424	3815
		22716	15493	49114	87323	35007
		3088	4340			5702