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**INTRA INDUSTRY SPECIALISATION,
TRADE EXPANSION AND ADJUSTMENT
IN THE EUROPEAN ECONOMIC SPACE**

by

David Greenaway and Robert C. Hine

Paper presented at the IUI/NEF Workshop on **The EC Internal Market and the Nordic Countries**, June 11–13, 1990, at Lidingö, Sweden

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INTRA INDUSTRY SPECIALISATION, TRADE EXPANSION AND ADJUSTMENT IN THE EUROPEAN ECONOMIC SPACE

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David Greenaway and R C Hine

1. Introduction

Since the promulgation of the Single European Act, there has been a presumption that the EC '92 programme will further promote intra EC trade. This presumption is well grounded in economic theory. A major purpose of the programme is to eliminate restraints on trade which currently exist. One proposition which is certain to command widespread consensus among economists is that if you eliminate barriers to trade, trade will expand. Granted that trade expansion takes place, discussion then focuses on the geographical pattern and commodity composition of that change. In the context of trade expansion and integration arrangements, an issue which has excited some interest is the consequences of economic integration for the balance between inter and intra industry trade (see e.g. Balassa 1967, Greenaway 1987).

What is the relevance of all this to non EC countries in general, and other European countries in particular? The answer to that question is as follows: EC '92 will have an impact on the welfare of 'outside' countries. The exact implications of that impact will depend basically on market access. In turn this will depend on inter alia, the nature of any reciprocity requirements demanded by the EC post 1992; whether standardization and harmonization requirements will be implemented in a discriminatory fashion; the replacement of national restrictions with Euro restraints and so on. The fact that the potential for a 'Fortress Europe' has been so widely discussed indicates that these possibilities are being taken very seriously.

Interestingly however, what has not been widely discussed is the fundamental forces which will shape the implementation of market access policies after 1992. One thing which the post war analysis of trade policy indicates is that adjustment pressures are very important in fashioning protectionism. If the 300 or so Directives which constitute the EC '92 programme are implemented and if they are adhered to, there will be adjustment pressures.

The neo-classical response to all this is, that this is precisely what we would expect. Adjustment costs are simply the price society pays for change. However those who see themselves as bearing the adjustment costs may take a different view. Thus if there are 'serious' adjustment pressures after 1992, one can predict with a high degree of confidence that they will be accompanied by protectionist pressures, (as is happening at present in the automobile sector). The nature and extent of any adjustment pressures depends upon a number of factors. It has long been argued by several analysts that of central importance is whether the trade expansion in question is largely intra or inter industry trade based, (see e.g. Balasa 1967, Aquino 1978). Indeed, Hufbauer and Chilas (1974) go so far as to argue that the lower adjustment costs associated with intra industry trade expansion are responsible for the focus of GATT MTNs on manufactured goods. The possibility of differential adjustment costs between inter and intra industry trade, and the prospects for further growth of intra industry trade in the European Economic Space are therefore the subject of this paper.

The remainder of the paper is organized as follows: Section 2 examines the theoretical arguments for a link between adjustment costs and intra industry trade, and the empirical evidence that can be brought to bear. Section 3 reviews some recent studies of trends in intra-industry specialisation in Western Europe and other developed countries. Section 4 examines some new evidence on trade and production specialisation in these countries. Finally Section 5 offers

some concluding comments on trade and adjustment issues in the light of the EC 1992 programme.

2. Trade Expansion, Intra Industry Trade and Adjustment

The EC '92 programme is intended to stimulate intra EC trade expansion by eliminating barriers to trade. Research on the fall and rise of trade barriers over the post war period has emphasized the key role of adjustment costs and interest group behaviour. Trade liberalization results in price changes in the affected markets. If agents fail to respond quickly to these changes, or if any price change is resisted, an adjustment problem is said to exist. In theory an adjustment problem is a short to medium run phenomenon, depending on the nature of the market with which we are dealing. Generally it arises when there is some degree of factor specificity. The resulting wage/price inflexibility leads to sticky/incomplete adjustment. In turn these inflexibilities are generally attributable to differences in the input requirements of the expanding and contracting sectors. If factor ratios differ as between the exportable and importable sectors, the relative price adjustments following any liberalization shock will be significant. Consequently, resistance to liberalization will be greater. Even where factor ratios are similar, in terms of capital/labour requirements adjustment frictions can arise as a result of market segmentation. For example the labour market is segmented occupationally and geographically. Often this leads to a mis-match between the 'requirements' of expanding sectors, and the 'provisions' of contracting sectors. Clearly where this is perceived ex ante, resistance to liberalization may follow.

It can be plausibly argued that potential/perceived adjustment pressures are a necessary but not sufficient condition for resistance to liberalization, the sufficiency condition being that political action follows. Lobbies have to organize/be organized to take effective

action against liberalization, or if this is not possible, to take action designed to ameliorate the impact of liberalization. In the context of the 1992 programme the foregoing leads naturally to two questions. First how serious will any adjustment pressures be; second will they give rise to effective action? It may be possible to say something about whether adjustment pressures will be more or less strong according to whether trade expansion results in intra or inter industry specialisation. With respect to political action the issue here is not whether the intra EC liberalization will be resisted : the *raison d'être* of the 1992 programme is internal liberalization. Thus for present purposes we have to assume that effective enforcement of the Directives will occur. If we take that as a constraint, lobbying action, if it follows, can only be directed at ameliorating adjustment costs/capturing compensation, by initiating action against outside countries. The probability of this happening may also be influenced by the type of trade expansion which internal liberalization initiates. Let us take each in turn.

Why should intra industry trade expansion be associated with lower adjustment costs than inter industry trade? Intra industry trade is associated with the simultaneous exchange of 'similar' products. This has led several analysts to assert that adjustment will be easier when 'similar' imports and exports are growing, (e.g. Balassa 1967, Aquino 1978). Presumably these and others are implicitly assuming that in these circumstances, wage flexibility and/or labour market segmentation are less pervasive than in a setting of inter industry trade.

One source of inflexibility which has been extensively explored in recent years is the existence of labour market institutions - in particular trade unions, explicit and implicit contracts, and transactions costs of hiring and firing have all been stressed. There are, however, no a priori reasons why these institutions should be any

more, or any less important in a setting of intra industry than inter industry trade. Where market segmentation is concerned, there may be an asymmetry. If factor intensities between sectors are similar (ignoring for the moment problems of geographical mobility), then we should expect labour to transfer from one sector to another with comparative ease. The package of skills acquired during employment in the import substitute sector can be redeployed with minimal retraining in the export sector. By contrast if factor mixes are very different, transferability would not be possible without complete retraining. It is this contrast which most commentators have in mind when discussing adjustment and it does have intuitive plausibility. It is, however, a scenario which requires some qualification. First, even when a simultaneous expansion of imports and exports occurs in the same 'industry', both product mixes and factor mixes may alter. Specialization in products which are vertically differentiated provides a concrete example of a case where the capital-labour ratio alters in the process of specialization (see Falvey 1981). More importantly, however, the skill requirements may alter with the process of specialization. An obvious example here is the contrast which can be drawn between the skill inputs in imported 'low-quality' imports and 'high-quality' exports of clothing in many developed market economies. A second qualification is that much intra-industry trade is in parts and components rather than trade in final goods which are horizontally or vertically differentiated. In so far, however, as the traded components are produced in the same 'industry' and rely upon similar skills, transferability of labour from expanding to contracting activities may be easier than otherwise. Notwithstanding these qualifications, however, a plausible case can be made to the effect that similarity of factor requirements associated with intra industry trade and specialisation can make for smoother adjustment to trade expansion.

What about geographical segmentation? It can be argued that

adjustment is likely to be smoother in a setting of intra industry trade because the expanding and contracting activities are more likely to be based in a given region than with inter industry trade. With the latter, individuals may not only be required to retrain but also to relocate geographically. In so far as there is geographical resistance to mobility, adjustment would be more protracted. As with the issue of occupational mobility, the argument is plausible. After all industries frequently are geographically concentrated, particularly in manufacturing where external economies are often important, and if simultaneous expansion and contraction does occur within an industry and within an area/region then resistance to geographical mobility may be less. As with the question of occupational mobility this is ultimately an empirical issue.

Empirical Evidence

Empirical evidence on adjustment is very limited indeed. It is, however, possible to provide some empirical content to the foregoing by calling upon evidence from four different kinds of study, viz.,

- i) Factor ratio analysis
- ii) Case study analysis
- iii) Simulation studies
- iv) Political economy of protection studies

i) Factor ratio analysis. One of the best known papers on intra industry trade is Finger (1975). Finger purported to show that the variability in capital : labour ratios within SITC 3 digit 'industries' was greater than the variability of those ratios between 3 digit groups. Rayment (1976) offers similar evidence for the UK SIC. Lundberg and Hansson (1986) reinforce this result by pointing to product heterogeneity at the third digit of the SNI. On the surface this would appear to be fairly damning evidence: if factor ratios are

markedly dissimilar within 'industries' then IIT is merely a manifestation of categorical aggregation, and the adjustment costs associated with trade expansion can be expected to be no different to those associated with H-O-S trade. The evidence may merely be telling us that the third digit is not the appropriate level of disaggregation for identifying 'industries'. This view has a great deal of support, (see for instance Greenaway and Milner 1983). More careful analysis at lower levels of aggregation points to similarity of factor proportions being associated with IIT. Thus, for example, in the study cited earlier, Lundberg and Hansson (1986) find that IIT ".... is negatively correlated with various measures of within industry dispersion in factor proportions," (P.147). Even if the variability of factor ratios between and within industries is similar, IIT expansion may still generate fewer adjustment problems. This is because each broad factor type may group together resources which are industry specific. Thus 'physical capital' may embrace many types of machinery which could not easily be transferred between industries. This poses an adjustment problem for the expansion of inter industry trade which involves the growth of some industries but the contraction of others. It is not necessarily a problem for an expansion of IIT since in this case the relative sizes of the various industries need not change.

ii) Case Study Analysis. This is potentially the most fruitful line of investigation, and the most worthwhile source of information on adjustment. Unfortunately however, hardly any evidence is available. A rare sector specific study is Adler (1970). This paper examines changes in steel production and trade across the original six members of the European Community following the creation of the European Coal and Steel Community (ECSC) in 1952, which resulted in a free market for steel products within the European Community. As Adler notes, a prognosis of the effects of the agreement, founded on Vinerian customs union theory, would suggest sectoral specialization

in accordance with comparative advantage in the member states. Fears of such inter industry specialization, with the German steel industry dominating the entire market, created anxieties regarding possible adjustment problems, in particular on the part of the French and Italians. What Adler demonstrates however, is that, at least by 1966, rather than inter industry specialization, a substantial increase in intra industry specialization and trade took place. Instead of one country dominating, as had been widely anticipated, specialization in different steel products in different countries resulted - of 10 product lines examined, country specialization could be detected in six. From this analysis Adler concludes :

"The significance of these findings lies in their ability largely to allay the apprehensions of the founding Six countries, concerns over the welfare issues connected to the disruption impact of resource reallocation become immediately less wearisome" (p.190).

Fukurora (1990) offers a similar analysis of adjustment in the Japanese textile and clothing industry which followed trade expansion with a number of East Asian trade partners. The analysis demonstrates that although significant changes have occurred in the industry, adjustment has been relatively smooth. Fukorora offers evidence to support the thesis that this is largely attributable to the fact that the trade expansion was intra- rather than inter- industry trade in nature.

iii) Simulation studies. One of the most important empirical by-products of the development of work on imperfect competition and international trade has been the application of CGE technology to investigate the impact of policy shocks on trade flows. This literature has recently been surveyed by Richardson (1988). Table 1 which was widely reported, summarises his results. The column

headed 'adjustment stimuli' suggests that in 2 of the 10 cases examined, adjustment stimuli would be large, and in 2 more cases it would be moderate to large. Taken at face value it is not easy to interpret this information since we are dealing with the impact of trade shocks on all, or a sample of, imperfectly competitive industries, and in general the studies do not model inter-sectoral changes. Two points of interest arise however. First, in those instances where inter and intra industry adjustment is explicitly modelled intra sectoral adjustments dominate. This is the case with Cox and Harris (1985) and Canada (1988). Second, it is clear that trade expansion need not result in increased IIT between industrialized countries - it depends very much on market structure. Thus, in those cases where m.e.s. is large relative to the total market, significant inter industry adjustments can occur with large numbers of firms exiting sectors.

iv) Political economy of protection studies. We mentioned earlier that adjustment pressures can give rise to political pressure for protection. This provides a further source of indirect evidence: if adjustment costs are lower in sectors which are intensive in IIT, we would expect to see less pressure for protection and/or less resistance to liberalization in those sectors. A number of analysts have investigated the relationship between protection (typically measured by tariffs), and IIT. Pagoulatos and Sorensen (1975), Lundberg and Gavelin (1986), and Ray (1987) all provide evidence which suggests that IIT and tariff protection are negatively correlated. Against this, a recent study for the UK by Greenaway and Milner (1990) provides mixed evidence. The results however are generally supportive of the view that recorded protection tends to be lower in IIT intensive sectors.

Overall the evidence is suggestive rather than conclusive. Taken together with our priors it does suggest that adjustment pressures associated with intra industry trade and specialization will be no

greater than, and most probably less than, those associated with inter industry specialization. In turn, we can anticipate stronger pressures for protection in response to inter industry specialization than intra industry specialization. Thus in the context of post 1992 EC trade expansion, the balance between inter and intra industry specialisation will be crucially important. It is to this issue that we now turn.

3. Recent Trends in Intra Industry Specialization in Western Europe and Other Developed Countries

A high degree of IIT has become an important feature of international trade in manufactured goods over the last 30 years or so. Indeed, the exchange of similar products has come to dominate industrial trade between the developed countries. IIT appears to be associated with European economic integration in that the EC and EFTA countries have a particularly high level of IIT. However the rationale for this link is not entirely clear (Greenaway 1989). The extent of this IIT in part reflects certain characteristics of the European countries such as high per capita incomes or geographical proximity rather than integration per se. Nonetheless, Balassa and Bauwens (1988), for example, have shown empirically that membership of a regional trading arrangement like the EC or EFTA does tend to increase the level of IIT. But they offer little help in understanding why integration should affect the propensity for IIT. However they do suggest that IIT involving the mutual exchange of different varieties of goods requires a larger information flow than inter industry trade. This would help to explain why IIT tends to be greater between countries that are geographically close. This argument could also be applied to regional integration arrangements. Membership of the EC or EFTA generates an intensification of contacts between countries thereby facilitating information flows; this could act as a stimulus to increased IIT (Hine 1990).

There is good empirical evidence confirming the strong growth of intra industry trade in the 1960s and 1970s. Grubel and Lloyd (1975) in their pioneering study found for a sample of ten industrial countries that IIT as a proportion of total trade rose from 36% in 1959 to 42% in 1964 and 48% in 1967, (measured using the Grubel-Lloyd Index). Similarly, Finger and de Rosa (1979) for a slightly larger sample of countries observed a growth in IIT for most products over the period 1961-76.

Within the EC, specialisation along intra-industry lines was identified by Balassa (1975). He found that the product composition of exports between pairs of EC countries became more similar over the periods 1958-63 and 1963-70. Grubel and Lloyd (1975) confirmed the growing importance of IIT in the Community. They estimated that 71% of the increase in trade between the EC countries from 1959 to 1967 was intra-industry. In the early 1960s, according to Meyer (1978), intra-industry specialisation particularly affected the machinery and transport equipment sectors, and later in the decade spread to chemicals and consumer durables. The continuing growth of IIT in the 1970s has been shown by Greenaway (1987): the six founding members of the EC and the UK all recorded major increases in the share of IIT in total trade. For Germany, for example, the proportion rose from 46% to 64% between 1967 and 1977.

Following the prolonged periods of expansion of IIT, there is some indication from the Greenaway (1987) study that IIT may have declined in the EC countries during the late 1970s. More generally, Globerman and Dean (1990) suggest that "for a range of countries and industries, the trend towards IIT terminated by the late 1970s and, in some cases, even began to reverse". This suggestion is based on a study of 11 OECD countries at 5-yearly intervals from 1970 to 1985.

The commodity coverage is SITC 3(sic) and 5 to 9, but the degree of disaggregation is not stated. The share of IIT increased for 7 out of the 11 countries between 1970 and 1975, for 9 between 1975 and 1980, but only 5 between 1980 and 1985. Moreover in two of the latter cases the increase was only a single percentage point.

There are grounds for questioning Globerman and Dean's suggestion of a slowdown or even reversal of the IIT phenomenon. First, with such a small sample of countries the differences between the five year periods are not statistically significant, particularly the comparison between 1970-75 and 1980-85. Secondly, the IIT share fluctuates from year to year and it could be misleading to place too much emphasis on the results for one year - in this case, 1985. Thirdly, the early 1980s was a period of unusually weak growth in international trade. After doubling in volume between 1970 and 1980, trade in manufactured goods grew only 7% between 1980 and 1983 (GATT 1989). Since then the growth of trade has become more substantial. The rise in the IIT share has come about mainly through a simultaneous increase in exports and imports and thus a slowdown in trade growth generally might be expected to retard also the expansion of IIT. (N.B. Globerman and Dean argue that between countries, IIT growth is faster the slower is the growth of a country's trade). Thus the experience of the early 1980s may be a special case from which it would be unwise to extrapolate. A further reason for caution in interpreting the Globerman and Dean findings is that the Grubel and Lloyd index which they use may be biased downward by trade imbalance (Grubel and Lloyd 1971, 1975). The US and Japan were two of the five countries recording a decline in the IIT share between 1980 and 1985 and both experienced major increases in trade imbalance during this period.

4. Analysis of trends in trade and production specialisation in the OECD countries 1970-85

Given the extent and economic significance of intra-industry exchange in world trade in the postwar period it is important to ascertain whether or not the process of intensification of IIT has peaked or even reversed. Such a development would imply a changing relationship between the world's major economies. Further growth in international trade and specialisation might, as suggested earlier, then confront more painful adjustment problems. A new assessment of the evidence should include as full a coverage of developed countries as possible, over a long run of years. The continuing debate over methods of measuring IIT suggests that the sensitivity of results to methods of measurement should also be explored. Since trade is a vehicle for specialisation it may further be of interest to consider whether the trends observed for trade are reflected in national production patterns.

The following analysis is based on data for 22 countries in the OECD COMTAP database, and covers the period 1970-85. The disaggregation used is relatively coarse: manufacturing industry is divided into only 28 SIC categories. Results on intra-industry trade and specialisation have to be interpreted accordingly. However the data source has the major advantage that trade and production data are available on the same basis, enabling a comparison to be made between specialisation in trade and specialisation in production. Moreover, although the level of disaggregation may overstate the extent of IIT, there is evidence that the ranking of countries according to intensity of IIT trade is not very sensitive to the degree of industry disaggregation.

(i) Methods of measuring IIT.

A number of measures of IIT have been suggested in the literature

(Greenaway and Milner 1986). The most widely used is the *Grubel-Lloyd index* (Kol 1988 p.39)

$$GL = \frac{\sum_i (X_i + M_i) - \sum_i |X_i - M_i|}{\sum_i (X_i + M_i)}$$

where X_i are exports of industry i and M_i are imports of industry i . One of the major criticisms of the Grubel-Lloyd measure is that it is biased downwards by an overall trade imbalance, and methods have been suggested for "correcting" for this. The *Michaely index* abstracts from overall trade imbalances by focusing on a comparison of trade patterns - how closely the distribution of exports resembles that for imports. Adapted to restrict the range of the index from 0 to 1, the Michaely index, F , (Kol 1988, p.48) is

$$D = \sum_i \left| \frac{X_i}{\sum X_i} - \frac{M_i}{\sum M_i} \right|$$

Glejser et al (1982) adopted a markedly different approach to the measurement of IIT by examining trends in export and import patterns separately. The *Glejser index* for exports (Kol, 1988, p.45) is given by

$$\xi = \frac{1}{n} \sum_{i=1}^n \log \left(\frac{X_i}{X} \right) / \left(\frac{X_{g_i}}{X_g} \right)$$

where g refers to the trade of a country group (e.g. OECD).

The corresponding index for import specialisation is:

$$\mu = \frac{1}{n} \sum_{i=1}^n \log \left(\frac{M_i}{M} \right) / \left(\frac{M_{g_i}}{M_g} \right)$$

With a growth in intra-industry specialisation the trade patterns for each country should become increasingly similar to the group average. Thus the variances of the import and export indexes should decline and an F test could establish whether or not any decline is statistically significant. However, the Glejser index has the disadvantage that "exports and imports that are small but represent widely differing shares in their respective totals may influence the summary index unduly" (Kol 1988 p.54) . This proved to be an important defect in relation to the COMTAP data set. An alternative measure of import/ export specialisation is provided by the Michaely index which can be used to compare an individual country's export (import) pattern with that of a group of countries. A convergence of import and export patterns across countries would indicate a trend towards intra-industry trade.

(ii) Developments in IIT 1970-85

Analysis of the COMTAP data supports the view that there was a general and sustained increase in intra-industry trade in the developed countries during the period 1970-85. The unweighted average Grubel-Lloyd index for the 22 OECD countries rose from 0.546 in 1970 to 0.590 in 1978 and 0.646 in 1985 (see Table 1). These increases were broadly shared: 18 of the 22 countries increased IIT in 1970-78 and 19 between 1978-85. As noted above, Globerman and Dean(1990) have suggested that the expansion of IIT may have ended in the 1980s. In their sample of 11 countries, 6 recorded a decrease in IIT between 1980 and 1985. However in the bigger sample used here, only 8 out of 22 countries had a reduction in IIT over the same period. Most industrial countries continued to increase IIT in the first half of the 1980's. This general conclusion does nevertheless need some qualification. In particular :

(a) the upward trend in IIT was weaker towards the end of the period studied: the average Grubel-Lloyd index hardly increased from 1983 to 1985 and the number of countries with decreases in IIT

grew; however this is too short a period to conclude that the trend has changed, and there were special factors at work (see point (c));

(b) there was no expansion of IIT in the original EC countries during the first half of the 1980s; the average Grubel-Lloyd index was stable (in 1980 and in 1985), and France, Italy and the Netherlands all recorded decreases; by 1980 IIT had already reached a very high level in EC; the levelling off of IIT may also be related to the tendency noted by Jaquemin and Sapir (1988) for the intra-EC share of EC trade to stabilise in recent years; and

(c) in Japan and the US IIT declined between 1980 and 1985, according to the Grubel-Lloyd index; results using the Michaely index (Table 2) lend support to the view that trade imbalances in these two countries during this period depressed their IIT according to the former measure. On the Michaely index IIT increased in both countries during this period; the fall in the Grubel-Lloyd index in the US and Japan may thus be a transient phenomenon, assuming that these countries' trade imbalances do not increase further; overall, the Michaely results are very similar to those using the Grubel-Lloyd measure.

Do developments in import and export specialisation throw any further light on IIT and the debate as to whether this continued to expand in the 1980s? On the import side there was a remarkable stability in intra-OECD comparisons over the period 1970 to 1985. The mean and variance for the Michaely index hardly changed over this period (Table 3). Export patterns are, as might be expected, more diverse than those of imports. During the 1970s, however, that diversity decreased, so that the mean value of the Michaely index rose from .644 to .689, whilst the standard deviation fell from .170 to .155 (Table 4). Taken together the development of import and export specialisation during the 1970s is consistent with a growth of IIT.

The convergence of export patterns does not however appear to

have continued into the 1980s: overall the similarity of export patterns stabilised: the average was .687 in 1980 and .682 in 1985. Consistent with this, the proportion of countries drawing closer to the overall OECD export pattern fell from 18 out of 22 in 1970 to 1978, to 12 in 1978 to 1985. The change of trend was particularly pronounced for the original EC countries: 4 out of 5 had an increase in the Michaely index for exports in 1970 to 1978, but in 1978 to 1985 4 out of 5 had a decrease. This change of pattern also occurred for the EC countries on the import side. The failure of export patterns to converge further in the 1980s reinforces the view that, at least in some countries, the expansion of IIT has levelled off.

Within the OECD group there has been considerable regional variation in the development of IIT. In particular, in the **southern European countries**, where the average share of IIT in total trade remains low, IIT has increased throughout the 1970-85 period, whether measured by the Grubel-Lloyd index or the Michaely index. Export and import patterns tended to move away from the average for OECD countries in the first half of the period, but later to converge. For the **non-European countries** the Grubel-Lloyd index displays no trend since 1980, but this may reflect growing trade imbalances, since the Michaely index shows a growth in import-export similarity during the 1980s. There was some convergence of export and import patterns on the OECD average over the whole period. In the original member countries of the **European Community** IIT appears to have stabilised in the 1980s; import and export patterns tended during this period to move away from the OECD average. The four **European Free Trade Area** countries in the sample had a strong growth in IIT during the 1970s but this stabilised after 1982 according to both the Grubel-Lloyd and the Michaely indexes. The import and export patterns converged on the OECD average.

To summarize, the results of this analysis of the COMTAP data

indicate a general expansion of IIT in the industrial countries during the period 1970 to 1985. There is some indication of a deceleration at the end of the period, possibly associated with the slowdown in world trade and growing trade imbalances among the OECD countries. The latter may have led to a decline in IIT in the US and Japan. In the original EC countries, IIT may have stabilised, albeit at a high level, during the 1980s.

ii) Empirical evidence on changes in production specialisation

The COMTAP database enables a comparison to be made of trends in trade specialisation and trends in production specialisation. Is the observed increase in intra-industry trade, particularly during the 1970s, matched by a growing similarity of production patterns? The latter can be measured using the Finger-Kreinin index (of the same general form as the Michaely index described earlier, but focusing on the similarity of production rather than trade). Table 5 gives for each country the average of its 21 bilateral comparisons with its trade partners.

For the period 1970-80, the general tendency is for production patterns to become more similar, that is for the relative importance of the various industries to converge across countries. During the 1970s, 17 out of 22 countries showed an increase in the average Finger-Kreinin measure. Thus the evidence from this data is that there was a slow convergence of production patterns in the OECD countries during the 1970s and, as described earlier, this was accompanied by an expansion of IIT. Specialisation in the 1970s appears to have taken predominantly an intra-industry form.

By contrast, according to their average Finger-Kreinin scores, only two of the 22 countries moved closer to their OECD partners in 1980-85 in terms of production patterns. The tentative finding earlier in the paper that IIT may have stabilised in the original EC countries

during the first half of the 1980s may then reflect a move to greater inter-industry specialisation in production. It should however be added, as has been observed elsewhere (Hine 1990), that a growth in intra-industry trade is in principle consistent with inter-industry specialisation in production.

5. Conclusions

During the 1960s and 1970s trade in Western Europe grew rapidly. The growth took primarily an intra-industry form, and as discussed in Section 2 may therefore have presented fewer adjustment problems than if more inter industry specialisation had taken place between industries. In the 1980s, not only was trade expansion slower but also there is some evidence that in the EC and EFTA countries the growth in the share of IIT stabilised. At the same time there has been a general reversal in the pattern of specialisation in production. Whereas production patterns were drawing closer together in the 1970s, since then there has been some divergence, suggesting a move towards inter-industry specialisation. Thus tentatively, one may suggest that specialisation in Europe may have entered a new phase, and that this could pose greater problems for adjustment. This phase may be driven by some of the factors discussed by Globerman and Dean (1990), most notably the tendency towards longer production runs in a larger set of products, and in particular parts and components as further 'Allyn Young' specialisation occurs, (see also Kol and Rayment 1990).

1992 and the creation of the single market could push this process further, the result being greater inter industry specialisation in the Community. Eliminating non tariff barriers in manufactures should facilitate the continued exploitation of scale economies. Minimum efficient scale of production in many final products and in parts and components exceeds the national markets of even the largest member states. Moreover it must be remembered that an intention of the

programme is liberalisation in services and agriculture. Taken together these forces can be expected to result in further inter industry specialisation. For the reasons discussed in Section 2 it is likely that this will bring in its wake adjustment pressures which are more serious than those which accompanied earlier intra industry specialisation. If this is the case, the likelihood of defensive action against outside countries is greater. Ultimately this may put greatest pressure on countries in the European Economic Space.

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TABLE 1 - The Grubel-Lloyd Index of IIT in Manufactures, OECD Countries 1970-85

	1970	1978	1980	1983	1985
CANADA	0.663	0.687	0.645	0.737	0.764
UNITED STATES	0.680	0.716	0.682	0.705	0.665
JAPAN	0.406	0.281	0.308	0.301	0.293
AUSTRALIA	0.314	0.372	0.411	0.419	0.364
NEW ZEALAND	0.211	0.286	0.296	0.279	0.306
BELGIUM	0.800	0.835	0.841	0.875	0.867
DENMARK	0.630	0.679	0.674	0.721	0.726
FRANCE	0.814	0.828	0.861	0.855	0.855
GERMANY	0.607	0.641	0.554	0.687	0.682
IRELAND	0.444	0.600	0.685	0.723	0.703
ITALY	0.617	0.614	0.696	0.662	0.695
NETHERLANDS	0.741	0.759	0.779	0.776	0.763
UNITED KINGDOM	0.620	0.807	0.808	0.832	0.843
AUSTRIA	0.707	0.777	0.766	0.802	0.792
FINLAND	0.411	0.569	0.567	0.630	0.664
NORWAY	0.613	0.634	0.647	0.632	0.621
SWEDEN	0.630	0.653	0.681	0.706	0.719
GREECE	0.283	0.415	0.396	0.462	0.463
PORTUGAL	0.457	0.410	0.453	0.514	0.546
SPAIN	0.570	0.644	0.504	0.677	0.682
TURKEY	0.154	0.120	0.223	0.359	0.468
YUGOSLAVIA	0.638	0.647	0.688	0.700	0.700
mean	0.546	0.590	0.598	0.639	0.645
standard deviation	0.185	0.195	0.184	0.175	0.169
coefficient of variation	0.339	0.330	0.307	0.274	0.262

TABLE 2-The Michaely Index of Similarity of Manufactured Imports and Exports, OECD Countries 1970-85

	1970	1978	1980	1983	1985
CANADA	0.664	0.7	0.649	0.74	0.764
UNITED STATE	0.688	0.722	0.68	0.746	0.754
JAPAN	0.526	0.42	0.42	0.432	0.431
AUSTRALIA	0.356	0.4	0.43	0.422	0.418
NEW ZEALAND	0.212	0.287	0.303	0.279	0.306
BELGIUM	0.795	0.827	0.833	0.878	0.865
DENMARK	0.648	0.649	0.675	0.721	0.725
FRANCE	0.816	0.85	0.859	0.86	0.854
GERMANY	0.676	0.716	0.726	0.75	0.761
IRELAND	0.502	0.634	0.748	0.721	0.716
ITALY	0.336	0.594	0.683	0.677	0.689
NETHERLANDS	0.745	0.757	0.774	0.78	0.764
UNITED KINGDX	0.643	0.814	0.815	0.835	0.845
AUSTRIA	0.716	0.799	0.789	0.799	0.791
FINLAND	0.412	0.546	0.532	0.6	0.627
NORWAY	0.673	0.631	0.692	0.665	0.648
SWEDEN	0.632	0.67	0.684	0.714	0.728
GREECE	0.415	0.403	0.44	0.509	0.519
PORTUGAL	0.474	0.478	0.483	0.54	0.525
SPAIN	0.585	0.636	0.579	0.69	0.698
TURKEY	0.182	0.098	0.346	0.392	0.463
YUGOSLAVIA	0.623	0.698	0.685	0.698	0.701
mean	0.56	0.606	0.628	0.657	0.663
standard devi	0.178	0.19	0.163	0.162	0.155
coefficient of	0.318	0.314	0.259	0.247	0.233

TABLE 3 - The Michaely Measure of the Similarity of Import Patterns, OECD Countries 1970-85

	1970	1978	1980	1983	1985
CANADA	0.737	0.741	0.729	0.745	0.737
UNITED STATES	0.847	0.861	0.872	0.863	0.854
JAPAN	0.782	0.742	0.752	0.767	0.753
AUSTRALIA	0.776	0.836	0.839	0.842	0.834
NEW ZEALAND	0.799	0.790	0.785	0.768	0.812
BELGIUM	0.890	0.896	0.898	0.896	0.883
DENMARK	0.887	0.905	0.868	0.864	0.876
FRANCE	0.889	0.893	0.912	0.909	0.894
GERMANY	0.893	0.904	0.918	0.914	0.892
IRELAND	0.840	0.847	0.847	0.841	0.834
ITALY	0.871	0.862	0.903	0.847	0.799
NETHERLANDS	0.882	0.917	0.897	0.896	0.872
UNITED KINGDOM	0.807	0.915	0.911	0.915	0.921
AUSTRIA	0.841	0.836	0.850	0.867	0.867
FINLAND	0.849	0.848	0.868	0.858	0.864
NORWAY	0.866	0.892	0.893	0.872	0.881
SWEDEN	0.873	0.875	0.862	0.873	0.889
GREECE	0.795	0.788	0.778	0.802	0.810
PORTUGAL	0.845	0.798	0.809	0.864	0.819
SPAIN	0.780	0.770	0.825	0.836	0.818
TURKEY	0.859	0.766	0.753	0.686	0.749
YUGOSLAVIA	0.701	0.629	0.654	0.739	0.717
mean	0.832	0.832	0.837	0.839	0.835
standard deviation	0.053	0.073	0.070	0.062	0.057
coefficient of variation	0.064	0.087	0.084	0.074	0.068

TABLE 4 - The Michaely Measure of the Similarity of Export Patterns, OECD Countries 1970-85

	1970	1978	1980	1983	1985
CANADA	0.592	0.608	0.671	0.641	0.630
UNITED STATES	0.820	0.835	0.847	0.845	0.839
JAPAN	0.751	0.728	0.701	0.723	0.720
AUSTRALIA	0.452	0.492	0.532	0.489	0.475
NEW ZEALAND	0.251	0.313	0.338	0.323	0.336
BELGIUM	0.742	0.784	0.778	0.768	0.749
DENMARK	0.673	0.679	0.692	0.690	0.688
FRANCE	0.888	0.914	0.910	0.895	0.873
GERMANY	0.855	0.906	0.904	0.903	0.912
IRELAND	0.446	0.568	0.622	0.659	0.632
ITALY	0.750	0.748	0.743	0.748	0.731
NETHERLANDS	0.689	0.695	0.684	0.657	0.651
UNITED KINGDOM	0.864	0.889	0.880	0.865	0.857
AUSTRIA	0.706	0.751	0.750	0.765	0.778
FINLAND	0.466	0.581	0.561	0.631	0.630
NORWAY	0.684	0.697	0.710	0.706	0.706
SWEDEN	0.758	0.783	0.775	0.790	0.796
GREECE	0.484	0.435	0.479	0.434	0.400
PORTUGAL	0.508	0.533	0.545	0.568	0.550
SPAIN	0.677	0.767	0.809	0.767	0.759
TURKEY	0.707	0.806	0.763	0.446	0.799
YUGOSLAVIA	0.404	0.310	0.416	0.777	0.488
mean	0.644	0.674	0.687	0.686	0.682
standard deviation	0.170	0.175	0.155	0.155	0.154
coefficient of variation	0.265	0.260	0.226	0.226	0.226

TABLE 5 - The Finger-Kreinin Measure of Similarity of Industrial Production Patterns, OECD 1970-85

	1970	1978	1980	1985
CANADA	0.762	0.748	0.768	0.729
UNITED STATE	0.77	0.778	0.783	0.757
JAPAN	0.736	0.756	0.752	0.73
AUSTRALIA	0.786	0.776	0.762	0.743
NEW ZEALAND	0.713	0.73	0.708	0.704
BELGIUM	0.742	0.754	0.749	0.72
DENMARK	0.742	0.71	0.713	0.703
FRANCE	0.78	0.786	0.788	0.775
GERMANY	0.75	0.74	0.75	0.726
IRELAND	0.658	0.646	0.66	0.653
ITALY	0.761	0.769	0.77	0.753
NETHERLANDS	0.734	0.724	0.709	0.677
UNITED KINGDX	0.762	0.777	0.78	0.75
AUSTRIA	0.765	0.768	0.779	0.764
FINLAND	0.682	0.702	0.705	0.703
NORWAY	0.724	0.747	0.747	0.715
SWEDEN	0.739	0.731	0.739	0.718
GREECE	0.721	0.697	0.7	0.683
PORTUGAL	0.696	0.715	0.73	0.705
SPAIN	0.748	0.793	0.791	0.77
TURKEY	0.651	0.712	0.699	0.673
YUGOSLAVIA	0.753	0.782	0.781	0.746
mean	0.735	0.743	0.744	0.723
standard devi	0.036	0.036	0.036	0.033
coefficient of	0.049	0.049	0.048	0.046