

Pomfret, Richard

Working Paper — Digitized Version

Intra-industry trade in Israel: Level, explanation and implications

Kiel Working Paper, No. 40

Provided in Cooperation with:

Kiel Institute for the World Economy – Leibniz Center for Research on Global Economic Challenges

Suggested Citation: Pomfret, Richard (1976) : Intra-industry trade in Israel: Level, explanation and implications, Kiel Working Paper, No. 40, Kiel Institute of World Economics (IfW), Kiel

This Version is available at:

<https://hdl.handle.net/10419/46744>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Kieler Arbeitspapiere Kiel Working Papers

Working Paper No. 40

Intra-Industry Trade in Israel;
Level, Explanation and Implications

by

Richard Pomfret

A⁹ 197 76 Weltwirtschaft
Kiel

Institut für Weltwirtschaft an der Universität Kiel

Kiel Institute of World Economics
Department IV
2300 Kiel, Düsterbrookweg 120

Working Paper No. 40

Intra-Industry Trade in Israel,
Level, Explanation and Implications

by

Richard Pomfret

January 1976

A 9 197 76 Weltwirtschaft
Kiel

Kiel Working Papers are preliminary papers written by staff members of the Kiel Institute of World Economics. Responsibility for contents and distribution rests with the author. Critical comments and suggestions for improvement are welcome. Quotations should be cleared with the author.

INTRA-INDUSTRY TRADE IN ISRAEL; LEVEL, EXPLANATION AND IMPLICATIONS^x

Recent empirical studies of the phenomenon of intra-industry trade, i.e. simultaneous import and export of goods from the same industry, have found it to assume significant proportions in the industrialized countries.¹ The present paper reports the extent of intra-industry trade in the semi-developed economy of Israel. Under the most commonly used classifications of industries, the level of intra-industry trade is found to be similar to that in the industrialized countries. An explanation of the phenomenon is sought, with particular attention being paid to the rôle of the aggregation procedure in determining the calculated level of intra-industry trade. The results of the paper are summarized in the final section and some implications for future research are drawn.

I

The measure of intra-industry trade within the *i*th commodity class, R_i , is taken from Grubel and Lloyd:-

$$(1) \quad R_i = (X_i + M_i) - |X_i - M_i|$$

^x This paper reports research undertaken in the "Sonderforschungsbereich Nr. 36, Weltwirtschaft und internationale Wirtschaftsbeziehungen (Kiel/Hamburg)", with financial support provided by the Deutsche Forschungsgemeinschaft.

¹ The pioneering work on the subject was done by Grubel and Lloyd, whose publications have recently been consolidated into book form. All references to their work are to the book, hereafter known as GL. Further studies measuring intra-industry trade are referred to in section I below.

where X_i and M_i are exports and imports respectively.² For comparative purposes it is useful to express intra-industry trade as a percentage of total trade:-

$$(2) \quad B_i = \frac{R_i}{X_i + M_i} \cdot 100$$

where B_i falls in the closed set between 0 and 100. To summarize a set of B_i the most useful statistic is the weighted average:-

$$(3) \quad \bar{B} = \frac{\sum_{i=1}^n B_i \cdot (X_i + M_i)}{\sum_{i=1}^n (X_i + M_i)} = \frac{\sum_{i=1}^n R_i}{\sum_{i=1}^n (X_i + M_i)} \cdot 100$$

$$i = 1, \dots, n$$

If a country's commodity trade is in imbalance \bar{B} cannot reach a value of 100 when applied to total commodity trade, even if the country's exports and imports consist solely of the same single product. In order to remove the trade imbalance effect, a "pure" measure of intra-industry trade would exclude unrequited trade from the denominator:-

$$(4) \quad \bar{C} = \frac{\sum_{i=1}^n R_i}{\sum_{i=1}^n (X_i + M_i) - \left| \sum_{i=1}^n X_i - \sum_{i=1}^n M_i \right|} \cdot 100$$

$$i = 1, \dots, n$$

² Exports and imports should be measured identically, preferably fob. In Israel exports are valued fob and imports cif, which will tend to bias the measure of intra-industry trade downwards in view of Israel's import surplus.

An undesirable property of this last measure is that, if $(X_i - M_i)$ has the same sign for all i , then $\bar{C} = 100$ irrespective of the distribution of X_i and M_i . Since Israel's trade deficit is large (equal to 27 % of $X_i + M_i$ in 1972), the adjustment factor incorporated in \bar{C} is substantial in the present case. Thus the estimates of \bar{B} and \bar{C} will differ markedly, although the former may be considered to undervalue and the latter to overvalue the level of intra-industry trade. Since there is no satisfactory solution to the problem of allocating imports between required and unrequired imports both \bar{B} and \bar{C} will be reported.

The definition of an industry is of crucial importance for determining the level of intra-industry trade. For the moment we will follow Grubel and Lloyd and:

" ... cease the search for an unambiguous definition of an industry at some level of aggregation and instead call each statistical class of internationally traded goods, regardless of the level of aggregation, an 'industry'" (GL, p. 4).

We will return to this question later.

Grubel and Lloyd's estimates of ten countries' intra-industry trade (\bar{C}) in 1967, at the 3-digit SITC level of aggregation, have a mean of 50 % (GL, p. 35). In the UK, USA and all EEC countries except Italy (45 %) intra-industry trade accounted for over 50 % of total trade, but the average was reduced by the lower figures for Japan (22 %) and Australia (17 %). These orders of magnitude are supported by Barker's estimates for fifteen industrialized countries (using 1965 2-digit SITC data), which also reveal high intra-industry trade for the West European and North American countries and lower levels for Japan and Australia (Barker, p. 31). Moreover, intra-industry trade is increasing over time. In Grubel and Lloyd's ten countries intra-industry trade as a percentage of total trade increased by 33 % in the nine-year period 1959-67 (GL, p. 41). Although different measures of intra-industry trade were used, the same conclusion was reached for

longer periods by Hesse (for 1953-70) and Hufbauer and Chilas (for 1929-69). The figures for Japan and Australia suggest that the level of intra-industry trade may be related to per capita income and to the degree of industrialization, but direct evidence for poorer countries is scarce. Grubel and Lloyd quote an estimate of 63 % for Yugoslavian trade in 1963 (at the 2-digit SITC level), and some estimates for South-East Asian countries (2-digit SITC level, sections 5-8 only) which range from 4 % for Ceylon and Thailand to a maximum of 15 % for Taiwan (GL, pp. 146, 179).

The level of Israeli intra-industry trade in 1972 is given in Table I. Defining industries as SITC 3-digit groups, the value of intra-industry trade was \$ 1,333 million, or 42.7 % of Israel's total commodity trade. After adjustment for Israel's trade imbalance the percentage is 58.7 %. This is larger than the figure for six of Grubel and Lloyd's ten developed countries, only exceeded by the UK, France, Belgium-Luxemburg and the Netherlands. Defining industries at the 2-digit SITC level increased the value of Israel's intra-industry trade to \$ 1,517 million, or 48.6 % of the total commodity trade. The adjusted figure, 66.8 %, is higher than that for twelve of Barker's fifteen industrialized countries, marginally below France and more substantially below the Benelux countries. The Israeli figure is also greater than that for Yugoslavia quoted above. In sum, Israel's level of intra-industry trade is high compared to that of other industrialized and semi-industrialized countries, and bears no resemblance to the low levels estimates for South-East Asian countries.

The breakdown of Israel's intra-industry trade by SITC 1-digit class is also given in Table I. In all classes except 4 and 3 the value of \bar{B} is less than the average for Grubel and Lloyd's ten countries. Nevertheless, Israel's high percentage of intra-industry trade rests heavily on the large amount of such trade in SITC 6, which has a big share of her total trade. This is primarily due to the nature of Israel's leading manufactured export, polished diamonds,

Table I : Intra-Industry Trade in Israel, 1972 (\$ 000),
by SITC Class

S I T C Class	X	M	X + M	2-digit aggregation		3-digit aggregation	
				ΣR_i	\bar{B}	ΣR_i	\bar{B}
0 Food & live animals	215,473	192,719	408,192	58,768	14.4 %	51,690	12.7 %
1 Beverages & tobacco	2,261	7,444	9,705	2,962	30.5 %	2,876	29.6 %
2 Crude materials, inedible, except fuels	41,334	140,945	182,279	65,430	35.9 %	36,384	20.0 %
4 Animal & vegetable oils & fats	5,111	9,515	14,626	10,222	69.9 %	10,212	69.8 %
5 Chemicals	88,416	232,855	321,271	122,214	38.0 %	120,326	37.5 %
6 Manufactured goods classified by material	572,768	698,919	1,271,687	993,004	78.1 %	887,154	69.8 %
7 Machinery & transport equipment	76,209	601,913	678,122	152,418	22.5 %	152,418	22.5 %
8 Misc. manufactured goods	126,873	81,519	208,392	97,868	47.0 %	57,908	27.8 %
9 Commodities & trans- actions, nes	7,045	21,151	28,196	14,090	50.0 %	14,090	50.0 %
T O T A L	1,135,490	1,986,980	3,122,470	1,516,976	48.6 % (66.8 %)	1,333,058	42.7 % (58.7 %)

Notes: Data on SITC 3 (mineral fuels, lubricants, etc.) are not available. Bracketed figures are \bar{C} . For explanation of symbols see text.

Source: Calculated from Central Bureau of Statistics, Israel's Foreign Trade General Summary 1973 (Jerusalem, 1974), pp. 26-32.

which have low value-added and whose major material input, uncut diamonds, is imported under the same SITC heading as the finished product is exported. If trade under SITC 667 is excluded from the analysis, the values of \bar{B} and \bar{C} are 27.8 % and 43.3 % at the 3-digit level and 35.6 % and 59.4 % at the 2-digit level. These figures are still high compared to those for industrialized countries, the average values of \bar{C} in Grubel and Lloyd's ten countries was 50 % (cf. 48 % in Israel) and in Barker's fifteen countries it was 53 % (cf. 59 % in Israel). The conclusion is that, even after allowing for the special case of diamonds, Israel's intra-industry trade is substantial when industries are defined at the 3-digit SITC or higher level of aggregation. It accounts for around half of Israel's total required non-diamond trade.

II

Explanations of intra-industry trade have been diverse. Hufbauer and Chilas stress the importance of tariff barriers in restricting the international divisions of labour. Hesse argues that intra-industry trade presents no problem for trade theory since it can be explained by existing hypotheses - an argument which implies that it is primarily an aggregation phenomenon. Grubel and Lloyd emphasise scale economies and product differentiation. The latter point is taken up by Barker, who argues that as income rises consumers demand greater product variety, which can be satisfied by importing goods which compete with, but are not identical to, domestic products. This is an attractive theory with respect to consumer goods, but not very persuasive for producer goods. Pagoulatos and Sorenson have included all of the above arguments in a multiple regression analysis of US intra-industry trade, and they concluded that all contribute significantly to the explanation of intra-industry trade.

The logically prior issue is whether high measures of intra-industry trade are a consequence of classification procedures or of economic forces independent from and transcending the aggregation problem. The commodity groups of the standard trade classifications are identified neither by low inter-group and high intra-group cross-elasticities of demand nor by similarity of input structures. Thus they possess a heterogeneity which could evoke intra-group trade because their products are from different "industries", in an economically meaningful sense of the word. The classification problem is alleviated by disaggregation and the value of \bar{B} at a given level of aggregation is always greater or equal to its value using more disaggregated data. The estimates quoted in the previous section suggest that in practice there is little difference between values calculated using 2- or 3-digit SITC data. In a more detailed study of the aggregation problem using Australian data for 1968/9, Grubel and Lloyd found that intra-industry fell from 20 % of total trade at the 3-digit SITC level to 5 % at the 7-digit level and they concluded that "intra-industry trade in Australia cannot be explained away by disaggregation" (GL, p. 67). The conclusion is not fully convincing since there is no procedure for determining whether 5 % differs significantly from zero. The problem is exacerbated by the low level of intra-industry trade even at the 3-digit level, and another country may provide a better case study.³

The most detailed published Israeli trade data permit identification of 2130 commodity groups. These statistics are prepared in

³ Pagoulatos and Sorenson claim that their analysis of US intra-industry trade confirms that it "is a real problem rather than just an aggregation problem" (p. 464). Their conclusion is based on a positive and significant coefficient for the number of 4-digit SITC groups in the i th 3-digit SITC group as an independent variable in a multiple regression equation with B_i as the dependent variable.

This is clearly an inadequate approach to the problem.

accordance with the BTN classification.⁴ The share of intra-industry trade in each BTN chapter, defining an "industry" first as a chapter and second as one of the 2130 disaggregated groups, is given in Table II. The 100 BTN chapters represent an aggregation level between the SITC 2-digit and 3-digit groups used in Table I, which had 52 and 169 members respectively, and it is not surprising that the values of \bar{B} (45.5 %) and of \bar{C} (62.4 %) lie between the figures quoted there. At this level of aggregation many chapters exhibit high intra-industry trade; for 24 chapters $B > 0.5$ (i.e. the value of exports is more than half and less than double the value of imports) and for 11 further chapters $B > 0.5$. At the more disaggregated level the values of \bar{B} and \bar{C} are considerably lower, 7.9 % and 10.8 % respectively. With disaggregation all values of B_i are reduced or remain constant. It is primarily the chapters with low intra-industry trade calculated at the aggregate level which show little reduction, whereas those chapters exhibiting high intra-industry trade in column 1 of Table II show greatly reduced levels in column 2. Under the disaggregated definition of an industry no chapters have $B_i \geq 0.5$ and for only five chapters is $B_i \geq 0.5$.

Intra-industry trade is then greatly reduced if industries are defined at a level of aggregation admitting about 2000. Whether the remaining intra-industry trade is significantly large is a question

⁴ While classification of imports and exports by BTN headings (4 figures) is identical, classification of imports specifies the headings into four additional figures and exports are only specified into two additional figures. Moreover, six figure categories are not identical for imports and exports. The rule of thumb adopted for the present exercise was to work at the greatest level of disaggregation for which export and import categories were identical. This clearly involves some arbitrariness since some commodities may appear more disaggregated than others. Such an arbitrariness, however, haunts all analysis of intra-industry trade in the absence of an unambiguous definition of an "industry". A further source of bias is that some traded goods are hidden in aggregated groups on security grounds.

Table II : Intra-Industry Trade in Israel by BTN Chapter, 1972 (percentage of total trade)

BTN Chapter	B _i	
	(a)	(b)
01 Live animals	94.4	24.8
02 Meat and edible meat offals	16.0	0.1
03 Fish, crustaceans and molluscs	13.8	0.7
04 Dairy products, eggs, natural honey	45.1	3.3
05 Products of animal origin, n.e.s.	52.3	31.1
06 Live plants, bulbs, etc., flowers	5.9	4.3
07 Edible vegetables, roots and tubers	63.4	10.9
08 Edible fruit and nuts	5.3	2.5
09 Coffee, tea and spices	0.1	0.1
10 Cereals	0.1	0.1
11 Products of milling, starches, etc.	7.2	2.3
12 Oil seeds and fruit, straw and fodder	28.8	3.3
13 Raw veg. material for tanning, dyeing	75.4	10.0
14 Veg. plaiting & carving materials	0	0
15 Animal and veg. fats and oils; waxes	69.1	2.4
16 Preparations of meat, of fish, etc.	72.1	45.0
17 Sugar and sugar confectionery	4.1	0.7
18 Cocoa and cocoa preparations	38.3	14.6
19 Preparations of flour and pastry products	24.9	3.2
20 Preparations of vegetables and fruit	11.4	3.2
21 Miscellaneous edible preparations	82.5	4.9
22 Beverages, spirit and vinegar	82.6	4.0
23 Food industry waste; prepared fodder	57.8	11.3
24 Tobacco	0.1	0
25 Salt, sulphur, lime, cement, etc.	38.9	2.7
26 Metallic ores, slag and ash	97.5	14.9
27 Mineral fuels, oils and products	0.3	0.3
28 Inorganic chemicals, precious metal compounds, etc.	89.6	9.8
29 Organic chemicals	63.6	15.0
30 Pharmaceutical products	52.5	10.4
31 Fertilizers	14.8	1.0
32 Tanning extracts, paints, inks, etc.	19.3	2.8
33 Perfumery & cosmetic preparations	75.9	31.9
34 Cleaning, polish preparations, waxes, etc.	41.6	13.2
35 Albuminoidal substances, glues	30.6	9.9
36 Pyrotechnic products, matches, etc.	95.1	57.6
37 Photographic and cinematographic goods	14.7	14.1
38 Misc. chemical products	91.1	31.4
39 Artificial resins, plastic materials, etc.	54.3	15.9
40 Rubber, synthetic rubber and articles	84.3	17.6
41 Raw hides, skins and leather	14.0	11.3
42 Articles of leather, animal gut, etc.	22.3	10.4
43 Furskins, artificial fur and products	97.3	62.3
44 Wood, articles of wood, and charcoal	26.9	1.9
45 Cork and articles of cork	0	0
46 Manufactures of straw plaiting material	22.8	22.8
47 Paper-making material	9.3	2.4
48 Paper, paperboard and articles	13.0	7.2
49 Books and newspapers, etc.	59.3	20.5
50 Silk and waste	2.7	0
51 Man-made fibres (continuous)	48.2	48.2

BTN Chapter	B _i		
	(a)	(b)	
52 Metallised textiles	64.0	64.0	
53 Wool and other animal hair	79.9	10.3	
54 Flax and ramie	2.4	0	
55 Cotton	35.3	28.8	
56 Man-made fibres (discontinuous)	89.5	42.1	
57 Vegetable textile materials, nes	0	0	
58 Pile, chenille, lace fabrics, etc.	47.8	15.9	
59 Wadding, ropes, textiles for industry	23.3	11.8	
60 Knitted or crocheted goods	12.0	3.5	
61 Apparel and clothing accessories, textile	13.7	10.0	
62 Finished textile articles, nes	80.4	24.4	
63 Old clothing and textile articles	0	0	
64 Footwear and parts	78.6	16.1	
65 Headgear and parts	82.5	42.5	
66 Umbrella, whips, walking-sticks, and parts	5.6	5.6	
67 Feather, down, human hair and articles	78.5	14.0	
68 Stone, plaster, cement material articles	25.5	19.1	
69 Ceramic products	9.7	9.6	
70 Glass and glassware	27.7	13.4	
71 Precious and semi-precious stones and metals	89.0	3.8	
72 Coins	8.9	8.9	
73 Iron, steel and products	41.7	8.2	
74 Copper and articles	95.7	4.1	
75 Nickel and products	9.3	9.3	
76 Aluminium and products	27.0	24.1	
77 Magnesium, beryllium and products	1.1	0	
78 Lead and products	1.7	1.7	
79 Zinc and products	1.2	1.2	
80 Tin and products	2.9	2.9	
81 Base metals and products, nes	2.1	2.1	
82 Tools, spoons, forks of base metal	75.1	22.8	
83 Miscellaneous articles, base metal	31.5	28.8	
84 Boilers, mech. appliances and parts	15.2	10.8	
85 Electric mech. equipment and parts	36.5	21.5	
86 Railway, locomotive and parts	2.4	2.4	
87 Vehicles, not for railway and parts	3.1	3.1	
88 Aircraft, equipment and parts	87.8	21.4	
89 Ships, boats and floating structures	32.3	0.6	
90 Photographic, check, medical instruments	42.3	33.8	
91 Clocks, watches and parts	20.7	20.7	
92 Musical instruments, sound recorders and parts	11.8	6.8	
94 Furniture, stuffed furniture and parts	66.6	33.6	
95 Carving, moulding materials and articles	40.8	0	
96 Brooms, brushes, etc.	60.6	60.4	
97 Toys, games, sport requisites and parts	69.7	51.2	
98 Misc. manufactured articles	47.1	29.8	
99 Works of art and antiques	63.5	49.6	
100 Articles, n.e.s.	46.0	-	
	\bar{B}	45.5	7.9
	\bar{C}	62.4	10.8

Notes: In column (a) $B_i = \frac{X_i + M_i - |X_i - M_i|}{X_i + M_i} \cdot 100$ where X_i and M_i refer to exports and imports in the i th chapter.

In column (b) $B_i = \frac{X_i + M_i - \sum_{j=1}^{m_i} |X_j - M_j|}{X_i + M_i}$ where X_j and M_j refer to exports and imports in m_i subdivisions of the i th chapter ($\sum_{i=0}^{100} m_i = 2130$).

which cannot be satisfactorily answered. It is interesting to note that Grubel and Lloyd's Australian study found a similar value of \bar{B} when they disaggregated to about 2000 "industries", although the Israeli and Australian figures are quite different under more highly aggregated definitions.

Even with 2000 "industries", the disaggregation process could be carried further. The "industries" with large intra-industry trade, i.e. $R_i > \$ 1$ million, are listed in Table III. These 57 "industries" account for 69 % of Israel's intra-industry trade under the disaggregated definition. It should be noted that 20 are explicitly n.e.s. categories, and they account for a quarter of total intra-industry trade. Sub-division of these categories, and others which are non-homogeneous would undoubtedly reduce the value of intra-industry trade.

Examination of the "industries" in Table III which are not obviously heterogeneous suggests that the phenomenon of intra-industry trade can in most cases be explained by existing trade theories. Nuts, for example, are a very popular consumption good in Israel, sold in an amazing variety. Dependence on geographic conditions, which vary between Israel and other nut-producing countries make this a typical "Ricardo good". In other "industries", especially in the first 50 BTW chapters, the varying nature of production conditions between countries can explain the presence of intra-industry trade. The large-scale intra-industry trade in radiotelegraphic apparatus is consistent with the product-cycle theory. Israel's combination of a fairly highly-skilled labour force and low wages make her an obvious early imitator of new products. Since no product breakdown of the traded radiotelegraphic apparatus is available this hypothesis cannot be conclusively tested, but the composition of Israel's trading partners is highly suggestive. In 1972 the USA supplied 54 %, Western Europe 45 % and the remainder came from Japan and Canada. Israel's leading customers were Iran, Singapore, Peru, Formosa, the Philippines and Nigeria, which purchased over 80 % of Israel's exported radiotelegraphic apparatus. The implication is that Israel is purchasing the most modern equipment

Table III : Disaggregated Commodity Groups with Intra-Industry Trade in Excess of
US \$ 1 million, Israel 1972

Commodity Group	Intra-Industry Trade (\$ 000)
08 05 0 Nuts	2,574
12 03 0 Seeds	1,656
23 07 90 Animal food n.e.s.	1,774
28 03 0 Carbon, including carbon black	1,660
29 21 0 Acid esters, salts and derivatives, n.e.s.	1,112
29 35 90 Heterocyclic compounds, n.e.s.	2,272
29 42 90 Vegetable alkaloids and derivatives, n.e.s.	1,372
30 05 0 Pharmaceutical goods, n.e.s.	1,204
38 19 998 Chemical products and preparations, n.e.s.	10,078
39 02 990 Polymerization products, n.e.s.	1,064
39 07 31 Plastic bags	1,354
39 07 998 Articles of plastic material, n.e.s.	3,522
40 11 90 Tyres and tubes for motorized vehicles	4,420
43 02 0 Furskins tanned or dressed	4,610
49 02 0 Newspapers, journals and periodicals	2,596
51 01 10 Yarn of synthetic fibres (continuous), not for retail	19,906
53 07 0 Yarn of combed wool, not for retail	1,284
55 01 0 Cotton, not carded or combed	2,910
55 09 91 Cotton fabrics, n.e.s.	3,466
56 01 10 Synthetic man-made fibres (discontinuous)	2,564
56 04 10 Tops of synthetic fibres, for spinning	1,110
56 05 10 Man-made synthetic yarn, not for retail	1,386
56 07 10 Fabrics of man-made synthetic fibres	1,066
61 09 0 Corsets, suspender belts and brassières	1,028
70 10 10 Bottles and jars of glass	1,036
71 02 19 Worked diamonds, non-industrial	2,386
73 18 10 Iron or steel pipes with seams	2,298
73 18 20 Iron or steel pipes, seamless	3,748
73 21 0 Structures and parts of structures of iron or steel	2,586
73 40 998 Articles of iron or steel, n.e.s.	4,694
76 02 0 Aluminium profiles	2,420
76 03 0 Wrought plates, strips, etc. of aluminium	2,598
84 06 12 Piston engines for aircraft	3,708
84 08 0 Engines and motors, n.e.s.	2,538
84 12 10 Air-conditioners	3,236
84 24 10 Soil preparation machinery for agriculture	1,232
84 38 0 Auxiliary machinery for knitting or weaving machines	1,784
84 52 991 Accounting machines, electric, with memory	1,464
84 55 0 Parts for accounting machines	3,320
84 61 0 Taps, valves, etc.	2,224
85 01 998 Electrical goods like motors, etc., n.e.s.	4,804
85 13 208 Electric telephone and telegraph apparatus, n.e.s.	1,340
85 15 10 Radiotelegraphic apparatus	13,574
85 18 0 Electrical capacitors	1,718
85 19 12 Electrical resistors	2,904
85 19 90 Accessories - re make or break of electrical circuits	1,554
85 21 99 Thermionic valves n.e.s.	1,340
85 23 10 Insulated electric wire, cable, etc.	2,828
87 02 99 Motor vehicles for passengers, n.e.s.	2,164
87 06 99 Parts for motor vehicles, n.e.s.	1,146
88 03 0 Parts of flying machines	3,610
90 17 99 Medical and surgical instruments, n.e.s.	4,816
90 28 10 Instruments to measure electrical phenomenon, n.e.s.	3,972
94 01 0 Chairs and other seats, and parts	1,308
94 03 0 Furniture and parts, n.e.s.	2,980
97 03 99 Toys, n.e.s.	1,592
99 01 0 Handmade paintings, drawings, etc.	1,920

Source: As in Table II.

from the western world's technological leaders, and is an efficient producer and seller of second-generation equipment. This case could also be explained by the Heckscher-Ohlin theory, if skilled labour were included as a distinct factor of production. The problem of addressing the Heckscher-Ohlin theory to the data in Table III is the unavailability of factor-proportions data at a microeconomic level. Casual empiricism does, however, suggest that the varying factor intensities involved in different furniture, toys, etc. could explain intra-industry trade in some "industries". Previous accounts of intra-industry trade have stressed product differentiation, but here it is only obviously apparent with respect to newspapers, journals and periodicals and works of art. A salient feature of Table III is the preponderance of producer goods and defence industries, almost to the exclusion of consumer goods industries.

III

The conclusions regarding intra-industry trade in Israel are three-fold. Intra-industry trade is important when industries are defined by 2- or 3-digit SITC groups; it accounts for around half of Israel's required non-diamond trade, which is similar to the levels found for industrialized countries. Much of the intra-industry trade disappears when the data are further disaggregated, so that it only accounts for 8-11 % of total trade when 2000 industries are identified and it would be still less if heterogeneous groups were disaggregated further. The intra-industry trade remaining after disaggregation can in most cases be explained by existing trade theories. In sum, the question of whether intra-industry trade is a significant phenomenon depends critically on the definition of an "industry" and in any case it does not require a reworking of international trade theory.

The consequences of these findings for empirical research go beyond the definitional problem. Any attempt to analyze Israeli trade

patterns at the 2- or 3-digit SITC level of aggregation is doomed to failure. A Leontieff test, for example, is inappropriate because the overall factor proportions of a commodity group will be calculated with different weights than its overall trade position. This Cassandran prophecy is applicable to research on almost all industrial and semi-industrial countries and suggests that the appropriate tests of theories of trade patterns can only be carried out at a much more disaggregated level than heretofore. Since data on factor proportions, etc. are not generally available at such levels, the signpost for future research points to the collection of such data and to the importance of microeconomic studies.

References

- T.S. Barker: "The Variety Hypothesis as an Explanation of International Trade", University of Stockholm Institute for International Economic Studies, Seminar Paper No. 41, November 1974.
- H.G. Grubel and P.J. Lloyd: Intra-industry Trade (Macmillan, London, 1975).
- H. Hesse: "Hypotheses for the Explanation of Trade between Industrial Countries, 1953-70" in H. Giersch (ed.): The International Division of Labour Problems and Perspectives (J.C.B. Mohr, Tübingen, 1974), pp. 39-59.
- G.C. Hufbauer and J.G. Chilas: "Specialization by Industrial Countries: Extent and Consequences" in H. Giersch (ed.) op.cit., pp. 3-33.
- E. Pagoulatos and R. Sorenson: "Two-Way International Trade: An Econometric Analysis", Weltwirtschaftliches Archiv III 1975 Heft 3, pp. 454-65.