Employment Coefficients for Irish Trade with extra-EEC Countries: Measurement and Implications

DERMOT McALEESE and PATRICK CAREY*
Trinity College, Dublin

Précis: This paper estimates the likely direction and size of changes in manufacturing employment associated with expansion of Ireland's extra-EEC trade. These changes are likely to be negative for extra-EEC trade generally, strongly negative for trade with LDCs and Japan but positive for trade with North America.

I INTRODUCTION

The purpose of this paper is to derive employment coefficients for Irish trade with countries outside the European Community (henceforth extra-EC countries). Employment coefficients are estimates of jobs "gained" per £1m Irish exports to different trading regions and jobs "lost" per £1m Irish imports from these regions. Our estimates are based on a number of assumptions, a key one being that an extra £1m imports displaces an equivalent amount of domestic production and an extra £1m exports adds an equivalent amount to domestic production.

Employment coefficients have been derived for other European countries and the United States but not, until now, for Ireland. The principal difficulty has been the lack of comparable trade and manufacturing production data. This lacuna has been filled with the publication of output and employment figures for the NACE group of 44 industries and the availability of corresponding trade data cross-classified by industry and trading region. Our estimates relate to 1976, the latest year for which requisite production data were available at the time of writing, and refer to manufactured goods only.[1]

---

1. The study is restricted to manufactured goods partly because of the difficulty of interpretation in the case of primary products, partly because of the limited scope of trade negotiations for trade in the latter products.

The employment coefficients estimated in this paper can be used to indicate the implications of trade expansion with different regions. Thus, our estimates show dramatically different consequences for employment of a balanced growth of trade with North America compared with, for example, an equivalent balanced expansion of trade with the LDCs. This type of information should provide a useful input into trade negotiations at an EC level. They also provide a short-hand test of the Heckscher-Ohlin theorem, by which it is possible to determine the degree of labour-intensity of Irish imports from a particular region relative to Irish exports to that region.

Attention is focused on extra-EC trade which comprises 25 per cent of Ireland's foreign trade. This limitation of scope is necessary because intra-EC trade no longer falls under the purview of trade policy but is governed by competition policy and other policies bearing on internal exchange. The Common Commercial Policy refers exclusively to trade with non-partner countries. It is based on uniform principles applicable to all member states. Article 110 of the Rome Treaty identifies the policy's objective in the following terms:

> By establishing a customs union between themselves member states aim to contribute in the common interest to the harmonious development of world trade, the progressive abolition of restrictions on international trade and the lowering of customs barriers.

In working towards achievement of a more liberal world trading order, the Community has already participated in numerous multilateral and bilateral agreements: GATT Tokyo Round, the Generalised System of Preferences (GSP), the Multifibre Arrangement (MFA), Lomé II, the trade arrangement with China etc. These agreements have different implications for the various member states. In order to appreciate the direction and magnitude of these effects for Ireland, it is necessary to study the industrial composition of our trade with the various extra-EC trading regions. This provides an indication of the direct employment effects of trade expansion on a bilateral basis, through export growth and the displacement of import-competing production. It does not, however, indicate the effects of export displacement. A more liberal EEC trading regime with the LDCs, for example, would affect not alone Irish imports from LDCs but also Irish exports to other EEC markets. The employment coefficients presented in this paper would require qualification in order to make them relevant to this type of export displacement.

Throughout this paper, the analysis is conducted in terms of the employment effects of a hypothetical balanced trade expansion with a constant composition of trade. The assumption of a balanced change is merely an analytical simplification and it will be clear that the exercise could easily be framed in terms of a particular level of deficit or surplus in trade expansion.

There is no suggestion that bilateral trade flows should or will be balanced. Indeed the likelihood is that trade will progress along unbalanced lines and its composition will change over time.

If the coefficients indicate that trade expansion is likely to have negative employment effects this does not imply a long-run welfare loss to the Irish economy. Quite the contrary, the gains from trade arise from the release of factors of production which can be reallocated to more productive uses. However, the more strongly negative the employment effects the higher the short-run adjustment costs are likely to be.

The plan of the paper is as follows: first, the pattern of trade with extra-EC countries is described; second, estimates of employment coefficients are derived; third, the usefulness of these coefficients is discussed. This section includes a comparison with estimates of employment coefficients for other countries, a discussion of the use of these coefficients as a test of the Heckscher-Ohlin hypothesis and an outline of the employment implications of trade expansion and of developments in the Community's commercial policy.

II IRELAND'S TRADE WITH EXTRA-EC COUNTRIES[2]

Extra-EC trade accounts for about one-quarter of the Republic's total trade. Although this share is much lower than the EC average (about 50 per cent) the Community's external trade policy still has considerable significance for the Republic.

First, the overall trade/GDP ratio is much higher for Ireland than for other EC countries and, consequently, the economic significance of even a 25 per cent extra-EC trade share is quite appreciable in an absolute sense. Exports to extra-EC countries are equivalent in value to 10 per cent of Irish GDP. Second, the structure of Irish manufacturing industry must also be con- sidered. Dependence on labour-intensive industry such as textiles, clothing and leather is markedly high by EEC standards. This group of industries offers employment to 18 per cent of the manufacturing workforce in Ireland compared with a community average of nine per cent. Only Italy among the EEC countries comes close to the Irish figure. As is well known, enterprises classified within this group face severe competition from low-cost suppliers notably the newly-industrialising countries (NICs). Hence the Irish economy will be disproportionately affected by EC trade in these sectors. Third, as we noted above, Ireland's share of *intra*-EEC trade will be affected by the Community's external trade policy. A reduction in the Common External

2. This section draws heavily on Matthews' (1980) extensive study of Ireland's extra-EC trade.

Tariff, for example, may increase the vulnerability of Irish intra-Community exports to competition from extra-Community sources.[3]

The main features of Ireland's total extra-EC trade (manufactured and primary goods) are outlined in Table 1. A striking feature is the preponderant share of industrial countries in this trade. Industrial countries outside the Community comprise roughly 17 per cent of total Irish trade or two-thirds of total extra-EC trade. The United States is the major trading partner in this group, followed by EFTA and Japan respectively. Less than one per cent of trade is conducted with state trading countries.

Table 1: *Geographical structure of Irish merchandise trade 1970 and 1978*

Area	Exports				Imports			
	1970		1978		1970		1978	
	£m	per cent	£m	per cent	£m	per cent	£m	per cent
UK	284.4	62	1395.5	47	352.6	52	1832.0	49
Other EEC	57.3	13	895.8	30	116.9	17	770.8	21
EEC	341.7	75	2291.3	77	469.5	69	2602.8	70
N. America	65.9	14	220.1	7	59.4	9	345.0	9
EFTA	9.5	2	93.9	3	31.9	5	128.8	5
State trading	3.4	1	25.4	1	13.2	2	70.9	2
Japan	4.0	1	25.0	1	6.4	1	117.2	3
Other	10.9	2	80.9	3	29.8	4	96.8	3
Extra-EC								
Industrialised	93.7	20	445.4	15	140.7	21	808.7	22
OPEC	2.5	1	109.5	4	24.4	4	126.9	3
ACP	2.4	1	46.0	2	7.8	1	63.3	2
Other LDC	9.4	3	67.2	2	32.2	5	105.4	3
Extra-EC non-								
industrialised	14.3	5	222.7	8	61.3	10	295.6	8
TOTAL	455.5	100	2959.2	100	676.7	100	3706.5	100

Notes: OPEC includes Algeria, Libya, Nigeria, Gabon, Venezuela, Ecuador, Iraq, Iran, Saudi Arabia, Qatar, UAE, Indonesia, Kuwait. Nigeria and Gabon are excluded from ACP to avoid double counting.

Totals may not add due to rounding.

Source: Central Statistics Office (Computer Tabulations).

Trade with the non-industrialised world amounts to eight per cent of total Irish trade. Exports to these countries have grown very rapidly in value terms during the decade, at a rate much in excess of the growth of Irish imports from them. Thus, the trade deficit with LDCs amounts to only about one-

3. A recent Commission report has emphasised the potential importance of the export displacement effects. See EEC (DG Development), "The European Community and Change in the International Division of Labour", January 1979.

fifth of our exports to LDCs compared with a deficit equivalent to twice our exports in the case of extra-EC industrial countries. Exports to the oil-producing countries have also expanded — so much so that, by 1978, the value of exports to OPEC fell only £17 million short of the value of imports from OPEC (£127 million).[4] Trade with ACP countries[5] constitutes a very small proportion of the total, less than two per cent, though the political and administrative efforts expended on the Lomé agreements might give the contrary impression. Also of interest is the comparatively minor incursion in the Irish market made by the newly industrialising countries of Latin America and Asia. These countries are included in "other LDCs", a category which accounted for only three per cent of total Irish imports in 1979.

The structure of extra-EC trade by geographical region has not altered greatly in basic outline during the decade. The two major changes have been the rapid growth of imports of Japanese goods — from a mere £6m in 1970 to £117m in 1978 — and the decline in the US share of Irish exports. In the former instance, Japanese imports have replaced imports from traditional overseas suppliers, such as the UK, rather than domestic suppliers. The loss of the US export market — reflected in a decline in the US share of Irish exports from 14 per cent in 1970 to seven per cent in 1978 — can be largely attributed to the reduced volume of beef and dairy exports, a consequence of agricultural protectionism in the US and the ready availability of outlets for CAP products in Europe.

Exports to LDCs and OPEC have also expanded rapidly. Because of their low initial share, the increase as a proportion of total exports is not marked. These countries absorbed eight per cent of Irish exports in 1978, roughly half of which consisted of processed foods. Although the LDC/OPEC share of total imports fell during the 'seventies, imports of LDC manufactured goods increased at an average annual compound rate of 29 per cent in volume with a consequent rise in the LDC share of Irish manufactured imports to five per cent in 1978. Only a negligible fraction of these imports have come from ACP countries, which enjoy free access to the EC market, mainly because the ACP group contains few countries with substantial manufacturing sectors.[6]

The structure of Irish trade with extra-EC countries suggests that employment coefficients could usefully be calculated for a number of regional categories. Trade with the industrialised countries — particularly North

---

4. These trade figures exclude OPEC oil shipped to Europe for refining and subsequently imported into Ireland.

5. The ACP group represents the African, Caribbean and Pacific states which are party to the Lomé agreements.

6. The exceptions would include Mauritius (clothing and electrical goods) and countries such as Ghana, Congo and the Cameroons which specialise in veneers and plywoods. As their manufacturing base expands, more extensive penetration of the European market is likely to occur.

America and Japan — is of special interest on account of their large share in extra-EC trade. Some expansion in this share is likely to follow from the implementation of the Tokyo round which envisages a decline in tariffs of some 30 per cent between now and 1985 in addition to the modification of certain non-tariff barriers. Employment coefficients for trade with LDCs, including ACP countries, are also of interest in view of the strong perfor- mance of these countries' import growth in the past and the likely continuance of this trend in the future. A third trading group of potential significance is OPEC. We attach importance only to the employment coefficient of exports to these countries, since imports of manufactures from them are a negligible fraction of the total. Employment coefficients for intra-EC and for total trade are also estimated for purposes of comparison.

III EMPLOYMENT COEFFICIENTS FOR TRADING GROUPS

The industrial classification applied to Irish trade (the SITC) has not in the past been readily comparable with that used for output and employment (the CIP classification). This situation has changed with the adoption of the EEC system of industrial classification, the NACE system, in the publication of trade and production statistics. Drawing on these data we were able to compute (a) the value of gross output per employee in 1976 in each NACE manufacturing group and (b) the percentage distribution of Irish trade in manufactures with the major trading areas using the same system of classifi- cation.[7] The results are presented in Table 2.

To obtain employment coefficients, gross output per man for each industry is re-written by inversion as jobs per unit of output at 1976 prices. Thus a representative £1m of domestic gross output in, say, the mineral products industry in 1976 had a direct labour content of 66 jobs. This can be described as the "direct labour-input coefficient" of that industry. We adopt the term "jobs" as a measure of the labour input associated with a particular level of output since our concern is with the change in employment due to incre- mental changes in output. However, what is implied is man-years since the input of labour services is obviously a flow. In other words, the coefficients indicate the amount of labour associated with a particular volume of output per year assuming as given the production function, hours of work and factor-ratios.

We can extend the analysis to trade flows by assuming that the labour content per unit of domestic gross output is equal to the labour content of

---

7. At the time of writing, NACE trade figures for 1976 were available but the most recent output and employment figures were for 1975. Estimates of 1976 gross output and employment were obtained using industrial price indices on a NACE basis, a key relating NACE industrial categories to their CIP-equivalents and the volume of production index and employment figures for CIP industries.

Table 2: *Gross output per person engaged in manufacturing industry and industrial composition of manufacturing trade by region, 1976*

		(1)	(2)		(3)		(4)		(5)		(6)		(7) LDCs (less OPEC)		(8)	
	NACE CL10	GO/E £000	Intra-EC M	X	Extra-EC M	X	US & Canada M	X	Japan M	X	OPEC M	X	M	X	ACP M	X
Non-food																
Non-metallic mineral products	24	15.2	2.5	1.6	0.7	3.2	0.7	5.5	1.1	1.0	—	1.9	0.1	2.3	—	4.7
Chemicals (including synthetic fibres)	25, 26	28.3	17.0	8.5	8.4	16.4	8.7	11.3	4.4	43.1	1.3	13.8	7.6	20.7	1.9	16.9
Metal products	31	10.3	5.6	2.7	2.3	2.3	1.7	3.7	3.2	0.1	—	1.8	2.3	1.1	—	1.7
Agric. and industrial machinery	32	11.4	15.3	3.8	11.3	5.8	14.7	7.0	15.0	0.5	—	5.1	0.2	4.0	—	5.6
Office & data processing machinery	33	27.4	2.2	6.6	9.6	6.6	19.8	5.4	7.1	6.1	—	0.8	3.5	3.0	—	0.8
Optical & precision instruments	37															
Electrical goods (industrial & domestic)	34	13.1	8.1	5.1	9.9	7.9	14.1	10.5	18.7	7.5	—	5.7	3.9	2.2	—	4.0
Motor vehicles (manufacturing and assembly)	35	17.7	9.2	1.0	4.3	0.1	0.4	0.1	32.9	—	—	0.4	—	—	—	0.8
Other transport equipment	36	11.4	0.7	1.2	1.9	1.5	3.9	0.3	2.1	—	—	2.0	—	2.1	—	5.4
Drink	424-28	20.3	0.8	1.6	0.5	2.1	—	1.6	—	1.0	—	4.3	0.5	4.6	1.4	13.5
Tobacco	429	20.5	0.6	0.1	0.1	2.9	0.1	3.3	—	0.6	0.1	4.4	—	4.3	—	0.1
Textiles (including hosiery)	43	12.6	9.6	9.7	7.4	3.8	5.2	5.4	9.0	0.9	1.8	2.3	15.4	2.1	0.1	1.4
Cloth	453-6	7.4	3.5	3.2	1.0	0.7	0.5	1.1	0.1	0.4	—	0.3	3.0	0.2	—	0.2
Leather products (including footwear)	44, 451	9.5	2.0	1.9	1.2	2.2	0.7	5.5	0.1	—	0.1	—	3.9	—	—	—
Paper products, printing and publishing	47	10.6	4.4	2.7	8.3	0.3	5.6	0.3	0.2	—	—	0.2	0.3	0.6	0.1	1.2
Rubber and plastics	48	13.9	4.8	3.5	2.4	2.7	3.2	2.9	1.5	—	0.3	0.9	1.1	0.9	—	0.8
Wood products, (including furniture)	46	9.7	1.1	1.4	8.0	0.4	3.2	0.6	0.7	0.3	9.5	0.9	14.5	0.2	23.2	1.6
Other manufacturing (including jewellery, sports goods, toys)	49	8.7	3.6	3.8	10.2	14.8	7.6	29.3	1.7	—	—	0.3	2.8	0.8	—	0.3
Food	41,420, 421	33.5	9.0	41.6	12.5	26.3	9.9	6.2	2.2	38.5	86.9	54.9	40.9	50.9	73.3	41.0

Notes: M = imports; X = exports; LDCs is equivalent to *Eurostat* Group III countries minus OPEC. The ACP countries are those LDCs participating in the Lomé Agreement in 1976. Column totals (2) to (8) add to 100.

Sources: Irish Statistical Bulletin, Sept. 1979 and additional information provided by the Central Statistics Office. *Eurostat* trade data (microfiche).

traded output in the same industry. Thus an increase of £1m in exports/
imports per period is assumed to create/displace the same number of jobs as
a £1m change in domestic gross output in the same direction. Using this
assumption, the employment coefficient for trade with the major trading
areas can be estimated from the following formulae:

$$E_{j, x} = \sum_i \left[\left(\frac{L}{Q}\right)_i \cdot \frac{X_{ij}}{\sum_i X_{ij}} \right]$$

$$E_{j, m} = \sum_i \left[\left(\frac{L}{Q}\right)_i \cdot \frac{M_{ij}}{\sum_i M_{ij}} \right]$$

where

$E_{j, x}$ = employment coefficient for exports to region j

$E_{j, m}$ = employment coefficient for imports from region j

$(L/Q)_i$ = labour content per unit of output in industry i

X_{ij} = exports of ith industry products to region j

M_{ij} = imports of ith industry products from region j

i   = ith industry (i = 1 . . . 44)

Basically, the manufacturing employment coefficient for a particular trading
area is a weighted average of direct labour input coefficients, the weights
being proportional to the share of the various industries in trade with that
area.[8] The results of our calculations are presented in Table 3.

On a bilateral basis the coefficients indicate the net employment con-
sequences of balanced trade expansion in manufactured goods with a
particular country or group of countries. The ratios of the coefficients on
exports and imports are also provided. A ratio less than unity indicates that
imports are comparatively more labour-intensive than exports and thus a
balanced expansion of trade, assuming a constant composition of trade,
would result in a net reduction in the demand for labour. By the same line
of reasoning, a ratio greater than unity shows that exports are more labour
intensive than imports.

Employment coefficients are provided for manufactured trade inclusive
and exclusive of foods. The food industry presents a number of problems.

8. A more disaggregated version of Table 2 was used for these computations.

Table 3: *Employment coefficients: jobs per £1m (current price) imports/exports by region, 1976*

	Total Trade	Intra-EC	Extra-EC	US & Canada	Japan	OPEC	LDCs	ACP
Exports ($E_{j, x}$)								
All manufactures								
excluding food	79.08	81.13	75.47	83.47	41.38	59.20	57.54	63.46
including food	58.60	57.37	63.20	80.64	33.16	44.45	42.27	48.92
Imports ($E_{j, m}$)								
All manufactures								
excluding food	78.73	78.06	80.52	72.63	77.92	92.06	96.65	95.39
including food	74.57	74.29	75.28	68.63	76.67	39.89	73.11	53.07
Ratio ($E_{j, x}/E_{j, m}$)								
All manufactures								
excluding food	1.00	1.04	0.94	1.15	0.53	0.64	0.59	0.66
including food	0.78	0.77	0.84	1.17	0.43	1.11	0.58	0.94

Sources: Computed from Table 2.

Since the domestic content of raw material inputs is relatively high, the direct labour-input coefficients may understate the total change in employment associated with an expansion of domestic food processing since employment is generated (or maintained) in the primary sector. Thus, special care must be taken in interpreting the coefficients inclusive of food. It would be inappropriate to exclude food from the calculations entirely because it accounts for a high proportion of employment in manufacturing, represents a significant share of trade with most trading areas and is especially capital-intensive. All of these factors conbine to give this industry a disproportionate influence on the size of the average employment coefficients.

Taking extra-EC trade as a whole, Table 3 shows a figure of 75 jobs created per £1m 1976 exports, as compared with 80 jobs lost per £1m import displacement. Manufactured imports from extra-EC are, therefore, more labour intensive than manufactured exports to extra-EC. The inclusion of the food industry accentuates the difference between the export and import coefficients, resulting in a ratio of 0.84 for extra-EC trade.

A balanced expansion of trade with the US and Canada would have strongly positive net employment effects. This is attributable to the highly labour intensive character of exports to this area — itself partly determined by the high proportion of exports in the "other manufacturing" category, combined with a high proportion of capital-intensive imports such as office machinery, precision instruments and chemicals. The removal of food makes only a slight difference to both export and import coefficients.

Imports from Japan are the most labour-intensive of those of the established industrialised countries and the coefficients for trade with Japan reflect this situation. The gross employment displacement effects of Japanese imports are the highest of any of the trading blocs, reflecting the concentration of imports in a few relatively labour-intensive areas, while the employment creation effect on the export side is lower than average because of the predominance of food and chemical products. The exclusion of food reduces the labour-intensity of Japanese exports and raises the ratio of the coefficients but the latter remain the lowest on the table.

The oil-producing countries have provided rapidly-growing markets for Irish manufactured exports, particularly food and, to a lesser extent, chemicals. The composition of our exports results in a comparatively low employment coefficient and the exclusion of food does not markedly change its relative size. As little as three per cent of imports from OPEC are classified as manufactured goods. This, taken in conjunction with the exceptional imbalance in the composition of our manufactured trade with OPEC, reduced the operational value of the ratio of export and import coefficients as a predictor of employment effects of trade expansion.

A striking difference can be observed in relative factor intensities of exports and imports for trade with LDCs. The difference is affected only

marginally by the inclusion of food, because of the high share of processed food in LDC imports and exports.

It is interesting to note that the coefficient for total manufactured imports from LDCs is marginally lower than the corresponding coefficient for extra-Community imports, implying that manufactured imports from LDCs are slightly more capital intensive than those from extra-EC countries taken as a group. This paradox can be explained both by the importance of food and also by the general restrictions placed on the more labour-intensive imports from LDCs.

The high share of food in imports from the ACP countries results in a particularly low value for the employment coefficient for imports (the ratio of the coefficients is in excess of 0.9). The exclusion of food has the predictable consequence of increasing both the export and import coefficients, the latter substantially more than the former. The resulting non-food import coefficient is very close to that of total LDCs with a more plausible ratio of import and export coefficients.

Three major conclusions can be drawn from the above analysis. First, a balanced expansion of non-food manufacturing trade with the extra-EC countries is likely to have negative net employment effects. Secondly, the inclusion of food, accepting the difficulties associated with it, implies that a balanced expansion of total manufacturing trade with the extra-EC areas is likely to be negative for all areas except North America and OPEC. Thirdly, a balanced expansion of non-food manufacturing trade with the rest of the Community is likely to have positive effects on employment. The inclusion of food reverses this conclusion.

Before completing this section, some methodological points may be noted.

First, the coefficients are average labour-input coefficients based on the existing industrial structure, plant size, capacity utilisation etc. Since interest centres around the net employment effects of incremental changes in trade, marginal coefficients would obviously be more desirable. However, marginal coefficients would be very much more difficult to estimate and also subject to a wide margin of error.

Secondly, labour is implicitly assumed to be a homogeneous factor of production and no distinction is made between skilled and unskilled labour. This must be borne in mind in interpreting some of the results.

Thirdly, the coefficients relate to direct labour content and therefore take no account of indirect or "linkage" employment effects. Several studies for other European countries have estimated total employment coefficients through the use of industrial input-output tables. *A priori* this would suggest that our coefficients are downwardly biased — underestimating the employment creation effects of exports and the employment displacement effects of imports. However, given the high import content of industrial raw

materials and the relatively weak linkages in the more export-oriented industries (see McAleese and McDonald (1978) on this point) it is unlikely that the use of direct coefficients seriously underestimates the total employ- ment effects of trade expansion in the manufacturing sector.[9]

Fourthly, coefficients calculated for a single year may be distorted by a great many random influences, as well as taking no account of the evolution of the commodity structure of trade. We agree that it would be desirable to estimate coefficients over a period of years but (at present) we are constrained by the lack of matching industrial and trade data. However, it is worth noting that Schumacher (1978) found that employment coefficients calcu- lated for Germany's trade with LDCs over the period 1972 through 1976 changed by as little as 0.02 during this time, and de Grauwe et al., (1979) reached a similar conclusion in a study of Belgian trade using data for 1965, 1970 and 1975.

IV EVALUATION OF RESULTS

Employment coefficients for Ireland can be compared with those of other EC countries and could, in certain circumstances, be useful in explaining different bargaining postures among Community members in trade negotia- tions. They can also throw light on the relevance of the Heckscher-Ohlin hypothesis to Irish trade. Finally, they are helpful in explaining the likely consequences of extra-EC trade expansion.

IV.1 International Comparisons

Employment coefficients have been calculated for a number of countries with the focus of attention generally being on trade with LDCs. Cross- country comparisons of individual export or import coefficients are not normally undertaken because each is defined in terms of different currency units in different years. This difficulty is easily circumvented by recourse to employment coefficient ratios such as those presented in Table 3 (see Martin, 1979).

De Grauwe et al., (1979) calculated employment coefficients for Belgium's trade with a number of trading areas. The ratio of the coefficients for total trade in 1965 is 1.01, 0.95 in 1970 and 0.98 in 1975, all of which are noticeably close to our estimate of unity for Ireland's total non-food trade. Their 1965 estimate for intra-Community trade is 1.02 and their 1970 estimate is 0.96, while our 1976 estimate for Ireland's non-food trade with

---

9. Linkage effects with the primary sector are, however, likely to be of importance in industries based on domestic raw materials, notably food processing — hence the need for special interpretation of this case.

the Community is 1.04. Their estimated ratio for trade with LDCs of 0.84, however, contrasts with the Irish ratio of 0.58.

De Grauwe's findings on LDC trade are similar to Schumacher's estimates for German trade with LDCs for 1972 through 1976, all of which are approximately unity. The implications of Schumacher's estimates is that German imports from LDCs are typically no more labour-intensive than German exports so that a balanced expansion of trade should have a negligible effect on the aggregate demand for labour. A similar ratio was calculated for Netherlands-LDC trade by Kol and Mennes (1978) — using 1973 input-output data. They suggest a value of 0.93 which, again, is close to the estimate for Belgium.[10] The counter-intuitive nature of these results may be due to the absence of any allowance for the skill-intensity of DC-LDC trade. In general, developed country exports to LDCs embody a higher human capital or skill content than imports from LDCs. This being the case, the implication of a balanced expansion of trade when the ratio approximates to unity is that relatively skill-intensive jobs are created while a broadly similar number of relatively unskilled workers are displaced.

A recent study of DC-LDC trade by Balassa (1979) produces results which are more intuitively appealing. Using 1976 data to calculate direct employment coefficients, Balassa finds that the average ratio for EC trade with LDCs is 0.65. This compares with our estimate for Irish-LDC trade of 0.58. Likewise, his estimate for Japanese-LDC trade of 0.90 is consistent with our finding that imports from both areas are of a relatively high labour intensity. However, it must be borne in mind that Balassa's results are based on data at a much higher level of disaggregation than those employed in either the present study or in the other studies cited above.

IV.2 A Test of the Heckscher-Ohlin Hypothesis

A close correspondence exists between gross output per worker (the inverse of the employment coefficient) and degree of capital intensity. Our calculations show a Spearman rank correlation coefficient of 0.903 between these two series. Employment coefficients can therefore be used as a short-hand test of the extent to which Irish trade patterns conform to basic Heckscher-Ohlin principles. The coefficients provide a simple measure of the labour intensity of trade with different regions. Moreover, the availability of employment coefficients exclusive of the food processing industry makes it possible to allow for the potential bias created by trade in natural resource-based products.[11]

10. Estimates for Belgium, Germany and the Netherlands are based on *total* (direct plus indirect) labour coefficients, whereas our estimates are based on direct coefficients. For reasons already given we do not feel that the use of direct coefficients is likely to be misleading or to prejudice the comparability of our results with those found elsewhere.

11. McGilvray and Simpson (1973) emphasise the distorting effects of the capital-intensive food processing sector on a Heckscher-Ohlin test of Irish trade.

A model also of relevance to Irish circumstances is that outlined in Jones (1974). Jones' proposition is that a small country produces a limited range of goods itself. It benefits from trade by imposting goods at either extreme of factor intensity and exporting in exchange products in the intermediate factor intensity range. Applied to the present case, the hypothesis would be that Ireland should import highly labour intensive goods from LDCs, highly capital-intensive goods from high income capital abundant countries such as the USA and exchange products of similar factor-intensity with countries of broadly comparable factor price ratios. The Jones approach is considerably more attractive than naïve versions of the Heckscher-Ohlin model. It incorporates the fact that a large proportion of Irish imports are complementary rather than competitive. In the case of complementary imports, however, the employment coefficients can be no more than very rough estimates of the coefficients which would be required were such goods to be produced in Ireland. Other qualifications to bear in mind are the absence of a measure of human capital in the calculations and the concentration on net trade flows, leaving out of account the large share of two-way intra-industry trade which is a feature of manufactured goods exchange.[12]

Reverting to Table 3, trade with LDCs clearly conforms to expectations with imports from these countries being markedly more labour intensive than exports to them. Trade with North America is also consistent with the hypothesis. GDP *per capita* in the US and Canada is almost three times the Irish level which accounts for the highly capital-intensive nature of imports from these countries. The employment coefficient ratio of 1.04 for intra-Community trade might also be regarded as supportive of the expected pattern. Average GDP in the EC on a trade-weighted basis is roughly 1½ times Irish GDP ($3,470 in 1978 prices).

The Japanese figures alone defy explanation along Heckscher-Ohlin lines. Japan's GDP *per capita* ($7,280 in 1978 prices) is more than double the Irish level and there is no *a priori* reason for expecting exchange between these countries to take the form it does. As already seen, Japan exports goods to Ireland which are highly labour-intensive while Irish exports to Japan are concentrated in highly capital-intensive industries such as chemicals. One possible explanation of this paradox is that imports from Japan employ much more capital-intensive processes than their closest Irish substitutes. This may be the case for imports of Japanese motor vehicles (33 per cent of Japanese imports into Ireland) and perhaps also of some electrical goods. Other factors to be taken into account are the small absolute level of Irish exports to Japan and the prevalence of non-tariff trade barriers affecting both exports and imports. The structure of Irish trade with Japan clearly deserves further study.

12. See McAleese (1979) for an analysis of intra-industry transactions in Irish trade and of the role of multinational firms in these transactions.

Farley (1972) concluded that the Heckscher-Ohlin hypothesis has some, but limited, validity in explaining Irish manufactured goods trade. Our conclusion, based on a less comprehensive test, is that the Heckscher-Ohlin approach does reasonably well in explaining trade with North America and the LDCs provided the hypothesis is understood in the context of a small economy trading in more commodities than it produces. The results are also consistent with the presence of a large volume of intra-industry trade between Ireland and our EC partners.

Implications for Trade Expansion

The growth in *per capita* income, greater industrial specialisation and the growing multinational character of Irish industry all point to the rapid growth of trade with the European Community in the 'eighties. Our data indicate that the *net* employment implications of a balanced trade expansion with the EC will be of a minor importance. Job gains through additional exports will be matched by job losses through additional imports — assuming, of course, that trade composition effects are not too large and that labour-productivity in the export and import-competing industries do not diverge in a significant and systematic way.[13] In this instance, therefore, the gains from trade are reaped in the form of increasing returns to scale and additional choice (through product differentiation) rather than through the "saving" of factors implicit in the standard neo-classical interpretation of the gains from international trade.

Quite the opposite conclusion holds in the case of trade expansion with LDCs. Here, large net job losses are to be expected, given the disparity between jobs created by exports (58 per 1976 £1m.) and jobs lost because of import penetration (97 jobs per 1976 £1m.). The possibility of net job loss does not imply a welfare loss from this trade. On the contrary, the gains from trade in neo-classical based exchange derive precisely from the saving of labour and capital released as a result of the re-allocation of resources. "Excess" labour can be absorbed elsewhere in the economy in just the same way as labour released by technological change in one sector is re-absorbed in other sectors. In other words, the labour released as a result of further balanced trade with LDCs itself constitutes the major potential gain from this type of trade. Thus, the existence of a negative employment effect does not mean that such trade should be discouraged through protection. It does,

13. Using data presented in Katsiaouni (1979) historical productivity growth rates for CIP industry were extrapolated to 1990 to give gross output per man estimates at 1976 prices. From these estimates employment coefficients were calculated for 1990. The ratio of the export/import coefficients for the major trading group changes but not in a way to alter our conclusions about the impact of trade changes.

however, indicate that a greater amount of readjustment may be required in order to turn potential into realised trading gains.[14]

Although it is still too early to predict how successful the Tokyo Round will be in dealing with non-tariff barriers, the prospects for a further liberalisation in the world trading regime in the 'eighties augur well for an expansion of trade with North America. Growth in US trade will involve net employment gains, indicating that the gains from trade will take the form of capital saving, in contrast with the labour-saving effects of trade with LDCs. Since capital adjustment is more easily implemented than labour adjustment (such, at any rate, is the assumption of the burgeoning literature on trade-adjustment mechanisms), the evolution of this trade would deserve every encouragement. Irish exports to North America include many labour-intensive products such as footwear, tweeds and tablewear. This gives us an interest in encouraging US-EEC trade — and resisting pressures to restrict US imports which run the risk of inviting retaliation.

V CONCLUSION

Although most Irish trade is transacted within the Community, extra-EC trade accounts for a 25 per cent share. This is a large amount of trade relative to GDP and an indication of its employment implications should be of value to trade negotiators and policy-makers. The conclusion of the GATT Tokyo Round and future developments in the Community's trading relations with the LDCs (notably through the Lomé Convention and the Multifibre Arrangement) make the exercise of more than usual interest.

Employment coefficients were estimated for each of the main extra-EC trading regions. Subject to the assumptions and qualifications spelt out in the text, these coefficients indicate the number of jobs lost or gained through an expansion of imports or exports with the various trading regions. Our main conclusion is that balanced expansion of extra-EC trade would be labour saving, i.e., more jobs lost as a result of import penetration than gained through exports. An expansion of £1m (1976) exports to extra-EC creates 75 jobs while an equivalent increase in extra-EC imports results in the loss of 81 jobs. While this loss of jobs may involve short-run adjustment costs it does not imply long-run economic loss. On the contrary, the gain from trade is reflected in the release of labour for allocation to more productive activities.

Comparison with employment coefficient estimates for other Community countries showed Irish estimates to be broadly comparable with those

14. See Wolf (1979) for a comprehensive analysis of the policies required in order to facilitate this type of adjustment.

countries for which data were available. However, our estimates of the employment coefficients of trade with LDCs — which show our imports to be nearly twice as labour-intensive as our exports — indicate that the adjustment costs for the Irish economy of a balanced trade expansion with LDCs would be considerably higher than that experienced by Belgium, the Netherlands or Germany.

Finally, our results are consistent with Heckscher-Ohlin theories of trade in showing very large differences in labour-intensity as between exports and imports in the case of Irish trade with the LDCs and North America. Our results are consistent with more recent theories of trade in the case of exchange with member countries of the EEC, where factor intensities of exports and imports are very similar. Much of this trade takes the form of intra-industry exchange based on economies of scale and product differentiation. The importance of food-processing industries in Irish trade was also underlined. Our results confirm McGilvray and Simpson's finding that the trade of this capital-intensive resource-based industry cannot be adequately explained within the standard Heckscher-Ohlin framework.

REFERENCES

BALASSA, B., 1979. "The Changing International Division of Labour in Manufactured Goods", *Banca Nazionale del Lavoro Quarterly Review*, September.
DE GRAUWE, P., W. KENNES, T. PEETERS and R. VAN STRAELEN, 1979. "Trade Expansion with the Less Developed Countries and Employment: A Case Study of Belgium", *Weltwirtschaftliches Archiv* Heft 1.
FARLEY, N. J., 1972. "Explanatory Hypotheses for Irish Trade in Manufactured Goods in the Mid-Nineteen Sixties", *Economic and Social Review*, Vol. 4, No. 1.
JONES, R. W., 1974. "The Small Country in a Many-Commodity World", *Australian Economic Papers*, December, reprinted as Chapter 2 in R. W. Jones, *International Trade: Essays in Theory*, Amsterdam: North-Holland 1979.
KATSIAOUNI, O., 1979. *Manufacturing Output, Productivity Trends and Employment Planning in Ireland*, Dublin: IPA.
KOL, J. and L. B. M. MENNES, 1978. *The Role of Developing Countries in the Dutch Market of Manufactures: Impact on Income and Employment*, Rotterdam: Deel Rapport 6, Economic Institute.
MARTIN, J., 1979. "Empirical Estimates of the Employment Content of Trade Flows", mimeo, Paris: OECD.
MATTHEWS, A., 1980. *The European Communities' External Trade Policy: Implications for Ireland*, Dublin: Irish Council of the European Movement (forthcoming).
McALEESE, D., 1979. "Intra-Industry Trade, Level of Development and Market Share" in H. Giersch (ed.), *On the Economics of Intra-Industry Trade.* Proceedings of a Symposium held in the Institut fur Weltwirtschaft, Kiel 1978, Tubingen: J. C. B. Mohr (Paul Siebeck).
McALEESE, D. and D. McDONALD, 1978. "Employment Growth and the Development of Linkages in Foreign-Owned and Domestic Manufacturing Enterprises", *Oxford Bulletin of Economics and Statistics*, 1. 40, No. 1.

McGILVRAY, J. and D. SIMPSON, 1973. "The Commodity Structure of Anglo-Irish
    Trade", *Review of Economics and Statistics,* Vol. 55, No. 4.
SCHUMACHER, D., 1978. "Employment Effects of Imports from Developing Countries
    should not be Dramatised", *DIW Wochenbericht,* No. 1.
WOLF, M., 1979. *Adjustment Policies and Problems in Developed Countries,* World
    Bank Staff Working Paper, No. 349, Washington, DC: World Bank.