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PRELIMINARY ANALYSIS OF TRADE PATTERNS IN MANUFACTURING: THE MALAYSIAN CASE

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PRELIMINARY ANALYSIS OF TRADE PATTERNS IN MANUFACTURING: THE MALAYSIAN CASE*

ABSTRACT:

This working paper reviews general changes in trade patterns for the Malaysian manufacturing sector, between 1980 and 2000. The analysis of trade data reveals that intra-industry trade (IIT) is an important component of Malaysia's international trade in manufactured good. At the three-digit level of industry aggregation, 30 per cent of all trade and 60 per cent of all trade in manufactured goods were found to be IIT in 1980 and 2000 respectively. The increase in IIT levels reflects a pattern of increased intra-industry specialization. There are considerable differences in the intra-industry trade development for different industrial groups and different trading partners. Industries that display strong and consistently rising levels of IIT are the modern expanding sectors, such as electrical and electronic products, machinery manufacturing and scientific and measuring equipment, while inter-industry trade is more prevalent in mature sectors that are in relative decline. With respect to trading partners, Malaysia's trade patterns do not differ significantly across countries at different development levels. However, an important share of Malaysia's trade with the "rest of the world," that is trade with the USA and Singapore, have been increasingly one of intra-industry trade.

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1. INTRODUCTION

The importance of foreign trade in the economy has been acknowledged. Malaysia shows a continual process of rising openness (the share of total trade in manufactures to GDP), from a high initial value of openness of 108 per cent in 1980, rising briskly to 171 per cent in 1990, and then rocketing to 325 per cent in 2000 (Table 1). The ratio of exports and imports to GDP has risen consistently over time, with the former superseding the latter. The expansion in Malaysian exports has been generated largely by external demand from developed economies and market access to them facilitated by foreign direct investment (Rasiah, 2002).

Table 1: International Trade of Malaysia, 1980-2000 (in per cent)

Year	Exports/GDP	Imports/GDP	Total Trade/GDP	Share of Manufactured Goods in Exports
1980	53.56	54.41	107.98	85.01
1981	51.42	47.06	98.48	78.21
1982	56.33	38.59	94.93	61.67
1983	56.67	51.44	108.12	76.70
1984	62.11	56.40	118.51	83.00
1985	63.11	51.15	114.26	78.67
1986	42.24	46.18	88.41	88.10
1987	51.17	51.57	102.75	92.00
1988	81.05	57.72	138.77	92.67
1989	82.79	63.73	146.52	89.76
1990	99.10	71.89	170.99	90.26
1991	102.93	80.39	183.32	88.81
1992	87.76	74.34	162.11	88.29
1993	110.45	74.77	185.22	81.96
1994	120.21	85.70	205.91	81.87
1995	123.57	94.38	217.95	81.80
1996	119.10	87.50	206.60	79.50
1997	121.18	89.62	210.80	79.17
1998	182.60	104.86	287.46	82.26
1999	197.61	106.61	304.21	81.20
2000	201.16	123.50	324.66	85.93

Source: Bank Negara Malaysia, *Quarterly Economic Bulletin*, various issues.

It is also shown in Table 1 that manufactured goods account for a large percentage in Malaysian exports. The fact that manufactures have been leading in Malaysian exports warrants a closer examination of the pattern of trade, focusing especially on intra-industry trade. The patterns of trade are decomposed using several standard methodologies in the international trade literature.

This paper takes the form of an interpretive survey with illustrative data to examine the following questions:

(a) To what extent has the manufacturing sector witnessed a shift in trade patterns over time? To what level has increases in trade been intra-industry trade (IIT) in nature?

(b) Which industries/industrial groups have higher levels of intra-industry trade?

(c) Does the trading partner matter for the type of trade specialization?

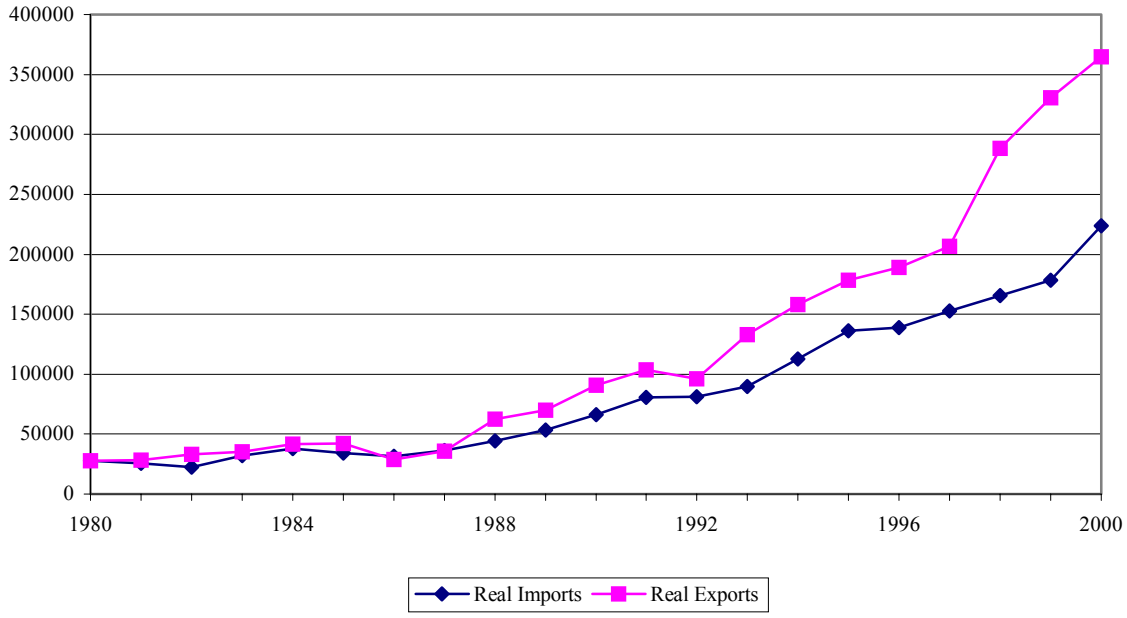
This paper is organized as follows. The following section describes the macroeconomic performance and composition of Malaysia's foreign trade between 1980 and 2000. Section three surveys the measurements for analyzing trade patterns. The fourth

section examines the systematic patterns of trade flows in the Malaysian manufacturing sector to discover shifts in the structure of trade. The final section concludes by summarizing and commenting on the main findings.

2. TRADE FLOWS AND COMMODITY COMPOSITION

Trade flows in manufactures between Malaysia and the world over a twenty-one-year period are presented in Figure1. Manufactured exports have remained higher than manufactured imports since 1987. The reason for this spurt in the expansion of exports was the industrial re-emphasis towards export-orientation, after a period of import substitution prior to 1986. The export expansion of the late 1980s occurred at the expanse of a relative slowdown in world exports in the 1980s as compared to the 1970s (Agrawal, *et al,* 2000). The 1990s witnessed a continued expansion of exports and imports. The gap between the two has grown considerably since 1997.

Figure1: Total Imports and Exports in Manufacturing (in million)



Note: The value of imports and exports are deflated by the import price and export prices indices based on constant 1980 prices.

Source: Computed from Bank Negara Malaysia, *Quarterly Economic Bulletin*, various publications.

The trade flows as illustrated above are related to government actions and other world developments. Manufacturing exports experienced setbacks in 1985 owing to a global recession in key export-oriented industries. Commodity imports also declined in 1986, with reductions in both quantum and price. The growth of imports of machinery, transport and communication equipment reduced in 1986, amidst the sluggish construction and manufacturing activities that resulted in cutbacks in public investment, lower corporate profits, excess plant capacity and relatively high inventory of capital goods (Economic Report, 1986/87).

Apart from the problem of slower expansion in domestic and external demand, Malaysia's manufactured exports faced protectionism threats from her major trading partners. Industrial countries had imposed severe tariff and non-tariff barriers against manufactured exports from developing countries, including Malaysia. For example, the US government had imposed countervailing duties on imports thought to be subsidized by the exporting country, under its Tariff and Trade Act 1985. Similarly the EEC too had a discriminatory non-tariff protectionist system biased against greater value-added exports.

Malaysia ends the recession by reversing the negative growth rates. In fact the highest growth levels of manufacturing exports and imports for the period 1980-2002 was recorded in 1988, at 119 percent and 24 percent respectively (growth rates are calculated from Figure 1). The improved competitive position of Malaysian exports was attributed to the lower value of the ringgit, as well as measures taken by the government to reduce the costs of doing business, through lower electricity tariff rates (since March 1986) and the introduction of more generous export incentives. Imports of commodities also increased due to selective increases in imports of machinery, transport and communication equipment, as a result of modernization of production technology undertaken by export-oriented manufacturing industries.

The year 1988 also sees the importance of the manufacturing sector in terms of trade volume. The sustained expansion reflected sustained external demand from the major trading partners and increased demand from new markets from Third World countries of South Asia, Central and South America and Oceania. This period also saw challenges emanating from the global trading environment, namely the conclusion of the Uruguay Round of Multilateral Trade Negotiations and the withdrawal of the Generalised System of Preferences (GSP) by the US in 1997.

However, export growth in manufacturing had dampened in most industries by 1996. In fact negative growth rates had already showed up in 1995 for the wood and wood products and transport equipment. The former was attributed to the slow housing construction starts in most major markets and the latter due to the sharp reduction in the export of ships, boats and floating structures for offshore drilling activities to the ASEAN countries (Economic Report, 1996/97). This marked the onset of the financial crisis.

Towards the end of 1997, a series of currency depreciations took place, which affected trade patterns. Malaysia took steps in October 1997 to raise import duties on construction machinery and materials, as well as consumer durable goods, in effort to curb imports and improve the trade deficit. Conversely the exports of electrical industrial machinery and equipment (which includes power generating machinery and equipment, machinery specialized for industrial uses, metal working machinery and general industrial machinery and parts) registered strong turnaround with growth, boosted by the combined impact of the ringgit depreciation. Manufactured exports rose sharply in 1998 (40 per cent)[1] due to the rising external demand for semiconductors as well as electronic equipment and parts from the continued growth of the US economy and the turnaround of the East Asian economies, particularly Singapore, Japan and Taiwan (Economic Report, 1998/99).

In summary, trade flows and trade patterns in manufacturing over the last two decades were greatly influenced by the three main events discussed above: the switch towards export orientation in the mid-1980s, the economic recession of the mid 1980s and the financial crisis in the late 1990s. It appears that export-oriented industrialization in the mid-1980s has not only affected trade flows *per se*, but also the shares of individual industries in total exports of manufactures as shown in Table 2.

[1] Calculated from Figure 1.

The commodity mix of manufactured exports in particularly has undergone important changes, which broadly conforms *a priori* expectations with the move towards a higher level of industrial sophistication. Traditional sectors such as food, beverages and tobacco and rubber products experienced declining shares of total manufactured exports over time, while modern sectors such as electrical and electronic products, machinery manufacturing and scientific and measuring equipment commanded increasing proportions of total exports.

Table 2: Manufacturing Export and Import Structure, 1980-2000 (in per cent)

	1980		1985		1990		1995		2000	
Industry	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import
Food	13.03	7.57	14.76	7.22	9.93	5.92	7.94	3.92	4.65	3.49
Beverages & Tobacco	0.09	0.67	0.06	0.50	0.11	0.34	0.19	0.26	0.28	0.20
Textile & Textile Products	2.46	2.80	2.88	2.40	5.46	3.67	4.07	2.31	3.81	1.38
Leather & Leather Products	0.01	0.02	0.02	0.03	0.02	0.07	0.06	0.17	0.03	0.08
Wood & Wood Products	13.79	0.19	9.78	0.10	10.15	0.13	5.65	0.22	3.14	0.29
Furniture & Fixtures	0.11	0.06	0.07	0.10	0.52	0.13	1.09	0.10	1.42	0.11
Paper, Printing & Publishing	0.02	1.18	0.10	1.29	0.46	1.79	0.37	1.60	0.31	1.08
Chemical & Chemical Products	0.44	4.85	0.90	4.68	1.27	5.21	2.00	4.30	2.23	4.25
Petroleum Products	21.37	10.68	22.03	8.04	13.38	4.50	4.40	1.87	5.18	4.01
Rubber Products	14.56	0.64	6.79	0.35	3.98	0.62	2.41	0.58	0.93	0.69
Plastic Products	0.09	0.20	0.07	0.16	0.19	2.52	0.69	2.01	0.99	1.97
Non-Metallic Mineral Products	0.11	0.63	0.19	0.73	0.60	0.67	0.52	0.86	0.29	0.31
Basic Metal Products	7.98	5.44	4.18	4.81	2.05	5.53	1.51	5.68	1.35	4.19
Fabricated Metal Products	0.29	1.79	0.28	1.50	0.63	2.04	0.90	1.61	0.72	1.43
Machinery Manufacturing	0.69	9.93	1.48	9.96	3.51	15.65	11.98	15.94	20.92	13.57
Electrical & Electronic Products	8.65	10.46	13.26	13.79	25.76	21.67	34.24	29.55	32.98	38.38
Transport Equipment	0.69	6.68	1.29	5.04	2.17	8.80	2.51	7.22	0.69	5.52
Scientific & Measuring Equipment	0.42	1.27	0.51	1.73	1.20	2.78	1.38	2.38	1.59	2.70
Miscellaneous	0.41	1.23	0.67	1.39	2.84	1.82	2.24	1.49	1.82	1.77

Source: Calculated from the *Malaysia: External Trade Statistics*, various publications.

Though there has been diversification of the export base of the manufacturing sector with the expansion of the new modern sectors, the composition of manufactured exports still remains narrowly based. There is a high concentration in the exports of electrical and electronic products and machinery manufacturing. The significance of the electrical and electronic products industry can be seen from the fact that it accounts for 33 per cent and 38 per cent of total manufacturing exports and imports respectively in the year 2000. This group has remained the dominant sub-sector within manufacturing for several years.

In short, there is no persistence in trade composition over the years as Malaysia no longer specializes in exporting unsophisticated, labour-intensive manufactures, but has

moved into manufacturing sectors requiring skill- and capital-intensive production processes. The largest groups contributing to total manufacturing exports were petroleum (21 per cent) rubber (15 per cent), wood products (14 per cent) and food (13 per cent) in 1980. Currently, the electrical and electronics (33 per cent) and machinery manufacturing (21 per cent) represent the largest share in total manufacturing exports. Overall, Malaysia has experienced a massive transformation in its export structure.

It appears that many of the industries that are enjoying high and growing export shares also have high import shares. Notably are the increase in import shares of the electrical and electronics and machinery manufacturing industries. This reflects that the modern and growing sectors of manufacturing are highly dependent on imported components. Therefore any dynamic changes in the import structure of these industries can be identified with changes in their export structure.

3.1 EXPLAINING THE STRUCTURE OF FOREIGN TRADE

3.1 Theoretical Developments

The Hecksher-Ohlin trade theory (1948) emphasizes the availability of factors of production that shape a country's specialization and trade. According to this theory, a country exports the product that is relatively intensive in the factor with which the country is relatively well endowed. The theory of factor endowments is extended into the sixties and seventies, with refinements on the theory itself and developments in its empirical application.

The explanations of trade provided by factor endowments alone could not explain the large volumes of trade flow between countries with similar factor proportions and the significant trade-overlap within industries. This saw the emergence of a new theory that emphasizes economies of scale and product differentiation, imperfect markets and consumers' tastes for variety in the 1980s. Economies of scale drive countries to specialize in different products, *via* learning-by-doing or investment in research and development. As such, the idea of identical techniques of production as propagated by the HO theory is less likely in the presence of dynamic economies of scale.

Intra-industry trade describes "international trade in differentiated products because commonly used statistical trade classification schemes result in much of this trade showing up as the simultaneous export and import of products belonging to the same 'industry', thus representing the exchange of goods and services within, rather than between industries" (Grubel and Lloyd, 1975, p.1). This generally occurs in cases whereby the trading countries are at similar development levels. Consumer preferences are similar but heterogeneous. Hence there will be specialization within product groups and exchange of differentiated products. This proposition neglects the difference in factor endowments of the countries in question. Therefore intra-industry trade can also occur among countries with different levels of development, whereby the product varieties traded will incorporate attributes that correspond to the factor endowments of the trading countries. For example, it can be hypothesized that developing countries will export lower quality varieties requiring chiefly unskilled labour to developed countries and import higher quality product varieties from them.

3.2 Methodological Arguments

There are three major issues to be considered when analyzing the structure and patterns of trade: a sound definition of IIT; a suitable quantitative measure of IIT; and the level of trade data disaggregation that allows for a more precise observation of IIT. This

section is devoted to a discussion on the various measures proposed in the literature and the related measurement problems.

Grubel and Lloyd (1975) provide the first comprehensive study of the extent of trade overlap. The GL index is directly associated with the level of intra-industry trade (IIT).

$$GL_i = \{1 - [| X_i - M_i |/ (X_i + M_i)]\}*100$$

where
X_i = exports of product i
M_i = imports of product i

The above index can also be referred to as the "unadjusted" GL index. If the GL index is zero, there is no intra-industry trade, which means that either exports or imports of that industry are equal to zero. If the GL index is equal to 100, all trade for the industry is intra-industry trade.

To obtain the level of intra-industry trade for the whole sample of industries in a given year, the GL indices are aggregated across industries taking into account their different weights. The weighted average GL index (AGL_i) is as shown below:

$$AGL_i = \frac{\Sigma(X_i + M_i) - \Sigma|X_i - M_i|}{\Sigma(X_i + M_i)}$$

Grubel and Lloyd observe that the mean as defined in the above indices is a downward-biased measure of IIT in the presence of an imbalanced commodities trade. A correction was proposed to the AGL for trade imbalance. The "adjusted" index, where in which IIT is measured with respect to total balanced trade and not to total trade, is then:

$$AdGL_i = \frac{\Sigma(X_i + M_i) - \Sigma|X_i - M_i|}{\Sigma(X_i + M_i) - |\Sigma X_i - \Sigma M_i|}$$

Aquino (1978) accepts the principle of adjustment, but claims that the trade imbalance problem still persists over the whole family of GL indices. He therefore proposes another adjustment index that avoids the problem of the correction of trade imbalance. His assumption is that the imbalancing effect is equiproportional in all industries as follows:

$$AQ_i = 1 - \tfrac{1}{2} \times \Sigma \mid X_i/\Sigma X_i - M_i/\Sigma M_i \mid$$

While some authors accept the need for correction for trade imbalances, many others reject the arguments for correction to some extent. Vona (1991) argues instead that the uncorrected Grubel-Lloyd index performs better in the empirical analysis of IIT because the correction for trade imbalances has no theoretical justification and leads to unreliable adjustment procedures.

Hamilton and Kniest (1991) challenge the empirical analysis of IIT by suggesting a measure of marginal intra-industry trade (MIIT). This spins off the debate on the relevance of a static index, which describes the level of trade flows in each period instead of the trade flows between time periods, for studies concerned with adjustment costs.

Following Hamilton and Kniest, Brulhart (1994) recognizes that adjustment costs depend on changes in trade flows and that each MIIT ideally should be scaled relative to structural economic variables when assessing the nature of adjustment. Brulhart's "dynamic" index decomposes the structure of changes into proportions attributable to intra-and inter-

industry trade. He argues that from the GL index, it is not possible to assess the significance of intra-industry trade during an adjustment process since it measures the changes in structure of trade flows and not the composition of these changes. Therefore the marginal intra-industry trade (MIIT) is proposed as follows:

$$A_i = 1 - [\{|\Delta X_i - \Delta M_i|\}/\{|\Delta X_i| + |\Delta M_i|\}]$$

Positive values of A_i imply converging trends in sectoral exports and imports, and for values close to unity, a predominance of MIIT in the adjustment process. Conversely, zero values for A_i imply diverging trends in sectoral trade flows and, ceteris paribus, a higher transitional adjustment costs. The A index is defined in all cases and it can also be summed across industries (like the GL index) by applying the following formula for a weighted average.

$$A_{tot} = \Sigma_i^k \, w_i A_i$$

where $w_i = \{|\Delta X_i| + |\Delta M_i|\}/\Sigma\{|\Delta X_i| + |\Delta M_i|\}]$

A_{tot} = weighted average over all industries

The A index can also be scaled to be a valid indicator for structural change as shown below:

$$A_{sc} = \Sigma_i^k \, v_i A_i$$

where $v_i = V_i/\Sigma_i^k V_i$

Brulhart concludes that studies investigating MIIT and adjustment should use a two-stage approach: MIIT is expressed firstly in relation to marginal inter-industry trade; and Second, MIIT is expressed in relation to structural variables. Oliveras and Terra (1997) recommend that MIIT be measured for different levels of aggregation to avoid the risk of incorrectly interpolating the characterization of one-sector's adjustment process to all of its sub-industries. They also demonstrate the inconsistent behaviour between the A index of a certain period and the corresponding index of its constituent sub-periods and between the A index of a certain industry and the corresponding indices of its sub-industries.

3.3 Data

The data on exports and imports are derived from the *Malaysia: External Trade Statistics* publications. Exports do not include re-exports. Exports are valued f.o.b. while imports c.i.f. Grubel and Lloyd (1975) caution that intra-industry specialization measures may be biased upwards or downwards depending on whether exports of commodities are greater or less than imports in aggregate, since the valuation of exports and imports are different.

Exports and imports are in ringgit Malaysia at current prices. Total manufacturing imports and exports is deflated with the import price and export price index (1980 =100) for the entire economy respectively. The nominal trade data is used when calculating the IIT indices since import price and export prices indices for manufacturing in particular, are not available.

The data is compiled for industries at the 3-digit Standard International Trade Classification (SITC level). The trade data in Malaysia is based on the SITC (Rev.2) for the period 1980 to1987 and on SITC (Rev.3) for the period 1988 to 2000. The changes between the two revisions have been identified as follows: change in division codes for certain commodities between the two versions; additional new commodities in the later revised version and change in the grouping of commodities within each classification. The changes require matching of division codes for certain commodities and combining division codes for commodities that have been reclassified in the later version. Following this, the study included 211 manufacturing industries at the SITC 3-digit, regrouped into 19 major industrial groups for the period 1980 to 2000.

4. STRUCTURE OF TRADE IN MANUFACTURES OF MALAYSIA

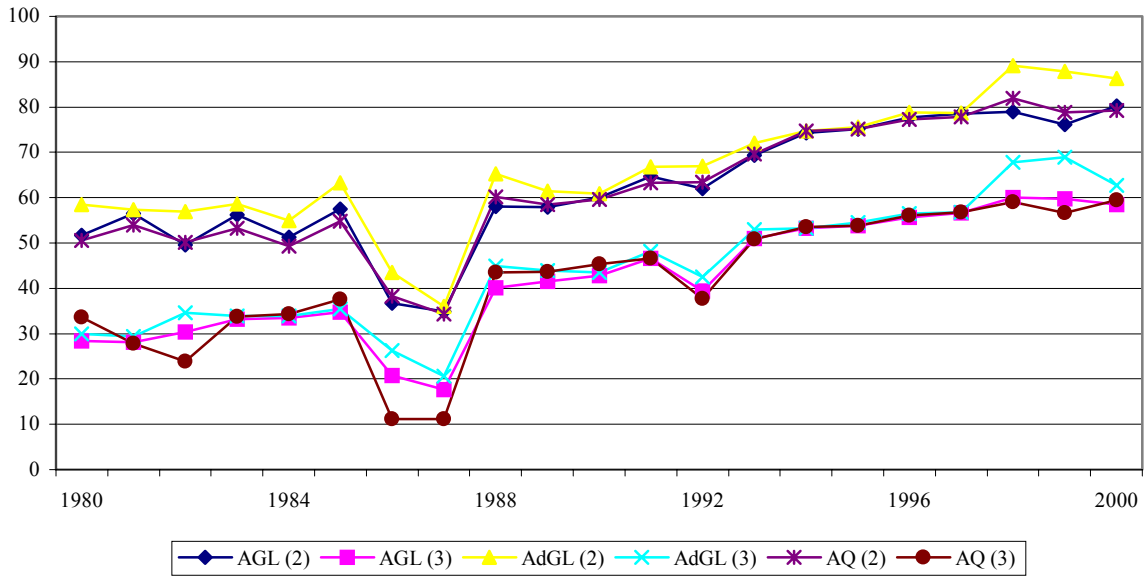
The major IIT indices utilized in the analyses are the GL unadjusted index, GL aggregate index (AGL), GL adjusted for trade imbalance index (AdGL) and the Aquino index (AQ) to explore the trading patterns. The various measures used are in line with Nilsson's (1997) suggestion that "alternative measures of intra-industry should be employed to complement the GL index in order to correctly observe the true extent of IIT." The MIIT index (A) is employed to analyze the structure of the change in trade flows.

The general agreement is that the two-digit classification is too broad for classifying industries and therefore the data may not be indicative of trends over time, while three-digit SITC is considered more appropriate for the definition of an industry in empirical studies of IIT. In this regard, the indices are computed at the two-digit and three-digit SITC levels, for analyzing the sensitivity of IIT measures to changes in the level of aggregation.

4.1 General Trade Patterns

The IIT indices with the world for all manufacturing products are shown in Figure 2. Several observations can be made. First, the level of intra-industry trade in manufacturing goods has grown with time, from about 30 in 1980 to reach 60 in 2000 based on the three-digit level of disaggregation. The upward trend in IIT is more pronounced from 1992 onwards. Second, there is a sharp drop in the level of intra-industry trade during the economic recession, between 1985 until 1987. This could be purely a transitory rather than a structural change. Third, the adjusted GL index (AdGL) yields a marginally higher value than the unadjusted GL index (AGL) while the Aquino (AQ) index follows closely the AGL. This is obvious since the correction for trade imbalance will generally lead to an index that produces higher values than the uncorrected one. Much more important is that trends are almost similar for all indices, so that the GL index to generalize about IIT from 1980 to 2000 appears valid. Fourth, for all indices, the values of intra-industry trade are lower at the three-digit data disaggregation, which is in line with the observation that the measured level of IIT reduces greatly with further disaggregation of data. Therefore the two-digit level of disaggregation can be conceived a "statistical artifact" and would thus not be referred to in making any conclusions.

Figure 2: IIT Indices with the World for All Products



Note: The figures in the parentheses indicate the level of disaggregation.

Source: Calculated from the *Malaysia: External Trade Statistics*, various publications.

The interesting point regarding the behaviour of IIT in Figure 2 is the marked decline during the recession period of 1985 to 1986. An explanation for this may be related to the Pryor's (1992) explanation of a similar behaviour observed in the US during the Great Depression. His explanation is that a decrease in economic growth and trade reduces discretionary income, which inevitably results in a drop in consumers' taste for variety and thus reduced IIT.

The average IIT indices for the manufacturing sector in Figure 2 masks the growth in the number of industries with high IIT levels (IIT indices above 50) during the period under review. The distribution of IIT indices for the 211 industries at the 3-digit level is thus presented in Table 3. The number of industries with IIT indices of above 50 grew from a mere 21 per cent of the total number of industries to 48 per cent over the 21-year period. Interestingly the number of industries with high IIT values of greater than 75 was 22 in 1980 but increased to 59 in 2000, while the number of industries with low IIT values lower than 26 was 125 in 1980 but declined to 59 in 2000. This result confirms the findings that IIT is on the increase during the period under review.

The coefficient of variation of Malaysia with the world for all manufacturing products is investigated in Figure 3 to show the level of concentration of IIT over time. A high coefficient of variation of IIT over different products indicates that IIT is concentrated on a few products. It is obvious from Figure 4 that the degree of concentration is becoming less with the passage of time. This relates to the increasing levels of intra-industry trade in the number products groups as shown in Table 4. It is also obvious that during the economic recession of 1985 until 1987, the coefficient of variation increases substantially, indicating a high concentration of IIT in a few products. This is reflected in a drastic drop from 23 to 11 industries with IIT indices of more than 75 and a concurrent increase of 26 industries with IIT

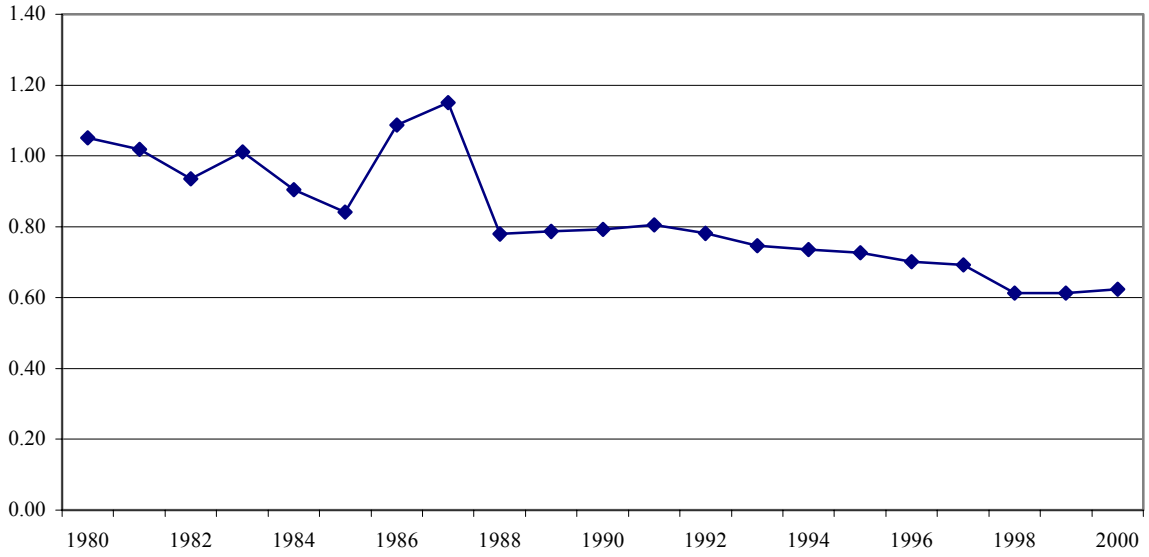
of less than 26 between 1985 and 1986. This implies that not all industries were affected uniformly during the mid-1980s economic crisis.

Table 3: Distribution of IIT Indices for World Markets in all Products

Year	0-25	26-50	51-75	76-100
1980	125	42	22	22
1981	128	46	26	11
1982	117	55	20	19
1983	112	59	20	20
1984	109	56	23	23
1985	103	60	25	23
1986	129	51	20	11
1987	131	48	20	12
1988	90	52	41	28
1989	98	39	42	32
1990	90	46	40	35
1991	96	42	37	36
1992	89	44	36	42
1993	89	38	39	45
1994	87	41	37	46
1995	83	37	44	47
1996	82	33	47	49
1997	76	44	41	50
1998	56	48	54	53
1999	57	57	47	50
2000	59	50	43	59

Source: Calculated from the *Malaysia: External Trade Statistics*, various publications.

Figure 3: IIT Coefficient of Variation for all Products



Source: Calculated from the *Malaysia: External Trade Statistics*, various publications.

The IIT indices are further calculated for the 19 major industrial groups to identify the changing patterns of trade across industries. The GL indices are calculated for the 2-digit and the AGL is calculated for the 3-digit, since Figure 3 reveals the sensitivity of the index to the level of disaggregation. The movements for the 3-digit are considered for the purposes of identifying shifts in the trade structure over the period 1980 to 2000. Four categories of trade patterns are identified based on the movements of the AGL indices as presented in Figure 4: (a) Shift in trade specialization; (b) Predominantly intra-industry trade; (c) Predominantly inter-industry trade; and (d) No discernible trade specialization.

The first category identifies with industries that have experienced a marked shift in trade specialization, either from inter (GL below 50) to intra-trade (GL indices above 50) or *vice versa*. This group comprises the most number of industries: chemical and chemical products, rubber products, plastic products, non-metallic mineral products, fabricated metal products, machinery manufacturing, scientific and measuring equipment and furniture and fixtures.

All industries in the first category, with the exception for furniture and fixtures, have experienced a shift from inter- to intra-industry trade. Furniture and fixtures experienced a drastic drop in the GL[2] index from a high 72 in 1980 to a low 13 in 2000, owing to a decline in imports with and expansion in exports. Malaysia is now ranked among the top furniture exporting countries in the US and Japan. Rubber wood furniture is beginning to become the mainstay of Malaysia's wooden furniture exports, with easy-to-assemble and knockdown furniture gaining increasing popularity.

Within the first category, some industries show an early start of an increasing upward trend of IIT, namely for the chemical and chemical products, rubber products, machinery manufacturing and scientific and measuring equipment. The remaining three industries of this group, that is plastic products, non-metallic mineral products and fabricated metal products, show an increasing upward trend in IIT only since late 1980s.

The second and third categories comprise industries that have been experiencing mainly intra-industry trade and inter-industry trade throughout the period respectively, with opposite movements in GL indices for a particular year/s. The industries that are predominantly intra-industry trade are the electrical and electronic products and miscellaneous items. The industries that are predominantly inter-trade are food, beverages and tobacco, textile and textile products, wood and wood products, paper, printing and publishing, petroleum products, basic metal products.

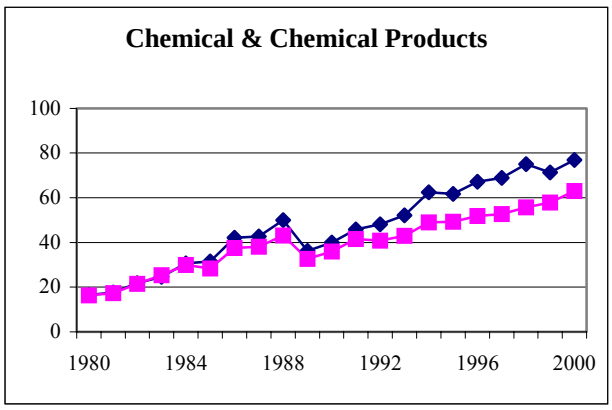
Within the third category, the indices for the wood and wood products industry shows and increasing trend but remain predominantly as inter-industry trade with the AGL index increasing merely from 2 to 14 over the the 21 year period. Export receipts of wood and wood products have outgrown imports substantially since the late 1990s due to the higher price of saw logs following a drop in supply form the La Nina phenomenon, the imposition of logging bans by China and the drop in Indonesia's production. Conversely the AGL index has been declining for textiles and textile products, from 59 in 1980 to 42 in 2000. The cause for this is the contraction of apparel exports since 1986 (Tham, 2001) and the continued dependence on imported primary textiles (raw materials such as silk, cotton, wool, synthetic fibre and fabrics) for its apparel industry.

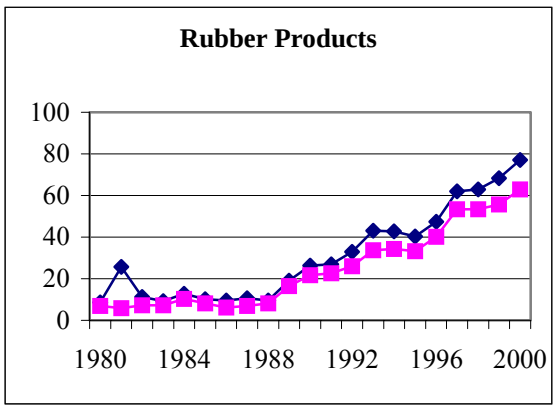
Within the third category, it is interesting to note that there is a prominent difference between the GL and AGL indices for the food, textile and textile products and basic metal products. This plausibly reflects the wide variation in the 41, 24 and 17 commodities within the food, textile and basic metal industries respectively. The AGL index that is calculated

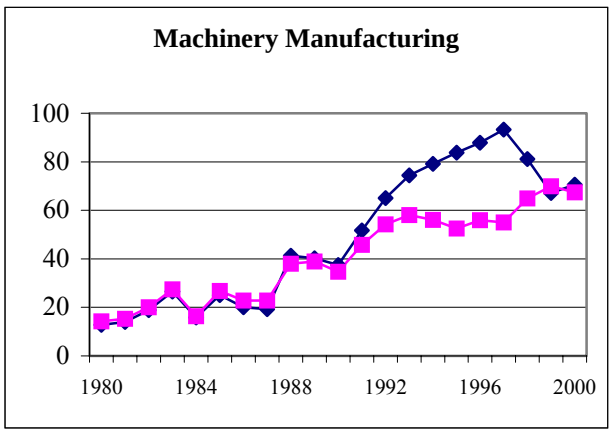
[2] The GL index alone is calculated for furniture and fixtures since it comprises only one industry at the three-digit level (SITC 821).

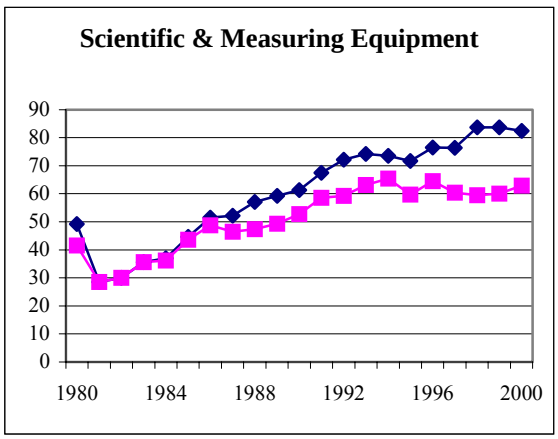
Figure 4: IIT Indices by Industrial Groups

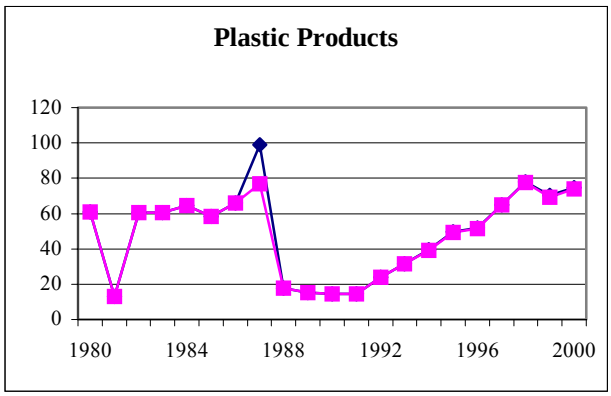
(A) Shift in Trade Specialization

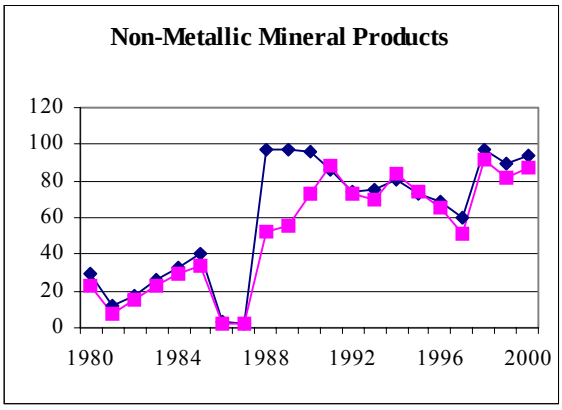


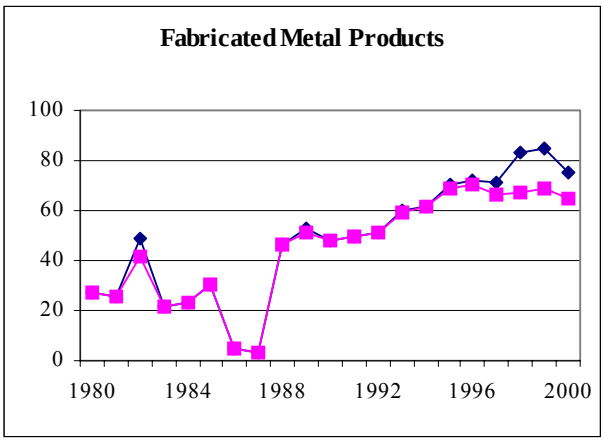


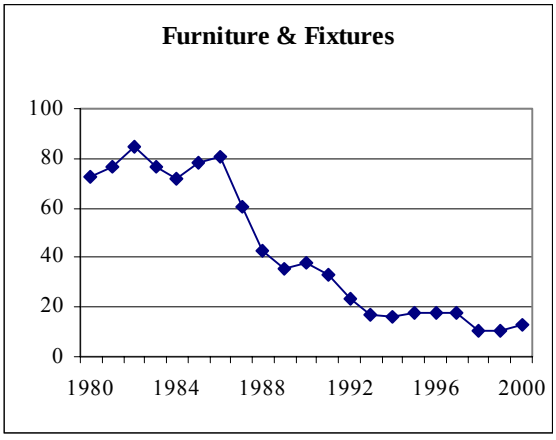




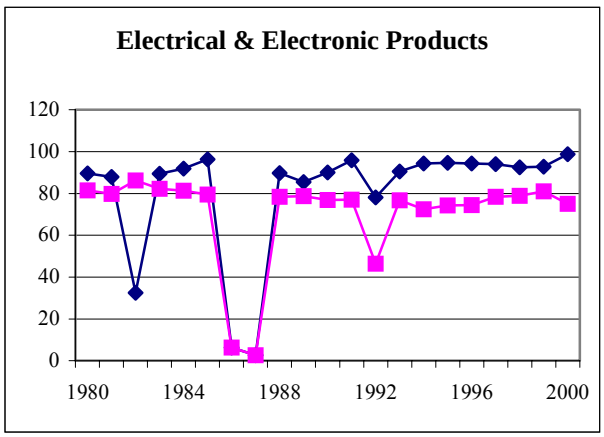


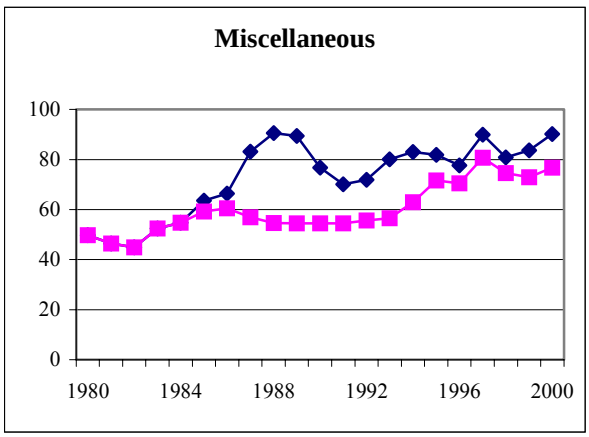




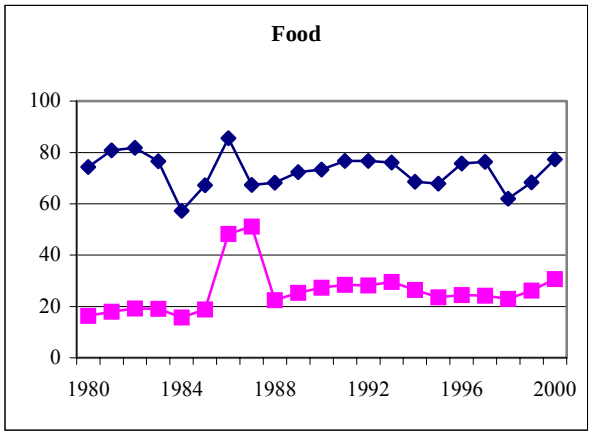


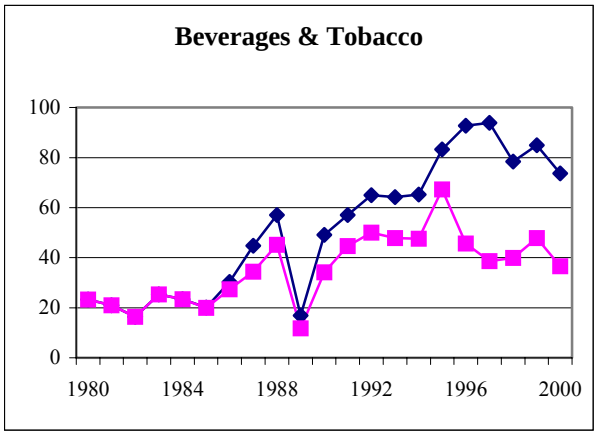
(B) Predominantly Intra-Industry Trade

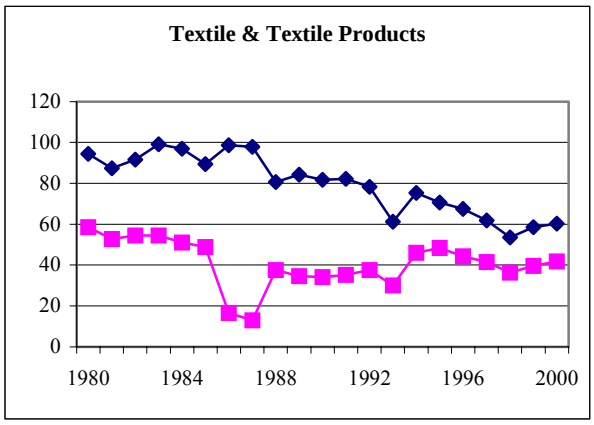


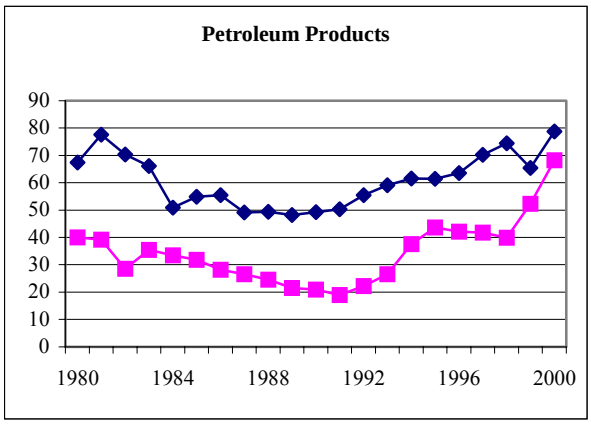


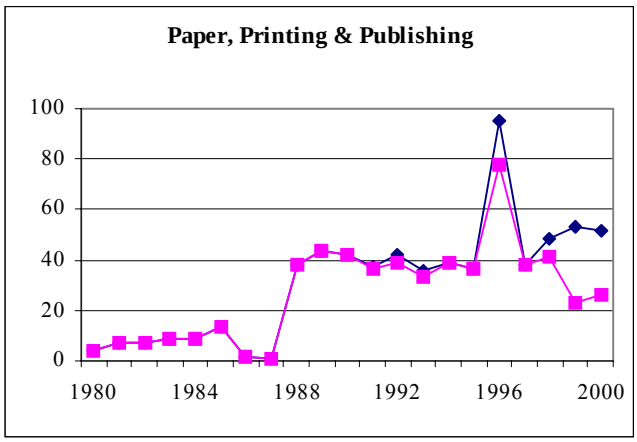
© Predominantly Inter-Industry Trade

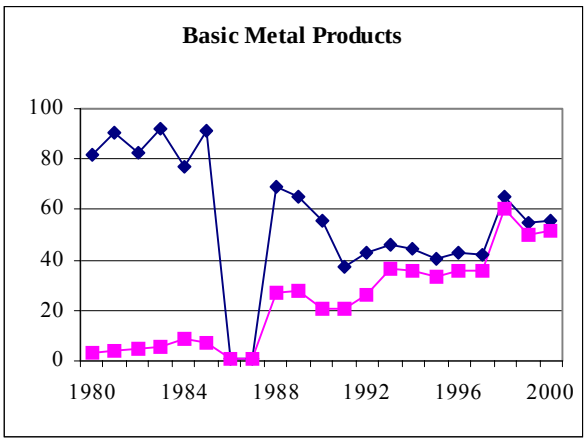


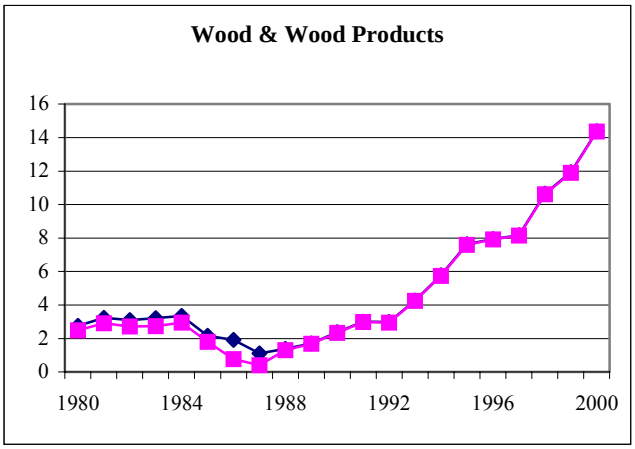




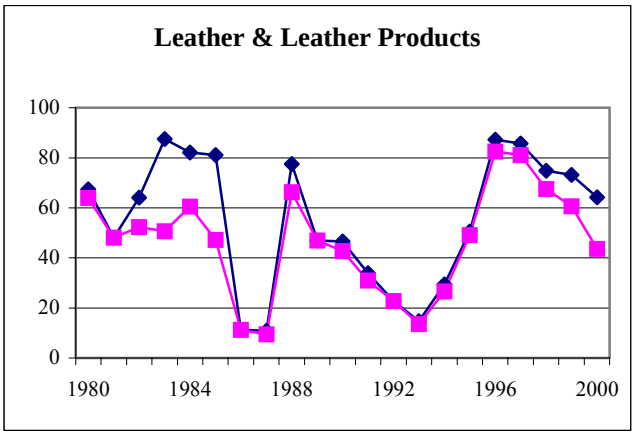


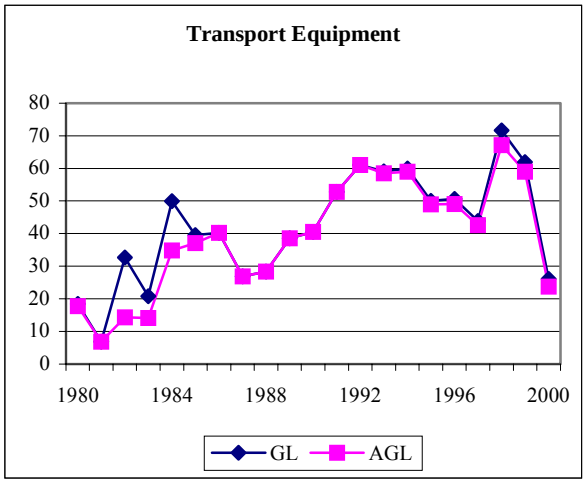






(D) No Discernible Trade Specialization





Source: Calculated from data in *Malaysia: External Trade Statistics*, various publications.

based on the three-digit level of aggregation is therefore more indicative of the change in trade specialization.

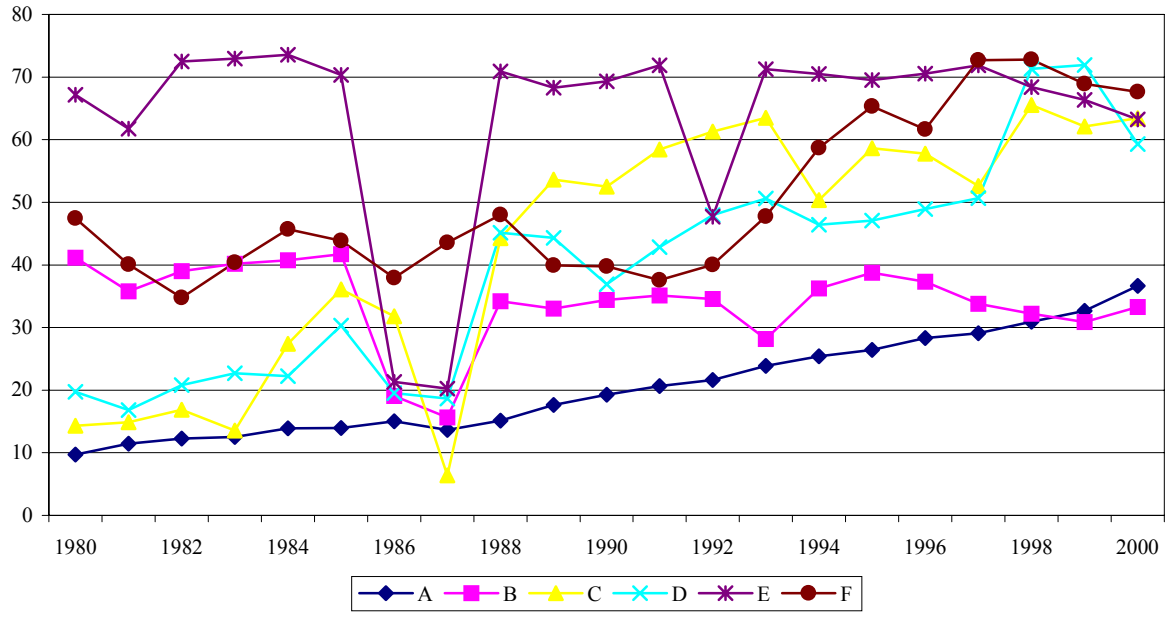
The final group comprises industries that have no discernible trade specialization that is the GL indices record swings between low and high levels over the entire period. The industries that dominate this group are leather and leather products and transport equipment.

Within the 3-digit SITC, trade data will be regrouped according to the "skill intensity" and "technology intensity" criterion in order to gauge the changes in IIT within a more homogenous group of products. This could prove to be useful since every given index of IIT is in general determined by some combination of categorical aggregation, in this case: two-way trade of skill-differentiated goods; and two-way trade of technologically differentiated goods. Two caveats have to be mentioned in this context: First, Somma (1997) cautions that an industry generally defined at the 3-digit SITC level may however contain products that have quite distinct input requirements; and Second, the method of regrouping data according to some economic criterion is always not immune to problems and criticisms.

The classification adopted here follows the United Nations (2002) classification of products according to the mix of different skill, technology and capital intensity as well as scale characteristics, based on SITC (Rev.2). This classification results in five product categories: Primary commodities (Group A); Labour intensive and resource based manufactures (Group B); Manufactures with low skill and technological intensity (Group C); Manufactures with medium skill and technology intensity (Group D); Manufactures with high skill and technology intensity (Group E); and Unclassified products (Group F).

Several observations can be made from Figure 5. First, trade in high skill and technology intensive manufactures (Group E) has been predominantly intra-trade. By contrast, trade in primary commodities (Group A) and labour intensive and resource based manufactures (Group B) are basically inter-trade in nature. Second, trade in manufactures with low skill intensity and technology intensity (Group C) and manufactures with medium skill and technology intensity (Group D) has witnessed a shift from inter- to intra-industry trade, with the former expanding faster towards intra-trade specialization.

Figure 5: AGL Indices, by Factor Intensity



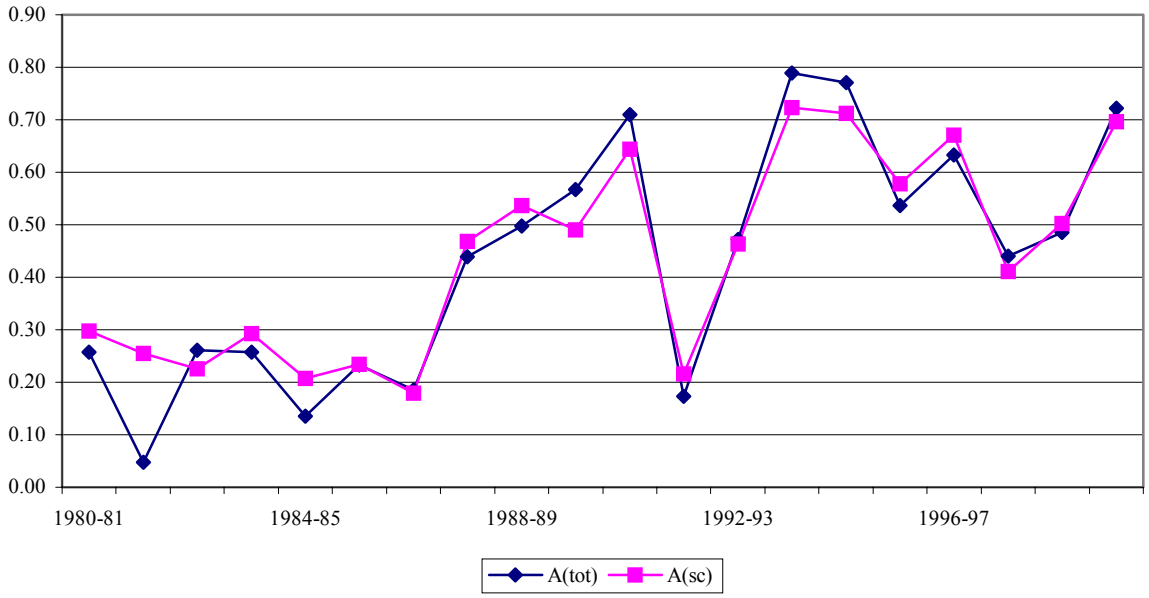
Source: Calculated from the *Malaysia: External Trade Statistics*, various publications.

4.2 Marginal Intra-Industry Trade (MIIT)

The *marginal* intra-industry (MIIT) is conceptually deemed to be closely related to calculated adjustment processes than the traditional static indices. The A index of Brulhart (1994) is used in the following analysis to complement the traditional static indices calculated in the preceding section. Two variants of the Brulhart index are used: First, A is summed across industries (A_{tot}) at the 3-digit disaggregation; and Second, A is scaled for gross trade (A_{sc}) in the initial year. The scaling of the MIIT to gross trade (or any other structural variable) permits the assessment of the significance of trade dimension for economic adjustment. Both variants of this index are presented in Figure 6.

Several observations can be made. First, a rise in the GL index does not necessarily imply MIIT to be positive. For example, the sharp drop in MIIT between 1991 and 1992 (Figure 6) is represented by a decline in the GL indices (Figure 2), but the decline in GL indices between 1985 and 1986 is represented by a marginal increase in MIIT. Thus, (dynamic) inter-industry adjustment can lead to higher (static) IIT. Second, where the changes in trade flows do not exceed initial gross trading volumes, any scaled MIIT index (Asc) is lower than the corresponding unscaled (Atot) measure and *vice versa* when the opposite holds.

Figure 6: Standard Weighted Average and Scaled Weighted Average of MIIT in Manufacturing Industries



Source: Calculated from data in *Malaysia: External Trade Statistics*, various publications.

It is acknowledged that the above short term trade changes (represented by year-on-year changes) are most likely prone to noises and excess volatility. The measurement of the MIIT indices necessitates a choice of the most appropriate time interval. The MIIT index is therefore analyzed for the entire period 1980 to 2000 and the two sub-periods, 1980 to 1990 and 1990 to 2000, for comparison. The choice of the two constituent sub-periods, that is the starting and ending points, is based on the relatively normal trade structures for those points, that is there are no sharp swings in the trade time series. Oliveras and Terra (1997) clarify that in the case of the A MIIT index, the values for the sub-periods (sub-industries) do not

have an unequivocal relationship to the index value for the overall period (industry). Therefore sub-indices are necessary to provide additional information about the adjustment process.

Table 4 examines the relationship between the MIIT indices for manufacturing industries for different time periods. The highest levels of MIIT (above 0.9) for the entire period are found for all sub-periods, particularly in the case of the electrical and electronic products and non-metallic mineral products. Wood and wood products and plastic products experienced high intra-industrial adjustment in the whole period relative to the sub-period 1980 to 1990, which was inter-industrial adjustment. On the other hand, furniture and fixtures underwent an inter-industrial adjustment process in the overall period, in spite of the adjustment in the sub-period 1980 to 2000 being relatively intra-industrial. For the remaining industries, adjustment for the entire period is reflective of the adjustment processes in the sub-periods.

Table 4: Comparison of MIIT Indices for Overall Period and Sub-Periods

Industry	A	A*	A**
Food	0.90	0.90	0.89
Beverages & Tobacco	0.80	1.00	0.65
Textile & Textile Products	0.71	0.77	0.69
Leather & Leather Products	0.89	0.57	0.91
Wood & Wood Products	0.50	0.35	0.61
Furniture & Fixtures	0.15	0.42	0.13
Paper, Printing & Publishing	0.82	0.65	0.86
Chemical & Chemical Products	0.82	0.60	0.88
Petroleum Products	0.91	0.75	0.99
Rubber Products	0.82	0.85	0.78
Plastic Products	0.78	0.36	0.91
Non-Metallic Mineral Products	0.94	0.92	0.95
Basic Metal Products	0.69	0.64	0.72
Fabricated Metal Products	0.83	0.75	0.86
Machinery Manufacturing	0.72	0.64	0.62
Electrical & Electronic Products	0.99	0.91	1.00
Transport Equipment	0.74	0.75	0.74
Scientific & Measuring Equipment	0.84	0.66	0.88
Miscellaneous	0.88	0.67	0.96

Note: *1980-1990; **1990-2000
Source: Calculated from the *Malaysia: External Trade Statistics*, various publications.

In summary, it is obvious that when marginal intra-industry trade is considered instead of the static intra-industry trade measure and when different time periods are taken into account, different signals are given regarding changing trade patterns in Malaysian manufactures.

4.3 Evidence of Intra-Industry Trade with Major Trading Partners

Intra-industry trade is considered across Malaysia's major trading partners. The country grouping adopted follows the World Bank's (2001) classification of economies into high, middle and low-income countries based on their 1999 per capita GNP. The trade flows that are considered comprise selected ASEAN members and major non-ASEAN trading partners, that is Japan, USA, UK, Germany, Hong Kong, China, Taiwan and the Republic of Korea.

The bilateral trade between Malaysia and ASEAN is examined in view of the impending AFTA (ASEAN Free Trade Area), to discover what commodity trade data shows regarding changing trade patterns. Trade with ASEAN is important with the elimination of tariffs and other trade barriers between member countries that have paved the way for further expansion of trade in manufactures. There are arguments that such regional trade groupings act as a substitute for the expansion of global trade. For example, total trade in manufactures between Malaysia and the ASEAN grew by 109.5 percent between 1995-2000, with exports and imports recording growth rates of 29.5 percent and 28.7 percent respectively. Intra-ASEAN trade is expected to increase further with the removal of tariffs to realize AFTA. The bilateral flows are also examined for Malaysia's top trading partners (non ASEAN), that is the United States of America, Japan, Taiwan, Hong Kong, the Republic of Korea, UK and Germany. The trade flows examined include trade with many of the world's most dynamic economies, and would therefore be more likely to contain changing trade patterns.

Bilateral trade flows with the above mentioned trading partners are considered over the period 1980-2000 and inferences are made based on the concentration of the traded goods with each country and the income group of the trading partner. This will make it possible to examine IIT at both industry and country levels to draw some conclusions about the co-relationship between them. Table 5 assesses the relative importance of these economies as markets and sources of supply for Malaysia. The direction of Malaysia's external trade remains relatively unchanged during the period 1980-2000, with major trading partners being the USA, Japan, Singapore and the EU.

The first observation from Table 5 is that within the ASEAN, Singapore, with its close proximity to and traditional trade links with Malaysia, maintained its dominance vis-à-vis other ASEAN members as the major trading partner for the entire period. Focusing on exports, Singapore has experienced a decline in market share while most of the other ASEAN members are gradually increasing their export share in Malaysia. Brunei has maintained a more or less constant market share throughout the period. In total, the ASEAN-4 (Thailand, Philippines, Indonesia and Singapore) experienced a decline in market share for both Malaysian imports and exports. The fall in the export shares is however less pronounced than the fall in import shares.

By comparison with the other major trading partners, the ASEAN is a significant market for Malaysia, after Japan. The importance of the ASEAN should not be underestimated to the extent that the effects of AFTA would presumably take some time to come through. Amongst the non-ASEAN counterparts, Japan and the USA command a relatively high market share (Table 5). However the import share of Japan in the Malaysian market is higher than the export share, and *vice versa* for the USA. The higher share of imports from Japan corresponds to high Japanese investments, since the latter results in Japanese firms in Malaysia sourcing their machinery and intermediate inputs from their parent or associate companies in Japan.

Table 5: Importance of Trading Partners

	% Share of Manufacturing Imports					% Share of Manufacturing Exports					% Share of Total Trade				
Country	1980	1985	1990	1995	2000	1980	1985	1990	1995	2000	1980	1985	1990	1995	2000
Vietnam	neg.	0.11	0.16	0.19	0.57	neg.	neg.	0.02	0.36	0.45	neg.	0.05	0.08	0.25	0.50
Brunei	0.01	0.01	0.01	0.01	0.01	0.16	0.19	0.27	0.29	0.23	0.09	0.11	0.14	0.15	0.13
Indonesia	0.53	0.85	0.93	1.31	2.48	0.38	0.46	1.15	1.41	1.73	0.45	0.63	1.04	1.36	2.07
Singapore	12.11	15.90	14.27	11.50	13.73	17.31	18.28	20.99	18.71	17.47	14.95	17.23	17.64	15.02	15.77
Philippines	0.98	1.84	0.52	0.57	2.37	0.45	0.37	0.68	0.75	1.43	0.69	1.03	0.60	0.66	1.86
Thailand	2.97	3.42	4.37	2.50	3.70	1.36	0.65	1.73	2.98	3.32	2.09	1.89	3.05	2.73	3.49
ASEAN-4*	14.87	21.28	19.25	15.67	22.20	21.67	25.10	27.74	25.02	24.62	18.58	23.40	23.51	20.23	23.52
USA	14.71	15.27	16.53	15.74	16.30	16.81	12.02	15.45	19.71	19.48	15.86	13.47	15.99	17.68	18.03
Japan	22.62	22.48	24.14	26.32	20.40	21.33	16.85	11.99	10.90	10.64	21.91	19.35	18.04	18.80	15.08
Hong Kong	1.31	1.58	1.75	1.84	2.61	1.85	1.29	3.08	5.25	4.46	1.60	1.42	2.42	3.51	3.62
China	2.27	1.87	1.62	2.01	3.71	1.10	1.05	2.09	2.61	2.88	1.63	1.41	1.86	2.30	3.26
Rep. of Korea	1.66	1.95	2.47	3.74	4.38	2.01	5.88	4.52	2.54	2.72	1.85	4.13	3.50	3.15	3.48
Taiwan	2.26	2.52	5.20	4.87	5.45	1.71	1.57	2.12	3.00	3.38	3.93	2.92	3.60	3.16	2.50
UK	5.47	3.38	3.31	2.39	1.83	2.64	2.55	3.89	3.98	3.05	3.93	2.92	3.60	3.16	2.50
Germany	5.30	4.42	4.20	4.26	2.80	3.56	2.85	3.84	3.14	2.47	4.35	3.55	4.02	3.71	2.62

Note: neg. - negligible

* The ASEAN-4 refers to Indonesia, Philippines, Thailand and Singapore. It does not include Brunei and Vietnam, since they joined the ASEAN in 1984 and 1995 respectively.

Source: Calculated from data in *Malaysia: External Trade Statistics*, various publications.

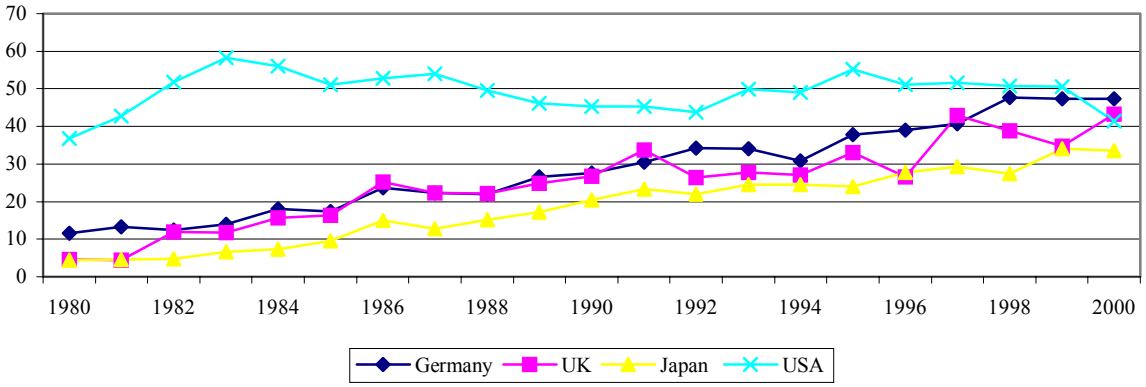
Though Malaysia's external trade is still highly concentrated on Japan and the USA, there has been an increase in trade with Korea, Taiwan, Hong Kong and China over the period under review. The rise in the value of the yen in mid 1980s had caused importers to procure manufactured goods from cheaper sources, particularly from Taiwan and Korea. Trade expansion with these countries continues as Malaysia seeks to diversify her trading partners.

Figure 7 presents the level of intra-industry trade in manufacturing between Malaysia and her trading partners, by income groups. Generally, the AGL indices for countries display an upward trend, with the exception for Brunei. No clear trends of higher intra-industry trade levels can be identified with a particular income group. The individual countries in each group are different from one another, and it seems reasonable to believe that the evolution of intra-industry trade over time may differ.

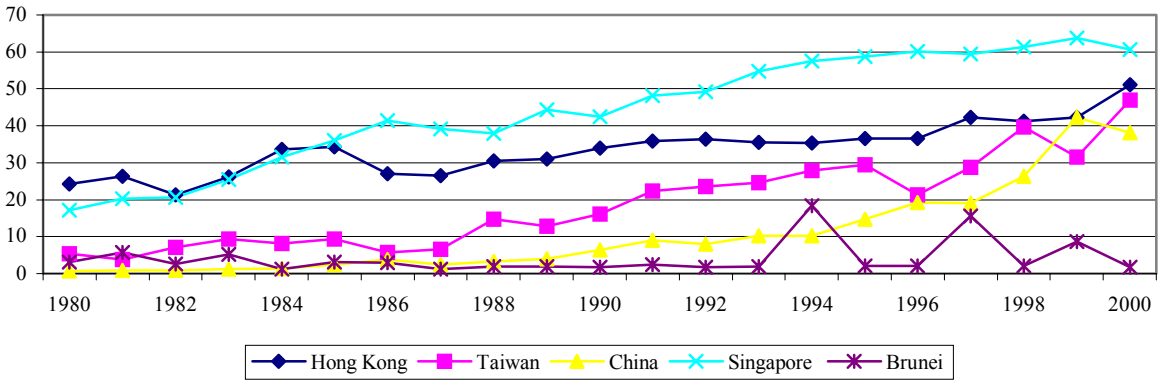
The indices indicate a high level of intra-industry trade between Malaysia and USA within the high income OECD group. Trade with Germany, UK and Japan is predominantly

Figure 7: AGL Indices with Major Trading Partners, by Income Classification

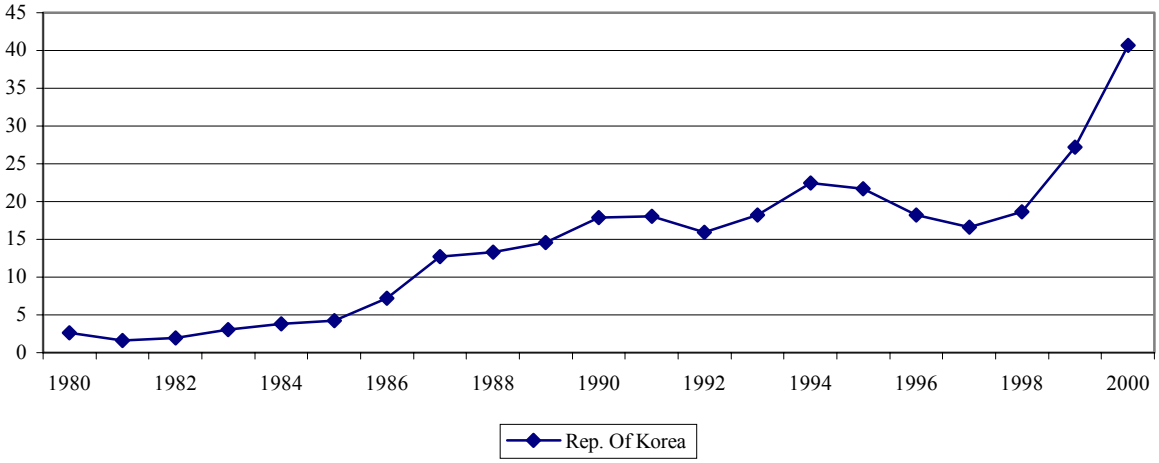
High Income OECD Countries



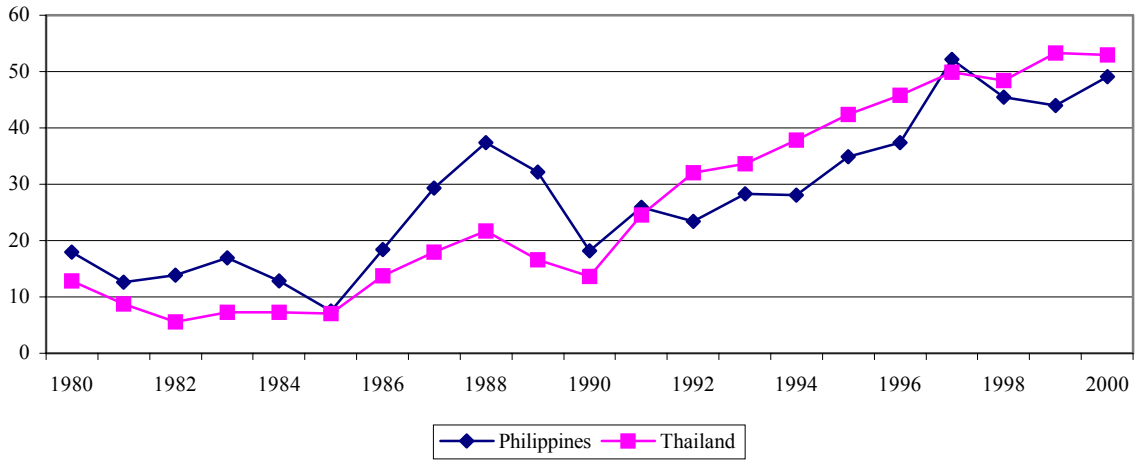
High Income Non-OECD Countries



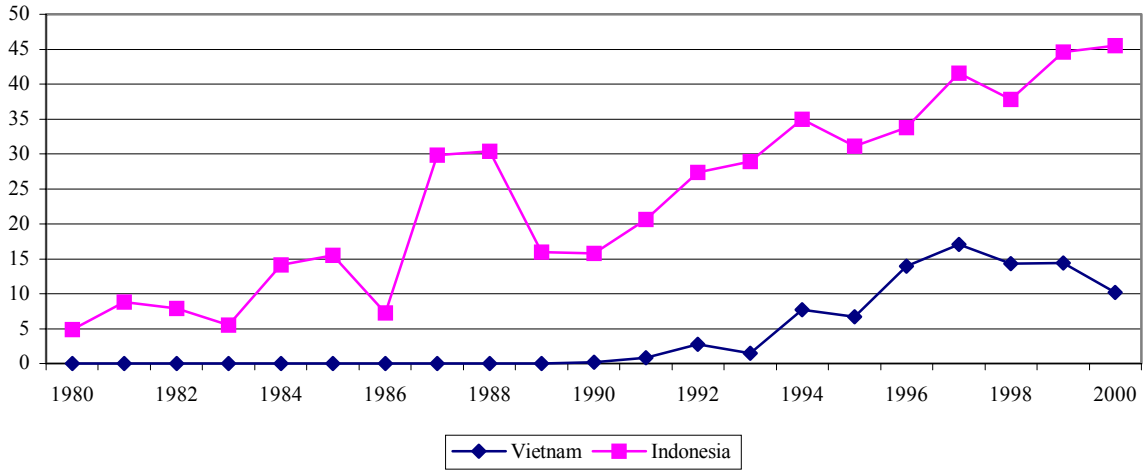
Upper Middle Income Country



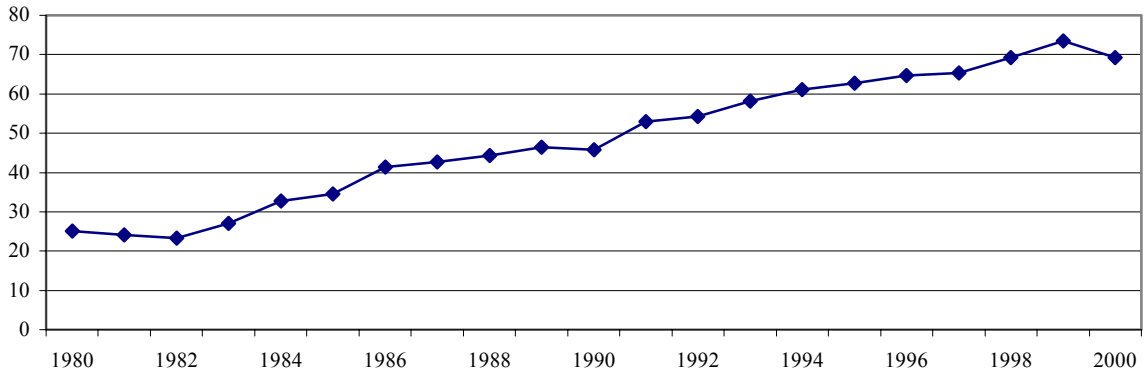
Lower Middle Income Countries



Lower Income



ASEAN-4



Source: Calculated from data in *Malaysia: External Trade Statistics*, various publications.

inter-industry trade, though declining over the period 1980 to 2000. The same trend can be observed with the high-income non-OECD group. Trade with all the non-OECD countries high income countries comprise inter-industry trade, with the exception for trade with Singapore. Intra-industry trade with Singapore conforms to the hypothesis that intra-industry trade is generally higher the smaller the distance between both countries, even more so with countries sharing a border. This is also evident in the case of trade with Thailand (lower-middle income), particularly since 1998.

Surprisingly trade with the Rep.of Korea, which is categorized in the same level of development with Malaysia, is profoundly inter-industry trade. This runs counter to the hypothesis that intra-industry trade levels should be higher between countries of similar levels of development, which is the smaller the difference in per capita income.

Inter-industry specialization predominates in trade with lower income countries. Prior to Vietnam's entry into the ASEAN, there was virtually no trade between Malaysia and the former, but after 1995, the AGL indices between both the countries had increased to a considerable degree.

From the above, it appears that only trade with the USA and Singapore are mainly of the intra-industry nature, while trade with all the other remaining countries are of inter-industry trade. However, if trade with the ASEAN-4 is considered (Thailand, Philippines, Indonesia and Singapore), there is evidence of a considerable increase of intra-industry trade over time. The AGL index for trade with this group has increased tremendously from 25 to 69 over the 21-year period. This is not surprising since intra-industry trade with individual countries of Thailand, Philippines and Indonesia has been increasing since the 1990s as shown in Figure 6.

According to Ariff and Hill (1985), intra-industry trade is unlikely to occur in the case of ASEAN manufacturing industries since governments have been promoting domestic vertical integration of many activities. The high IIT indices of trade between Malaysia and ASEAN imply otherwise, that is a growing inter-dependence between member countries. Ariff (1985) attributes high flows of Malaysian intra-industry trade with ASEAN mainly to the common borders shared with Thailand, Singapore and Brunei.

5. CONCLUDING REMARKS

The interest in trade patterns or rather trade specialization, particularly intra-industry trade, stems from the fact that growing trade of this nature may herald comparatively smooth factor market (labour) adjustments to trade liberalization. Evidence of increasing levels of intra-industry trade over the 1980-2000 period is found in the case of trade in Malaysian manufactures. The patterns of trade started to change in the nineties and in 1993; half of Malaysian trade in manufactures with the rest of the world was of the intra-industry trade type.

The Malaysian manufacturing trade exhibits not only growing levels of IIT, but also high levels of MIIT. The changing structure of trade across different time periods is evident for particular industries. This is portrayed in the calculation of the MIIT index for different sub-periods, showing some sensitivity of trade specialization when the latter is considered. The analysis of trade data does not merely reveal that intra-industry trade is an important component of Malaysia's international trade in manufactured goods, but that Malaysia's trade index varies significantly across industries and trading partners.

By industrial groups, there are considerable differences in the intra-industry trade development. Industries that display strong and consistently rising levels of intra-industry trade are the modern expanding sectors, such as electrical and electronic products, machinery

manufacturing and scientific and measuring equipment. This suggests that inter-industry adjustments is more prevalent in mature sectors that are in relative decline whereas the expansion of booming sectors show comparatively greater intra-industry trade.

With respect to trading partners, Malaysia's trade patterns do not differ significantly across countries at different development levels. However, an important share of trade with the "rest of the world," that is trade with the USA and Singapore, have been increasingly one of intra-industry trade. As a member of the ASEAN, intra-industry trade with the ASEAN-4 has also been increasing with the passage of time. The existing high levels of intra-industry trade in manufacturing with ASEAN countries are also envisaged to further accelerate under the common effective preferential tariff scheme (CEPT) by 2003. This poses challenges to the Malaysian manufacturing sector, since there are emerging similarities in the export specialization patterns with other ASEAN countries.

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