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SPECIALISATION TENDENCIES IN SWEDISH TRADE AND PRODUCTION OF FABRICATED METAL PRODUCTS IN THE 1960's

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Abstract

By analysing the development in the 1960's of the specialisation of the Swedish fabricated metal product industry this paper contributes to the empirical analysis of so called intra- and inter-industry specialisation. The paper sets out to illustrate how a mainly descriptive tool may be utilised to select more powerful variables explaining the structural development of trade and production. One interpretation of the results of the paper is that specialisation has diminished at each level of commodity aggregation. Earlier contributions have found similar tendencies for other countries and have interpreted this to mean that the specialisation has taken part within rather than between technologically similar "industries". If so interpreted the results would also indicate the failure of the factor proportions theory. This paper offers an alternative interpretation, namely that the observed tendency indicates a shift in the Swedish specialisation pattern. Such a shift is consistent with the modern factor proportions theory, if a shift has occurred in Sweden's comparative advantage.

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SPECIALISATION TENDENCIES IN SWEDISH TRADE AND PRODUCTION OF FABRICATED METAL PRODUCTS IN THE 1960's*

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In recent years there has been a growing interest inthe trade literature in the phenomenon of intra-industry trade (i.e. two-way trade of commodities within the same industries). This literature includes empirical studies of the extent and development of such trade as well as theoretical ones trying to explain it (see Adler [1970], Gray [1973], Grubel [1967,1970], Grubel & Lloyd [1971] and Hufbauer & Chilas [1973]).[1)] Depending among other things on the homogeneity of industries or commodity groups in the available trade statistics, intra-industry trade may or may not be another contradiction to the modern factor proportions theory or other trade theories implying different export and import trade patterns for a given country. In any circumstance two-way trade has important implications for the possibilities of testing the factor proportions theorem in a multi-commodity framework (Ohlsson [1974a].

This paper is confined to an analysis of specialisation tendencies in the 1960's in the Swedish fabricated metal product industry. Being one of the subsectors of the engineering industry, it accounts for nearly ten per cent of the entire manufacturing industry in Sweden in terms of both employment and output.

The purpose of the present paper is twofold. By presenting some new empirical results the paper contributes, first of all, to the empirical analysis of intra-industry trade. It extends earlier work by not only analysing trade specialisation tendencies but also similar tendencies in the deliveries to the Swedish home market. The second and more important purpose is to illustrate how a mainly descriptive and simple analytical tool can be utilized to select powerful variables explaining the structural development of trade and production. The analysis has therefore been extended to include a study of extreme cases and trends in the pattern of inter-industry specialisation.

*) The author wishes to acknowledge the valuable criticism on earlier versions of this paper from B.Carlsson, H.G. Grubel, G.C. Hufbauer,K.G. Jungenfelt, E.J. Ray, G. Du Rietz and B. Lindström. The paper is based on a study (Ohlsson [1973]) on the international specialisation and competitiveness of the Swedish fabricated metal product industry. The methodology used was originally developed for a forthcoming study of the whole Swedish engineering industry by the same author to be published by the Industrial Institute for Economic and Social Research, Stockholm, henceforth referred to as Ohlsson [forthcoming].

1) For further references see Grubel & Lloyd [forthcoming]. At the outset of our own study only the work of Grubel [1967] was published.

Methodology

Most trade theories rest on the basic assumption that each product is homogeneous as regards both technology and demand characteristics. Under free competition this implies that a given country with the rest of the world specialises completely in its foreign trade in the sense that exports and imports of the same product do not occur. In practice, however, commodities have to be classified and empirically defined as 1) pure exportables (i.e. no imports of the respective commodities), 2) pure importables (i.e. no exports), 3) non-tradable goods (i.e. neither exports nor imports) and 4) others (i.e. both exports and imports).
The empirically predominant category is the last one.[2] For practical reasons we must therefore construct measures with which we can distinguish between these four categories. If X = exports, fob, M = imports, cif and O_h = Swedish production for the home market,[3] then the following two ratios are sufficient to classify any given commodity with respect to these four categories:

(1) (X-M) / (X+M): henceforth for simplicity called the net exports ratio

(2) (O_h - M) / (O_h + M): " " " " the net home deliveries ratio

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2) Grubel Lloyd's study of Australia [1971] suggests that complete specialisation of trade is very rare at empirically possible aggregation levels. The same conclusion can be reached from Gray [1973] and Hufbauer & Chilas [1973].

3) As is noted in Grubel & Lloyd [1971], note 2, p. 496, the differences in valuation between exports and imports, and here also production for the home market (defined simply as gross output minus exports, fob), introduce a bias in the measures used. Both specialization ratios are biased downwards. It is difficult to say, however, whether the analysis of the cross-sections is systematically influenced in any particular direction.

A pure exportable obtains the value + 1 for both ratios, while a pure importable receives the value -1 for the net exports ratio but the same value for the net home deliveries ratio only if production is completely specialised between the two countries (i.e. $O_h = 0$). A non-tradable commodity obtains the value + 1 for the net home deliveries ratio, but the net exports ratio is indeterminate. All other goods have values between -1 and + 1 for the two ratios.[4] We shall here use the term exportables for all commodities having positive values for their net exports ratio - thus including pure exportables. Importables are analogously defined as commodities receiving negative values for their net exports ratio.

To be able to study general specialisation tendencies between two years for a set of commodities, the standard deviations of ratios (1) and (2) may be used, and the changes in these standard deviations be taken as measures of specialisation trends in trade and production respectively. An increased standard deviation of the net exports and net home deliveries ratios indicates a tendency for commodities to become more like pure exportables and importables according to the definitions above. The reduction of distorting tariffs should lead to increased specialisation between Swedish and foreign producers and in the simplest case increase the standard deviations of the trade and production specialisation ratios at some level of aggregation. In this case the first analytical problem is to find out at which possible levels of aggregation such an inter-industry specialisation tendency occurs.

As defined here the Swedish metal product industry consists of

4) Assuming perfect tradability for all commodity groups one would expect a high positive correlation between the two ratios in the cross-section. The correlation coefficients were, however, 0.25 (for 1960) and 0.00 (for 1969). This may be an indication of a low or strongly varying international tradability for the commodities. In fact some other rough calculations hinted at a low average tradability for the metal product industry, at least compared to other engineering industries. In order to investigate the sensitivity of the results presented below to non-tradable goods, some extreme cases were omitted. Two empirical criteria of what constituted non-tradable goods were used, namely a) commodity groups for which the Swedish home market share exceeded 95 % and b) commodity groups for which both this share exceeded 95 % and the Swedish exports/production ratio was less than 5 %. The results indicate that the inclusion of non-tradable goods has virtually no effect on the estimated specialisation tendencies. This result does not preclude, however, variations in tradability and its changes over time from having affected our results in one way or another.

nine subindustries, or at most 100 commodity groups, at the 5-digit SITC level[5]. This is the lowest SITC-level used in Swedish trade and production statistics. The specialisation tendencies may thus be studied at two different levels of commodity aggregation.

Specialisation tendencies between and within subindustries

At the subindustry level of aggregation no tendency of increased specialisation was found between 1960 and 1969. The standard deviation fell from 0.35 to 0.30 for the net exports ratio and from 0.32 to 0.31 for the net home deliveries ratio at the subindustry level of aggregation. In Grubel's terminology there has been an increased intra-(sub)industry specialisation, i.e. the specialisation occurred within rather than between the nine subindustries.

The absence of increased specialisation between subindustries may be attributed to the heterogeneous production technology and demand characteristics of the products involved. A further disaggregation might reveal whether this is the case or not.

According to the Swedish definition of the commodity content of these nine subindustries they consisted of between two and 31 commodity items (hereafter called commodity groups) at the 5-digit SITC-level[6]. Of these subindustries the tin and can industry, including only two items, had to be excluded from further analysis for statistical reasons. For the remaining eight subindustries, and for the whole metal product industry, the standard deviations of the net exports and net home deliveries ratios of the commodity groups could be calculated (see table 1). However, for some commodity groups the values of the net home deliveries ratio were found to exceed the theoretical boundaries of that ratio. One explanation might have been the bias introduced by the differences in the valuation of exports, imports and Swedish home deliveries, but

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5) For a more detailed definition of this industry see Ohlsson [1973] appendix A.

6) A few approximations had to be made. On this point see appendix A in Ohlsson [1973].

all informaion suggested that a more probable explanation is that there were errors in the Swedish gross output figures in the original sources used for ten of the commodity groups. The specialisation measures presented in table 1 alternatively includes or excludes these "odd" commodity groups, but the comments in this section are restricted to the latter case. The disaggregation from subindustries to commodity groups gives approximately a doubling of the standard deviations of the two ratios. The large standard deviations in table 1 for each subindustry do not contradict the earlier presumption of heterogeneous subindustries. In spite of the possibility that an increase in homogeneity may have been obtained by disaggregation it does not alter the tendency to decreased standard deviations between the years for the metal product industry as a whole. Again a further disaggregation may be necessary but this possibility is ruled out by lack of data.

Other analytical possibilities are suggested by the fact that increased standard deviations are obtained in both ratios for the instrument industry and in the net home deliveries ratio for the metal containers and structures industry and the miscellaneous fabricated metal products industry. Obviously there has been a stronger tendency at both aggregation levels to inter-subindustry specialisation in the deliveries to the Swedish home market than in exports and imports. This result may have been caused by country aggregation effects, perhaps attributable to the discriminatory tariff policies of EFTA and EEC during the 1960's. While the Swedish tariffs on imports either decreased or remained the same, Swedish exports were confronted with increased tariffs in some markets. Whether or not this can explain the difference in results for the trade and production specialisation measures can be investigated by analysing Sweden's specialisation by countries or markets.

Trade specialisation by countries

If, according to the argument above, country aggregation effects explain the absence of increased trade specialisation, one would expect Swedish trade with at least its EFTA partners to have grown more specialised in the 1960's. In order to investigate this possibility Swedish trade was divided into trade with four different markets, namely the Scandinavian countries (Denmark, Finland and Norway), the Rest EFTA market (here

Table 1. Measures of the specialisation tendencies between 1960 and 1969

SNI-code	Subindustry	Number of observations	Standard deviation (s) and mean value(m)	The net exports ratio		The net home deliveries ratio	
				1960	1969	1960	1969
3811	Hand- and machine tools	12	s	0.61	0.59	0.73	1.80
			m	0.24	0.04	0.26	-0.55
		10	s	0.61	0.60	0.57	0.57
			m	0.17	0.04	0.33	0.18
3813	Metal containers and structures	8[1]	s	0.60	0.45	0.32	0.56
			m	0.06	-0.01	0.69	0.63
38192	Fabricated wire products	11	s	0.79	0.66	0.83	1.00
			m	-0.22	-0.16	0.26	0.18
		9	s	0.73	0.63	0.58	0.55
			m	-0.05	-0.25	0.54	0.30
38193	Nails, screws, bolts, etc	6	s	0.59	0.45	0.83	0.78
			m	-0.24	-0.41	0.26	-0.07
38194	Metal sanitary and plumbing equipment	6	s	0.60	0.59	3.45	2.73
			m	0.06	0.12	1.98	1.56
		5	s	0.60	0.59	0.34	0.38
			m	0.05	0.12	0.58	0.48
38195	Metal household equipment	9	s	0.52	0.38	0.51	0.49
			m	0.07	0.17	0.50	0.32
38199	Miscellaneous fabricated metal products	31	s	0.51	0.50	0.75	1.08
			m	-0.43	-0.34	0.14	-0.19
		27	s	0.50	0.51	0.57	0.64
			m	-0.46	-0.37	0.29	0.13
3851	Instruments	15	s	0.46	0.55	1.88	7.37
			m	-0.34	-0.14	-0.82	-2.09
		14	s	0.45	0.49	0.60	0.62
			m	-0.36	-0.26	-0.36	-0.19
The metal product industry, total		100[1]	s	0.60	0.55	1.35	3.13
			m	-0.18	-0.15	0.23	-0.24
		90	s	0.60	0.55	0.64	0.64
			m	-0.19	-0.19	0.30	0.17

1) One commodity group has been excluded because there were no exports or imports in 1969.

for simplicity only including Austria, Great Britain and Switzerland), the EEC market and the Rest of the world market. For each market and the years 1963[7] and 1969 the trade specialisation measures were calculated with results as shown in table 2.

Tables 1 and 2 indicate that Swedish trade by markets is more specialised than its total trade since no trade at all is obtained in three of the four markets for some commodity groups.

Furthermore, the differences between markets in number of non-traded commodities do not seem to be a result of border trade due to variations in tradability. Trade appears in fewer commodity groups for Sweden's economically closest neighbours than for its distant markets. The results may instead suggest that smaller countries are more narrowly specialised in their trade and production.

For the metal product industry as a whole standard deviations of the Swedish specialisation measures are practically the same.

The changes of the standard deviations over time for the metal product industry as a whole do not support the hypothesis that country aggregation effects explain the lack of increased trade specialisation. Neither for the Scandinavian nor for the Rest EFTA market is an increased specialisation obtained at the commodity group level. However, even here differences are obtained between the subindustries. For each subindustry an increased specialisation is obtained in trade with either one of the two EFTA markets although the tendency is in some cases weak. Four out of eight subindustries show a similar tendency for trade with the two non-EFTA markets.

In summary, the results of table 2 do not give strong support to the hypothesis that country aggregation effects explain the lack of increased trade specialisation for the Swedish fabricated metal product industry. On the other hand the disaggregation by markets for the trade specialisation measure does give support to that there are notable differences in specialisation tendencies between subindustries both in trade and in sales to the Swedish home market. This may indicate that the disaggregation for some subindustries but not for others gives fairly homogeneous commodity groups. Alternatively, it may reflect the competitiveness of the subindustries. The former possibility cannot be investigated by further disaggregation as noted above. A methodology for inter- and intra-industry analysis developed for Ohlsson [forthcoming] reported in [1974b] was in consequence used in the subsequent analysis of the fabricated metal product industry (Ohlsson [1973]).

7) Due to the insufficient subdivision of Swedish trade by countries in earlier years 1963 had to be chosen as the first year insted of 1960.

Table 2. Trade specialisation by markets in 1963 and 1969

SNI-code	Industry[a]	Standard deviation(s) and mean value(m) of the net exports ratio and number of observations(n)[b]	The Scandinavian market		Rest EFTA market		EEC market		Rest of the world	
			1963	1969	1963	1969	1963	1969	1963	1969
3811	Hand- and machine tools (12)	s	0.39	0.50	0.62	0.60	0.67	0.67	0.55	0.63
		m	0.65	0.43	0.04	-0.16	-0.13	-0.23	0.30	0.16
		n	9	11	11	12	11	12	12	12
3813	Metal containers and structures (8)	s	0.61	0.51	0.53	0.70	0.30	0.32	0.49	0.42
		m	0.31	-0.05	-0.42	-0.39	-0.47	-0.52	0.36	0.54
		n	7	7	6	7	6	7	8	8
38192	Fabricated wire products (11)	s	0.54	0.72	0.83	0.68	0.82	0.47	0.82	0.66
		m	0.53	0.26	-0.24	-0.36	-0.41	-0.70	0.29	0.27
		n	6	7	5	9	7	8	11	11
38193	Nails, screws, bolts etc.(6)	s	0.79	0.54	0.34	0.42	0.40	0.25	0.77	0.54
		m	0.23	0.24	-0.74	-0.67	-0.71	-0.78	0.08	0.03
		n	4	3	5	5	5	5	6	6
38194	Metal sanitary and plumbing equipment (6)	s	0.41	0.44	0.81	0.67	0.85	0.76	0.57	0.45
		m	0.28	0.19	-0.01	0.23	-0.01	-0.04	0.53	0.49
		n	5	6	6	5	5	6	6	6
38195	Metal household equipment (9)	s	0.70	0.45	0.58	0.67	0.45	0.52	0.46	0.43
		m	0.27	0.17	-0.05	0.01	-0.10	-0.16	0.56	0.50
		n	9	9	8	9	8	8	9	9
38199	Miscellaneous fabricated metal products (31)	s	0.65	0.69	0.57	0.49	0.55	0.44	0.68	0.62
		m	0.26	0.14	-0.55	-0.44	-0.59	-0.59	-0.19	-0.06
		n	26	26	26	25	27	28	31	31
3851	Instruments (15)	s	0.41	0.34	0.53	0.57	0.51	0.59	0.55	0.55
		m	0.52	0.53	-0.49	-0.35	-0.39	-0.30	-0.05	0.06
		n	14	14	15	15	15	15	15	15
The metal product industry, total (100)		s	0.57	0.57	0.62	0.60	0.59	0.55	0.67	0.60
		m	0.37	0.23	-0.37	-0.32	-0.40	-0.44	0.11	0.15
		n	82	85	84	89	86	91	100	100

a) Number within parenthesis shows the largest number of commodity groups in the respective industry.
b) Number (n) stands for actual number of observations for which exports or imports differ from zero.

Some further tests

In the analysis above it was assumed that there was some level of aggregation, for which the commodity categories were homogeneous enough to make the net exports ratio a reasonable measure of the international competitiveness of Swedish producers. The existence of scale economies, quality differences, technology and other gaps, joint production, border trade etc might then explain the existing two-way trade, but not prevent the net exports ratios to cluster close to its formal boundaries (+1.0 and -1.0 respectively) in a free trade economy. In a period of substantial trade liberalisation, such as during the late 1950's and the 1960's the net exports ratios should then tend to move towards these boundaries. So far the results obtained contradict this presumed development.

One possible explanation to the analytical results is that there have been some substantial changes in factor intensity rankings, scale economies, technology gaps etc., that have worsened the competitive position of some exportables or improved it for some importables. In other words a few odd observations may have biased the results. To investigate whether this is the case the commodity groups were divided into exportables of 1960 (set 1)and importables of 1960 (set 2) respectively, each of which included as subsets exportables of 1969 (subsets 1.1 and 2.2) and importables of 1969[1] (subsets 1.2 and 2.1). For each two sets and four subsets the mean values and standard deviations of the net exports and net home deliveries ratios were calculated as shown by table 3.

Suppose that a few odd observations for the above discussed reasons make some exportables of 1960 become importables in 1969 (subset 1.2) and for some importables of 1960 exportables of 1969 (subset 2.2). Then the elimination of these observations should, ceteris paribus, strengthen the tendency for the net export ratios to move towards the values +1.0 and -1.0. The mean value of subset 1.1 (exportables) should increase and that of subset 2.1 (importables) should decrease. If anything the standard deviations should decrease. According to table 3, however,

1) A number of other criteria for the selections were tried with results virtually the same as those reported in table 3. As noted above we also tried to take account of the possibility that the net exports ratio of commodities with a very low international tradability might move oddly. There was, however, practically no change in results.

Table 3 Specialisation measures in different selections of commodity groups according to export and import surpluses 1960 and 1969

	Selections according to criterion	Number of cases[1]	Standard deviation(s) and mean value(m)	The net exports ratio		The net home deliveries ratio	
				1960	1969	1960	1969
1.	X > M in 1960	35	s	0.30	0.46	0.41	0.41
			m	0.46	0.22	0.65	0.53
	and						
1.1.	X > M in 1969	24	s	0.29	0.28	0.28	0.21
			m	0.51	0.47	0.68	0.66
1.2.	X < M in 1969	11	s	0.29	0.27	0.60	0.57
			m	0.36	-0.32	0.57	0.25
2.	X < M in 1960	55	s	0.29	0.43	0.65	0.64
			m	-0.61	-0.45	0.12	-0.06
	and						
2.1.	X < M in 1969	44	s	0.28	0.37	0.63	0.63
			m	-0.66	-0.56	0.05	-0.15
2.2.	X > M in 1969	11	s	0.21	0.25	0.71	0.57
			m	-0.41	0.26	0.25	0.29

Legend: X = exports, fob.
M = imports, cif.

1) As noted above ten commodity groups are excluded due to probably unreliable gross output figures. For the net exports ratios this exclusion does not make any difference for the conclusions drawn in the text.

both mean values and one of the standard deviations move in the opposite direction. This result is obtained in spite of the fact that the eliminated observations are not few; nor have they moved from small positive to small negative values of the net export ratios. Subsets 1.2. (exportables becoming importables) and 2.2. (importables becoming exportables) indicate quite the opposite in constituting 25 % of all observations and in having rather high positive and negative mean values in the two years.

In summary, table 3 seem to indicate a negative relationship between the 1960-69 changes in and 1960 levels of the net export ratio. Such a systematic relationship cannot, however, be explained by changes between individual products in factor intensities, economies of scale, product differentiation etc. If the relationship do exist both at all aggregation levels and not only for the two specific years here chosen, then trade theories seem to offer three explanations. First the protectionism of the pre-1960 period may have reversed the pattern of specialisation in the Swedish fabricated metal product trade from its free trade position. As far as tariffs are concerned it seems safe to reject this explanation.[8] Secondly Sweden may have experienced a shift in its comparative advantage for instance due to changes in its factor endowments visavi other countries. Thirdly, in accordance with the Burenstam Linder theory Swedish exports and imports grow more similar. Before exploring into the last two explanations, let us try to rule out the possibilities A. that there is not a systematic negative relationship, B. that the relationship is specific for the commodity group level of aggregation and C. that it is specific for the two years chosen. The following regressions of the change in the net exports ratio in a period (y) on the level of the same ratio in the first year (x) are intended to test these hypotheses (t-ratios within parenthesis):

For 100 commodity groups in 1960-69:

(1) $y = -0.042 - 0.393x$ $\quad R^2 = 0.253$
$\qquad\qquad\quad (5.779)$

For 9 subindustries in 1960-69:

(2) $y = -0.040 - 0.391x$ $\quad R^2 = 0.278$
$\qquad\qquad\quad (1.643)$

For 100 commodity groups in 1960-64:

(3) $y = -0.037 - 0.222x$ $\quad R^2 = 0.155$
$\qquad\qquad\quad (4.269)$

8) The highest effective tariff rates estimated by Balassa [1965] for 1962 covering the U.S.A., the U.K., EEC, Sweden and Japan were 35.9 % for metal manufactures and 44.2 % for precision instruments, both of which are received for the U.K. While such high tariffs might have been prohibitive the much lower Swedish ones should not have been. According to Carlsson [1968], Chap.I, p.42 the highest Swedish effective tariff rate for metal products was 22.3 % (for steel manufactures). At the more disaggregated commodity group level used here the nominal tariff ranged from 0.0 to 13.2 % with an average of 7.0 in 1960. By 1969 the same tariff (for all Swedish imports) exceeded 7.0 % only in one commodity group and the average tariff was then 3.4 %.

According to all three regressions the relationship is negative at the 10 % level of significance in regression (2), or more, in regressions (1) and (3). Hypothesis A can be rejected. Regressions (1) and (2), which cover the same population, indicate a rejection of hypothesis B, although more than two levels of aggregation should have been tried, if possible. In spite of the substantial increase in the standard deviations obtained by disaggregation (cf table 1) the intercept and slope of the regression lines are statistically the same. In the shorter period 1960-64 a significantly smaller negative regression coefficient is obtained for x (at the 5 % level of significance). Since a negative regression coefficient is received also for this period and since the year 1964 was chosen only because of the similar business cycles of 1960, 1964 and 1969, it seems reasonable to reject hypothesis C.

Having established a stronger case for the existence of a systematic negative relationship, it is time to discuss its possible causes. Figure 1 offers a simple illustration. The vertical axis measures changes in net exports ratios, with the formal boundaries -2.0 and +2.0, while the horisontal one measures the initial net exports ratio ranging from -1.0 to +1.0. Line a-a has the same intercept and slope as regressions (1) and (2) above and line b-b as regression (3). Line c-c, which is a 135°-line through the origin illustrates a complete elimination of an initial specialisation pattern to the end year of a period. Line d-d, having the slope -2.0, is instead illustrating a complete shift in specialisation between the two years.

Obviously the regression results may indicate either one of the two possibilities, namely that the specialisation pattern is shifting or tends to be eliminated. The theoretical foundation of the former conclusion appears to be the modern factor proportions theory while that of the latter can only be explained by the Burenstam Linder theory (see Burenstam Linder [1961] and also Hufbauer [1970]). A conclusion that the structure of exports and imports will eventually become almost the same cannot, however, be true for all levels of commodity aggregation. The fact that the disaggregation from a subindustry to a commodity group level strengthens rather than weakens the negative relationship in terms of significance levels may be interpreted as an indication disfavouring the elimination hypothesis. In addition the results of table 3, showing both a high percentage of shifts in sign of the net exports ratio as well as numerically substantial ones, point in the same direction.

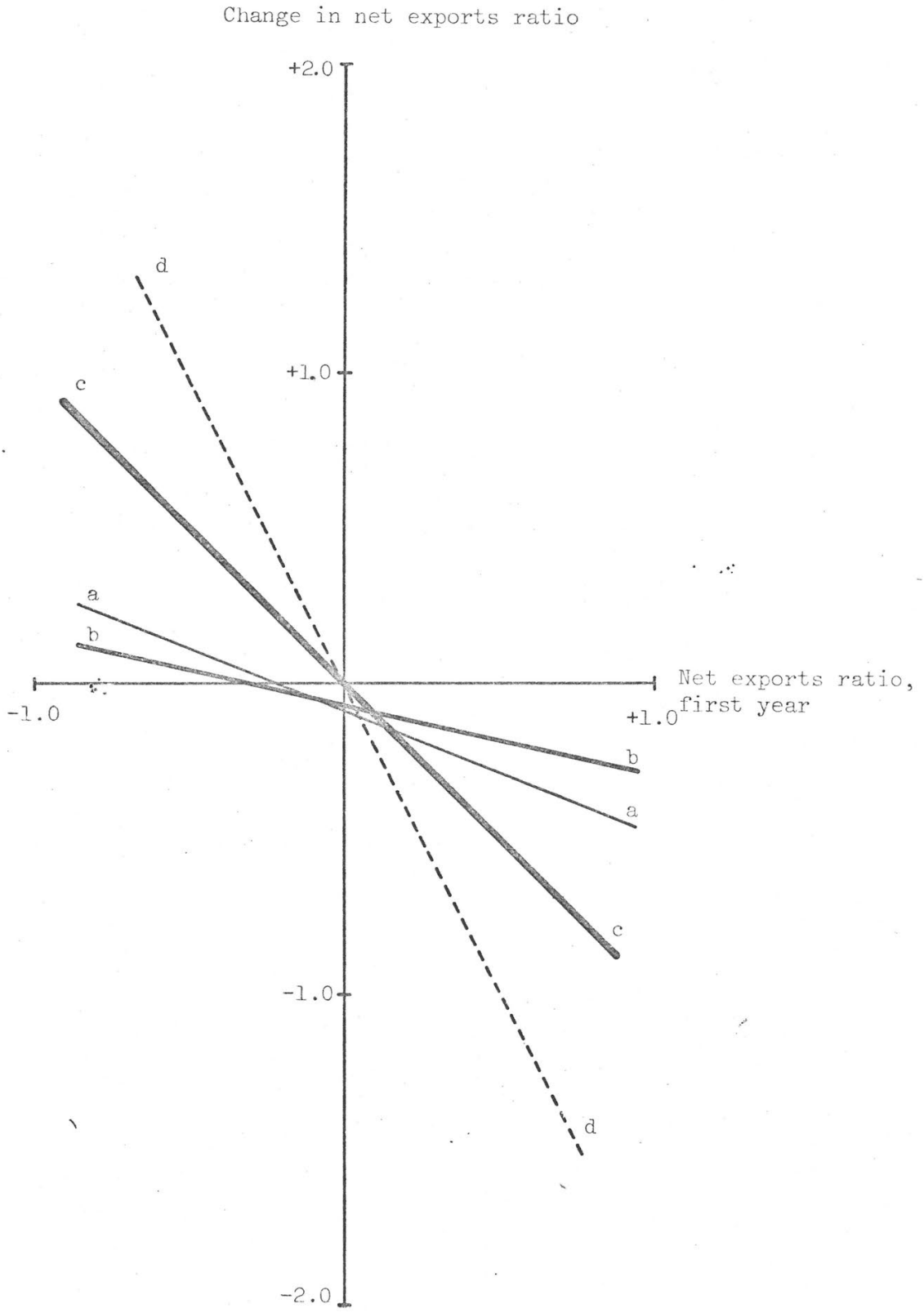
Change in net exports ratio
+2.0
+1.0
-1.0
-2.0
-1.0
+1.0
Net exports ratio, first year
a
b
c
d
a
b
c
d

FIGURE 1

There are two alternative ways of discriminating between the two possible conclusions. First a substantial extention of the period might yield the result that the negative slope of the studied relationship becomes significantly larger than 1.0, so that the elimination hypothesis can be rejected. Data limitations prevented such an extension of the period. Secondly, the hypothesis of a shift in specialisation implies, if it is due to a shift in Sweden's relative factor endowments, that the changes in specialisation should depend on the technology of production. Such an analysis was therefore subsequently tried in Ohlsson [1973] for the fabricated metal product industry and has also been pursued for the engineering industry as a whole (Ohlsson [forthcoming, 1974a]).

Summary and conclusions

One of the purposes of this paper was to contribute to the empirical analysis of intra-industry trade by analysing the changes in the Swedish trade and production specialisation for fabricated metal products. Another one was to facilitate a selection of major determinants of these changes. The first step of the analysis utilized a modified version of a methodology used by Grubel [1967]. The results obtained for Swedish fabricated metal products were quite similar to those derived by Grubel for the EEC countries. Grubel's conclusion that much of the specialisation seemed to have occurred within rather than between industries or commodity groups could not be rejected for Sweden. The subsequent analysis was in consequence designed to cover both inter- and intra-industry specialisation (Ohlsson [1973]) by utilising a new methodology developed for Ohlsson [forthcoming] and summarily reported in Ohlsson [1974b].

The second step of the analysis was first designed to reveal whether extreme developments in the specialisation measures for individual commodities had occurred for instance due to changes in the factor intensity rankings, economies of scale or technology gaps. This was found not to be the case. Instead a significant negative relationship was found to exist between the change in and the initial level of the trade specialisation measure. In other words exportables of 1960 tended to become importables or at least decrease their net exports ratios and vice versa for importables of 1960. Whether a shift or an evening out would eventually occur in the pattern of trade specialisation could not be decided by the analytical methods used. If the former was true the

results of the first analytical step above might alternatively be explained as a shift in specialisation rather than as a tendency towards increased emphasis on intra-industry specialisation. Consequently the subsequent analysis (Ohlsson [1973]) included tests of whether a shift in specialisation was actually occurring.

If instead the specialisation pattern tended to disappear at the aggregation levels studied then it emphasised the need for analysing intra-industry specialisation.

In summary, the analysis reported in this paper suggested that major determinants of the changes in the pattern of specialisation within the Swedish fabricated metal product industry might be taken either from the modern factor proportions theory or from the Burenstam Linder or other intra-industry trade theories. It suggested either an instability over time in Sweden's factor abundance or that this abundance played a minor role in its trade specialisation. Furthermore, the discriminatory changes in tariffs did not seem to directly influence the Swedish trade specialisation by countries very much.

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