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The Pattern of International Trade Between Japan and the Pacific Basin Countries: A Comparison between 1975 and 1985

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Abstract

Using the international input-output tables between Japan and five Pacific Basin countries (Indonesia, Korea, Malaysia, Singapore, and Thailand) for the years 1975 and 1985, the paper examines the trade structure in 1975 and how it had shifted by 1985. It shows that intra-industry trade in manufactured products expanded as Japan increased imports of more capital-intensive products from these countries. Intra-industry trade of intermediate inputs increased substantially more than of final products, reflecting a trend by manufacturers to subdivide the production process of intermediate inputs and to shift their locations to different countries. This suggests a more active development of international labor in the intermediate stages of production and a deepening of regional linkages.

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Summary

In recent years, so-called new theories of international trade have been rapidly developed to provide better explanations of actual trading patterns. These new trade theories, which are based on the concepts of product differentiation, imperfect competition, and economies of scale, seek to explain why trade takes place even when countries do not differ much in relative factor endowments or labor productivity. The theories seem to explain the pattern of trade between Japan and the five Pacific Basin countries (Indonesia, Korea, Malaysia, Singapore, and Thailand) that initiated industrialization in the postwar period--patterns that led to strong economic growth in the 1980s.

The purpose of this paper is to analyze the patterns of trade between Japan and these five Asian countries in the light of insights provided by the new trade theories. In particular, the paper attempts to examine the pattern of trade in 1975 and to determine how it had shifted by 1985. In doing so, we examine the deepening economic linkages in the Pacific Basin region, using data on intermediate inputs, final products, and sellers and buyers by country and industry from the international input-output tables for the available years, 1975 and 1985.

This paper shows first that Japan has remained a substantial net exporter of manufactured or capital-intensive products and a large net importer of primary, or natural-resource, labor-intensive products. It also shows, however, that Japan's intra-industry trade in manufactured products with the five Asian countries has increased, although inter-industry trade remained dominant with those countries, such as Indonesia and Malaysia, that are rich in natural resources. The increase in intra-industry trade was more actively observed in manufactured intermediate inputs (such as chemicals, machinery, and metals) than in final products. The rapid growth reflected Japan's increasing dependence on these manufactured products and the expanding intra-industry import/export markets in its Asian partners. In particular, Japanese industries imported more manufactured intermediate inputs from parallel industries in its Asian partners than they obtained from counterpart industries in Japan. As manufacturing firms subdivided the production process of intermediate inputs and shifted their production locations to different countries, the division of labor between Japan and the five Asian countries changed substantially. The largest increase in imports was observed for machinery products and can be attributed to an expansion of intra-firm trade as a result of Japan's foreign direct investment (FDI) in these countries.

Although the paper does not cover the large-scale structural change in trade that took place after the yen began to appreciate in 1985, the deepening of economic linkages between Japan and the five Asian countries was observed before 1985. Thus, we believe a detailed analysis of the structural changes before 1985 is important in understanding the growing international division of labor taking place in the Pacific Basin countries.

I. Introduction

In recent years, so-called "new" theories of international trade have rapidly developed to provide a better explanation of the actual pattern of trade. These new trade theories, based on the concepts of product differentiation, imperfect competition and economies of scale, seek to explain why trade takes place even when countries do not differ much in relative factor endowments or labor productivity. Compared with so-called "conventional" trade theories, such as those of Heckscher-Ohlin and Ricardo, the new trade theories focus on five main facts: (i) a large part of trade consists of two-way flows of products with similar factor intensity; (ii) countries with similar relative factor endowments participate actively in trade activities; (iii) intermediate inputs account for a large part of trade flows; (iv) intra-industry trade in manufactured products occurs mainly between technologically-advanced countries or countries producing high-quality products; (v) intra-industry and intra-firm trade associated with foreign direct investment (FDI) take place frequently.

The new trade theories provide three main conclusions on the static pattern of trade (e.g., Helpman and Krugman (1985)).

(i) Relatively capital-rich (labor-rich) countries are net exporters of capital-intensive (labor-intensive) products and net importers of labor-intensive (capital-intensive) products.

(ii) Inter-industry trade dominates between countries that differ significantly in relative factor endowments, while between countries with similar factor endowments, intra-industry trade is dominant.

(iii) Intra-industry trade in manufactured intermediate inputs and final products takes place even when countries have the same relative factor endowments.

The new trade theories also seek to explain the dynamic pattern of trade (e.g., Flam and Helpman (1986) and Shirai and Huang (1994)). According to the theories,

(i) Industrialization that takes place in developing countries and results in (a) quality improvement; (b) technology advancement; and (c) an increase in factors specific to manufacturing industries, expands intra-industry trade toward more capital-intensive or higher-quality manufactured products. In other words, industrializing countries increase exchanges of manufactured final products that differ in variety and quality.

(ii) Industrialization increases intra-industry and intra-firm trade in manufactured intermediate inputs if the production process is subdivided across countries and each country specializes in different intermediate inputs.

(iii) FDI in search of a low-cost labor force promotes conditions (a) and (b) by shifting production locations of labor-intensive products to developing countries (Helpman (1984) and (1985)). As a result, when developed countries expand exports of capital-intensive intermediate inputs and final products and imports of labor-intensive products, both intra-industry and intra-firm trade increase.

These explanations of the static and dynamic trade patterns seem to fit the pattern of trade between Japan and the rapidly industrializing Asian countries. Since the post-war period, these Asian countries have promoted industrialization policies that have led to strong economic growth in the 1980s. From the beginning, the Newly Industrializing Economies (NIEs)-- Hong Kong, Korea, Singapore, and Taiwan Province of China--selected an export-promoting industrialization policy because they lacked natural resources and had small domestic markets. By contrast, the Association of Southeast Asian Nations (ASEAN), which includes Indonesia, Malaysia, the Philippines, and Thailand, initially selected an import-substituting industrialization policy and later adopted an export-promoting industrialization policy. In both cases, the rapid pace of industrialization in these Asian countries changed their pattern of trade with advanced countries like Japan to a considerable degree.

Appealing to the new trade theories, this paper analyzes the changes in trade patterns between Japan and five other Pacific Basin countries over the 1975-85 period. Indonesia, Korea, Malaysia, Singapore, and Thailand have been selected for the purpose of examining the deepening economic linkages in the region. In order to obtain trade data on intermediate inputs, final products, and on sellers and buyers specified by country and industry, we utilize data of the International Input-Output Tables for the years that were available--1975 and 1985.

It should be noted that deepening economic linkages between Japan and the five Pacific Basin countries were already in evidence before 1985. We therefore believe that a detailed analysis of the structural changes before 1985 is important to understanding the growing international division of labor that has been taking place in the Pacific Basin countries during the post-1985 period.

Before moving to the discussion, it seems appropriate to mention some limitations of the paper. First, it does not examine the impact of trade liberalization on the structure of trade, nor does it cover the changes in international trade that have taken place since the appreciation of the yen in 1985, when Japan increased its FDI to the five Asian countries being examined. Further, it does not analyze the impact of increased FDI from Korea and Singapore to other labor-abundant Asian countries in the 1980s--whether this financial assistance may have contributed to deepening the international trade linkages in the region or led to an expansion of intra-industry trade between the more industrialized and less industrialized Asian countries. Thus, the paper does not consider the impact of the recent movement toward intra-regional economic integration on the structure

of trade in the Pacific Basin. Although these issues are beyond the scope of this paper, they are important topics for future research.

This paper consists of six sections. Section II undertakes an overview of the economic linkages between Japan and the five Asian countries. Section III analyzes the static and dynamic pattern of trade between the countries by considering intra- and inter-industry trade. Section IV focuses on static and dynamic import-export structures of the Japanese manufacturing industries. In particular, the section focuses on two types of trade flows of manufactured products. One type is of intermediate inputs imported by the Japanese manufacturing industries and the resulting input relationships established with the interacting industries. The other type is of manufactured products produced by the Japanese manufacturing industries and exported as intermediate inputs, and the resulting output relationships created with the associated industries. Section V undertakes an overview of the trends in trade since 1985. Section VI contains concluding remarks.

II. Overview of the Economic Linkages Between Japan and the Pacific Basin Countries

The intra-regional economic linkage between the Pacific Basin countries has deepened significantly in recent years and is clearly observed in international trade transactions between the countries. More than half the exports and imports of the fourteen Pacific Basin countries (including Canada and the United States) were transacted between these countries. For example, in 1984, exports and imports of countries within the region reached 61 percent and 58 percent of their total exports and imports. This intra-regional trade is considered high, particularly when compared with intra-regional trade in the European Union, whose exports and imports achieved 52 percent and 50 percent, respectively (Kraus and Lutkenhorst (1986)).

While the deepening of the intra-regional economic linkage can be partly attributed to a wave of trade liberalization or a political movement toward intra-regional economic cooperation, it is also the result of strong endogenous market forces along the "international production cycle" (Vernon (1966)). According to the international production cycle theory, in the first stage the production of labor-intensive products takes place, such as consumer electronics, processed food, and textiles. Also, the production of heavy industrial products, such as metals, refined oil products, and chemicals, is initiated at this stage. These products are usually produced through import-substitution programs. In the second stage, countries experience an increase in labor costs. In this stage, countries increase productivity in the labor-intensive industries by introducing advanced technology, upgrading their products, or beginning production of higher value-added products. At the same time, heavy industries become competitive, catching up to international standards. In the third stage, countries finally lose competitiveness in the labor-intensive industries. These industries are gradually phased out and as a consequence, firms shift

production locations to other labor-abundant countries or they switch to the production of more capital-intensive or advanced-technology industries.

The relationships between Japan and the five Asian countries followed this process of the international production cycle (Mardon and Paik (1992)). Japan, which revitalized the industrialization process in the 1950s, had already experienced an increase in labor costs in the 1960s and subsequently increased productivity of labor-intensive products to deal with high labor costs, or, following the production cycle, it intensified production of capital-intensive products. In the 1960s, Japan gained a comparative advantage in labor-intensive products such as apparels, rubber, plastic, textiles, and nonmetallic minerals. Also during this period, Japan already had a comparative advantage in some capital-intensive products such as machinery and transport equipment. In the 1970s, Japan lost its comparative advantage in the labor-intensive products and gradually shifted to higher value-added capital-intensive or advanced-technology-intensive products. As a result, Japan enhanced its comparative advantage in these products in the 1980s.

In the meantime, the five Asian countries followed the international production cycle on the basis of their relative factor endowments. Among the five Asian countries, Indonesia, Malaysia, and Thailand are endowed with natural resources or a large labor force, while Korea and Singapore are rich in capital stock per capita and have a skilled labor force (Table 1). Korea and Singapore, which lack natural resources or large domestic markets, successfully initiated export-promoting industrialization in the 1960s and since then have moved into higher stages of the production cycle by integrating higher technological processes to advance their industrial production. They increasingly developed a comparative advantage in capital-intensive products such as radio, television, telecommunication equipment, and office and computer equipment products. In the 1980s, the two countries experienced an increase in labor costs and entered the third stage. They upgraded their consumer-oriented products by increasing labor productivity and shifted toward more value-added market niches. They also gained international competitiveness during this period, particularly in capital-intensive industries. As a result, they increased exports of automobiles, fertilizers, machine tools, metal products, and ships.

Indonesia, Malaysia, and Thailand, which are rich in natural resources or have fertile soil suitable for agriculture, initiated their industrialization in the 1960s based on natural resources such as food processing, combined with the development of heavy industries. Thus, during this period exports were primarily of agricultural and mining products. In the 1980s when Korea and Singapore were faced with increased labor costs, these three countries experienced rapid industrial growth in labor-intensive industries by taking advantage of their low cost labor force.

Since 1985, when the yen appreciated sharply, this international production cycle accelerated and as a consequence, Japan's FDI surged in the five Asian countries. Traditionally, Japan's FDI in the Pacific Basin region was oriented toward natural resource-based industries for the purpose

Table 1. Factor Endowments of the Countries in the Pacific Basin

	Indonesia	Korea	Malaysia
Arable land			
1968	15,050	2,319	5,533
1988	21,378	2,135	4,337
Capital stock			
1968	27,190	21,121	15,785
1988	301.662	303,380	123,496
Labor force			
1968	38.3	9.8	3.1
1988	78.9	16.4	6.1
Oil reserves			
1968	8,850.0	0.0	500.0
1988	8,169.2	0.0	2,941.8
Psacharopoulos indexes			
1968	296.0	1,013.0	563.0
1988	925.8	2,410.9	1,227.8
		Singapore	Thailand
Arable land <u>1/</u>			
1968		12.0	13,300
1988		4.0	18,459
Capital stock <u>2/</u>			
1968		9,770	28,441
1988		52,982	127,567
Labor force <u>3/</u>			
1968		0.7	16.2
1988		1.2	30.8
Oil reserves <u>4/</u>			
1968		0.0	0.2
1988		0.0	82.2
Psacharopoulos index <u>5/</u>			
1968		1,024.0	213.0
1988		2,213.0	1,026.4

Source: Noland, M., (1990), Table A.2 and A.3, pp. 199-204.

1/ Thousands of hectares

2/ Millions of 1980 PPP dollars

3/ Millions

4/ Millions of barrels

5/ Defined as the average per capita expenditure on education embodied in the labor force and regarded as a proxy for human capital

of acquiring raw materials such as copper ore, iron ore, oil, and natural gas. However, since the 1970s, this type of FDI has gradually declined. For example, Japan's FDI in mining accounted for 11.3 percent in the 1950s, 31.8 percent in the 1960s, 25.1 percent in the first half of the 1970s, 15.4 percent in the second half of the 1970s, and 9.9 percent in the first half of the 1980s. Japan's FDI in Indonesia was particularly high.

Meanwhile, Japan's annual FDI flow in the region's manufacturing industries swelled from \$1.57 billion in 1951-74 to \$3 billion in 1975-80. It surged further in the late 1980s, from \$2.95 billion in 1981-85 to \$11 billion in 1986-90. Originally, Japan's FDI was concentrated in manufacturing, mainly in response to the wave of import-substituting industrialization that was under way in the ASEAN countries during the 1950s to the early 1960s. At the same time, Japan provided FDI to manufacturing industries in the NIEs to promote the export of locally-produced products to Japan and to third countries.

During the 1980s, however, Japan increased its FDI in the region's locally-produced products for the purpose of increasing their export to Japan. Between 1951 and 1974, this FDI was concentrated in the textile and consumer electronics industries. Between 1975 and 1980, the FDI was directed to the chemicals, metals, and nonferrous metal industries, while it declined in the textile industry. In the early 1980s, Japan increased FDI to the transport equipment industry and in the late 1980s increased it again in the electronics industry. The increased FDI in the electronics industry was more evident in Indonesia, Malaysia, and Thailand than in Korea and Singapore because of the lower costs of labor in the former countries. Consequently, the export share of manufactured products, which were produced by Japanese-affiliated local firms in the Pacific Asian countries and for shipment to Japan, expanded from 10 percent in 1981, to 12.3 percent in 1984, and to 16.1 percent in 1987 (Uriu, Koishi, and Shinohara (1991)).

In recent years, Japan's FDI by parts makers has accelerated as they have been shifting their production locations to increase local production networks and raise sales in the region (Japan Export-Import Bank (1992)). As a result, the local content ratio of parts for Japanese firms increased significantly. For example, the share of domestically-produced parts by Japanese-affiliated firms in the Pacific Asian countries expanded from 36.1 percent in 1984, to 42 percent in 1987, and to 49.1 percent in 1990 (Uriu, Koishi, and Shinohara (1991)).

Japan played a dominant role as a major trade partner of the five Asian countries. Japan's role exceeded that of the United States, except in the case of Korea where the United States was the major export market (Kraus and Lutkenhorst (1980)). Table 2 shows that Japan supplied the major portion of the five countries' imports in both 1978 and 1984. Japan has been a major supplier of capital-intensive intermediate inputs and of capital products, which helped these countries to industrialize their economies and led to export growth. For example, Japan supplied 40 percent of Korea's imports in 1978 and still maintained a 25 percent share in 1984.

Table 2. Japan: Share of Exports and Imports with the Five Asian Countries
(In percent)

	1978		1984	
	Export	Import	Export	Import
Indonesia	39.2	30.1	47.3	23.8
Korea	20.7	40.0	15.3	25.0
Malaysia	21.7	23.2	22.6	26.2
Singapore	9.7	19.2	9.4	18.4
Thailand	20.3	30.7	13.0	26.8

Source: Kraus and Lutkenhorst (1986), Table 22, p. 123.

The rapid progress of industrialization that took place in the five Asian countries changed the trade structure, shifting their economies toward capital-intensive industries. For example, between 1970 and 1991, the value-added share of machinery and transport equipment in manufacturing increased from 2 percent to 12 percent for Indonesia, from 11 percent to 33 percent for Korea, from 8 percent to 35 percent for Malaysia, from 28 percent to 52 percent for Singapore, and from 9 percent to 14 percent for Thailand (World Bank (1994a)). Thus, the shares of these products in merchandise exports increased from 0 percent to 4 percent for Indonesia, from 7 percent to 40 percent for Korea, from 2 percent to 38 percent for Malaysia, from 12 percent to 24 percent for Singapore, and from 0 percent to 22 percent for Thailand. As a result, GNP per capita in 1992 reached \$15,730 for Singapore, which, according to the World Bank criteria, is a high-income economy. It reached \$6,790 for Korea and \$2,790 for Malaysia, both classified as upper-middle-income economies. Thailand achieved \$1,840 as a lower-middle-income economy, and Indonesia, whose GNP per capita was \$670, remained the low-income economy in the group. 1/

This industrialization process, which was greatly facilitated by Japan's FDI, deepened the economic linkages between Japan and the five Asian countries by enhancing the international division of labor. The international division of labor is one way to achieve a better allocation of scarce resources among countries and to increase social welfare in the participating countries. The expansion of Japan's FDI in manufacturing, along with the push toward industrialization in these countries, created an international production network in the region. The production network was effected by the multilateral trade between the six countries of their domestically-produced manufactured intermediate inputs, and through the specialization by each country in the production of the particular manufactured final products in which it had gained a comparative advantage.

III. The Pattern of Trade between Japan and the Pacific Basin Countries

This section focuses first on the static pattern of trade that existed between Japan and the five Pacific Basin countries in 1975, and second, it analyzes how the pattern had shifted by 1985. It covers tradable products exported and imported by the manufacturing and nonmanufacturing industries in Japan and the five Pacific Basin countries. The products are classified as intermediate inputs and final products. On the basis of final usage, final products are subclassified further--as private consumer products, government consumer products, and capital products.

The two subsections each have three parts, the first of which examines trade flows in the three aggregate industries--primary, secondary, and tertiary. Primary industry covers agriculture, forestry, and mining;

1/ GNP per capita in 1970 was \$80 for Indonesia, \$270 for Korea, \$390 for Malaysia, \$1,050 for Singapore, and \$210 for Thailand.

secondary industry refers to the manufacturing industry (the terms "secondary" and "manufacturing" are used interchangeably in the paper); the tertiary industry covers services. The second part focuses solely on secondary industry and analyzes trade flows of manufactured products in detail by decomposing them into twelve manufacturing industries: (1) food (beverages and tobacco), (2) textiles (and leather), (3) lumber (and wood products), (4) pulp (paper and printing), (5) chemicals, (6) petroleum, (7) rubber, (8) nonmetallic minerals, (9) metal, (10) machinery, (11) transport equipment, and (12) other manufacturing. The results of these analyses are summarized in the third part.

1. Static trade pattern--1975

The new trade theories provide four main implications for the static patterns of trade that existed between Japan and the five Asian countries. First, as previously mentioned, Japan is a substantial net exporter of manufactured products and a substantial net importer of primary products. This phenomenon is more commonplace with the natural resource-rich Asian countries than with the capital- or skilled-labor-rich Asian countries. Second, Japan has a larger share and volume of intra-industry trade in manufactured products with the more industrialized Asian countries than with the less industrialized ones. Third, intra-industry trade in manufactured intermediate inputs occupies a larger part of trade when developing countries are more industrialized. Fourth, reflecting the technology differences between Japan and the five Asian countries, intra-industry trade in manufactured final products is small, especially for capital products--Japan is a substantial net exporter of capital goods.

a. Three-industry analysis

We now analyze the pattern of trade in primary, secondary, and tertiary industry products in 1975 between Japan and the five Asian countries in the context of the new trade theories described above. Furthermore, we utilize a conventional intra-industry trade index to measure the size of this trade. We focus on the index because balanced trade, which the new trade theories assume, does not hold in reality; thus, calculating the share and volume of intra-industry trade is difficult since we need to identify factors that affect trade imbalance (Aquino (1978)). To estimate the relative size of inter-industry trade compared with intra-industry trade, we examine the shares of exports and imports of each industry.

Reflecting the lack of natural resources, Japan specialized in the production of manufactured products rather than primary products. Japan's production shares of the primary and the secondary industries accounted for 4.4 percent and 42.3 percent of total output, respectively. The shares of the primary industry in total output for four of the five Asian countries were much larger: 30 percent for Indonesia, 14 percent for Korea, 16 percent for Malaysia, and 19 percent for Thailand. The exception was Singapore, where primary industry accounted for only 3 percent of total output.

As the new trade theories have suggested, the value of net total exports shows that Japan was a substantial net exporter of manufactured products and a substantial net importer of primary products (Table 3). Japan's net imports of primary products were highest from Indonesia, reaching \$2.8 billion and reflected the abundance of natural resources in the latter country. Also, Japan's net imports of the products were modestly high with Korea and Thailand and reached \$231 million and \$193 million, respectively, reflecting the comparative advantage these two countries had in primary industry relative to Japan during this period.

More than 87.8 percent of Japan's total exports consisted of manufactured products (Table 4). Japan's export shares of manufactured products in total exports were higher for intermediate inputs and capital products than for private and government consumer products. Its total import shares of manufactured products were lower than its total export shares. In other words, Japan depended less on the manufactured products produced by the five Asian countries than these countries did on Japanese manufactured products. Equivalently, Japan depended more heavily on their primary products, reflecting its lack of natural resources. For example, 85 percent of Japan's imports from Indonesia consisted of primary products such as oil, natural gas, and minerals.

Total trade values of manufactured products between Japan and Korea were much higher than those between Japan and the other four countries (Tables 3 and 5). Japan exported mainly intermediate inputs and capital products to Korea and imported mainly intermediate inputs and private consumer products from the country. Japan's exports of intermediate inputs to Korea reached \$1.4 billion and accounted for 67.5 percent of its exports of manufactured products. Its exports of capital products to Korea reached \$609 million, accounting for 29.3 percent of its exports of manufactured products. Meanwhile, imports of intermediate inputs from Korea to Japan reached \$521 million and accounted for 56.1 percent of the country's total imports of manufactured products. Also, Japan's imports of consumer products from Korea reached \$345 million, accounting for 37.1 percent of its total imports of manufactured products. As a result, Japan was a substantial net exporter of intermediate inputs and capital products to Korea, but was a substantial net importer of private consumer products from the country.

Total trade values of manufactured products between Japan and the five Asian countries were highest for intermediate inputs and lowest for government consumer products (Table 3). Furthermore, two-way flows of intermediate inputs were larger than those of final products, except for the private consumer products traded between Japan and Indonesia. Among final products, total trade values of capital products were higher than those of private consumer products. However, two-way flows were larger for the latter products than the former. These results suggest that Japan had a strong comparative advantage in capital-intensive products, such as capital products, and thus, flows of these products were rather unilateral from Japan to the five Asian countries. By contrast, trade flows of

Table 3. Pattern of Trade between Japan and the Five Asian Countries (1), 1975
(In US\$1,000)

Partner Country	Industry	Intermediate Input		Final Product				Aggregate Product				
		Export	Import	Private Consumer Product	Government Consumer Product	Capital Product	Export	Import	Net Export			
		Export	Import	Export	Import	Export	Import	Export	Import	Export		
Indonesia	Primary	1,375	2,808,167	336	41,303	0	0	0	0	1,711	2,849,476	(2,847,765)
	Secondary	1,083,476	287,441	46,365	46,280	17,054	0	411,815	220	1,558,710	313,941	1,244,769
	Tertiary	65,008	175,445	5,531	16,495	1,376	0	19,820	371	91,735	192,311	(100,576)
	Total	1,149,859	3,231,053	52,232	104,078	18,430	0	431,635	597	1,652,156	3,155,728	(1,703,572)
Korea	Primary	7,798	119,902	396	119,376	2	0	23	196	8,219	239,474	(231,255)
	Secondary	1,402,655	521,372	50,019	344,962	16,376	0	609,477	62,336	2,078,527	928,671	1,149,856
	Tertiary	197,868	281,732	23,151	59,025	4,341	0	59,004	18,082	284,364	338,839	(54,475)
	Total	1,608,321	903,007	73,566	523,363	20,719	0	668,504	80,614	2,371,110	1,506,984	864,126
Malaysia	Primary	1,647	14,919	1,842	4,955	2	0	0	0	3,491	19,875	(15,384)
	Secondary	258,609	166,936	76,622	15,718	3,985	0	147,572	11,426	484,788	194,080	290,708
	Tertiary	2,815	26,537	1,646	1,747	272	0	836	2,135	5,569	30,419	(24,850)
	Total	263,071	208,392	78,110	22,420	4,259	0	148,408	13,562	493,848	244,374	249,474
Singapore	Primary	2,096	2,362	1,619	1,610	7	0	1	3	4,923	3,637	1,286
	Secondary	546,062	319,025	90,253	59,530	6,990	0	172,634	13,562	815,939	392,117	423,822
	Tertiary	4,405	55,946	1,663	6,121	49	0	859	2,027	6,976	64,094	(57,118)
	Total	552,563	377,313	94,735	67,061	7,046	0	173,494	15,594	827,838	459,868	367,970
Thailand	Primary	791	158,679	409	36,030	1	0	3	27	1,204	194,736	(193,532)
	Secondary	500,738	219,271	86,966	29,972	4,520	0	258,515	2,874	850,739	352,117	498,622
	Tertiary	44,653	118,661	8,838	2,652	1,573	0	12,460	376	67,524	121,689	(54,165)
	Total	546,182	596,611	96,213	68,654	6,094	0	270,978	3,277	919,467	668,542	250,925

Source: Asian International Input-Output Table 1975, Institute of Developing Economies.

Table 4. Pattern of Trade between Japan and the Five Asian Countries (2), 1975

(In percent)

Partner Country	Industry	Intermediate Input		Final Product						Aggregate Product	
		Export Share	Import Share	Priv. Consumer Product		Gov. Consumer Product		Capital Product		Export Share	Import Share
				Export Share	Import Share	Export Share	Import Share	Export Share	Import Share		
Indonesia	Primary	0.001	0.864	0.006	0.397	0.000	0.000	0.000	0.010	0.001	0.849
	Secondary	0.942	0.082	0.888	0.445	0.925	0.000	0.954	0.369	0.943	0.094
	Tertiary	0.057	0.054	0.106	0.158	0.075	0.000	0.046	0.621	0.056	0.057
	Total	1.000	1.000	1.000	1.000	1.000	0.000	1.000	1.000	1.000	1.000
Korea	Primary	0.005	0.133	0.005	0.228	0.000	0.000	0.000	0.002	0.003	0.159
	Secondary	0.872	0.577	0.680	0.659	0.790	0.000	0.912	0.773	0.877	0.616
	Tertiary	0.123	0.290	0.315	0.113	0.210	0.000	0.088	0.224	0.120	0.225
	Total	1.000	1.000	1.000	1.000	1.000	0.000	1.000	1.000	1.000	1.000
Malaysia	Primary	0.006	0.072	0.024	0.221	0.000	0.000	0.000	0.000	0.007	0.081
	Secondary	0.983	0.801	0.955	0.701	0.936	0.000	0.994	0.843	0.982	0.794
	Tertiary	0.011	0.127	0.021	0.078	0.064	0.000	0.006	0.157	0.011	0.124
	Total	1.000	1.000	1.000	1.000	1.000	0.000	1.000	1.000	1.000	1.000
Singapore	Primary	0.004	0.006	0.030	0.021	0.001	0.000	0.000	0.000	0.006	0.008
	Secondary	0.988	0.846	0.953	0.888	0.992	0.000	0.995	0.870	0.986	0.853
	Tertiary	0.008	0.148	0.018	0.091	0.007	0.000	0.005	0.130	0.008	0.139
	Total	1.000	1.000	1.000	1.000	1.000	0.000	1.000	1.000	1.000	1.000
Thailand	Primary	0.001	0.266	0.004	0.525	0.000	0.000	0.000	0.000	0.001	0.291
	Secondary	0.917	0.535	0.904	0.437	0.742	0.000	0.954	0.877	0.925	0.527
	Tertiary	0.082	0.199	0.092	0.039	0.258	0.000	0.046	0.115	0.073	0.182
	Total	1.000	1.000	1.000	1.000	1.000	0.000	1.000	1.000	1.000	1.000

Source: Asian International Input-Output Table: 1975, Institute of Developing Economics.

Table 5. Pattern of Trade between Japan and the Five Asian Countries (3), 1975

(In percent)

Partner Country	Industry	Intermediate Input		Final Product						Aggregate Product	
		Export Share	Import Share	Priv. Consumer Product		Gov. Consumer Product		Capital Product		Export Share	Import Share
				Export Share	Import Share	Export Share	Import Share	Export Share	Import Share		
Indonesia	Primary	0.804	0.986	0.196	0.014	0.000	0.000	0.000	0.000	1.000	1.000
	Secondary	0.695	0.852	0.030	0.147	0.011	0.000	0.264	0.001	1.000	1.000
	Tertiary	0.709	0.912	0.060	0.086	0.015	0.000	0.216	0.002	1.000	1.000
	Total	0.696	0.969	0.032	0.031	0.011	0.000	0.261	0.000	1.000	1.000
Korea	Primary	0.949	0.501	0.048	0.498	0.000	0.000	0.003	0.001	1.000	1.000
	Secondary	0.675	0.561	0.024	0.371	0.008	0.000	0.293	0.067	1.000	1.000
	Tertiary	0.696	0.772	0.081	0.174	0.015	0.000	0.207	0.053	1.000	1.000
	Total	0.678	0.599	0.031	0.347	0.009	0.000	0.282	0.053	1.000	1.000
Malaysia	Primary	0.472	0.751	0.528	0.249	0.001	0.000	0.000	0.000	1.000	1.000
	Secondary	0.533	0.860	0.154	0.081	0.008	0.000	0.304	0.059	1.000	1.000
	Tertiary	0.505	0.872	0.296	0.057	0.049	0.000	0.150	0.070	1.000	1.000
	Total	0.533	0.853	0.158	0.092	0.009	0.000	0.301	0.055	1.000	1.000
Singapore	Primary	0.426	0.613	0.573	0.386	0.001	0.000	0.000	0.001	1.000	1.000
	Secondary	0.669	0.814	0.111	0.152	0.009	0.000	0.212	0.035	1.000	1.000
	Tertiary	0.631	0.873	0.238	0.096	0.007	0.000	0.123	0.032	1.000	1.000
	Total	0.667	0.820	0.114	0.146	0.009	0.000	0.210	0.034	1.000	1.000
Thailand	Primary	0.657	0.815	0.340	0.185	0.001	0.000	0.002	0.000	1.000	1.000
	Secondary	0.589	0.907	0.102	0.085	0.005	0.000	0.304	0.008	1.000	1.000
	Tertiary	0.661	0.975	0.131	0.022	0.023	0.000	0.185	0.003	1.000	1.000
	Total	0.594	0.892	0.105	0.103	0.007	0.000	0.295	0.005	1.000	1.000

Source: Asian International Input-Output Table: 1985, Institute of Developing Economies.

intermediate inputs and private consumer products were more bilateral, reflecting the comparative advantage that each country had achieved in different types of products at various production stages.

We now analyze the trade pattern between Japan and the five Asian countries using the intra-industry trade index. In particular, we utilize the measure developed by Grubel and Lloyd (1971) since it is the most widely used. We calculate indexes for the four types of manufactured products: intermediate inputs, private consumer products, government consumer products, and capital products. Intra-industry trade of product i is defined as the value of its exports which is exactly matched by the value of imports of the same product; thus, the index for the product measures the share of trade overlap in total trade value for the product. The unweighted index is based on the aggregate value of net exports of the product while the weighted index is based on the weighted average of the index calculated for each industry producing the product.

Unweighted intra-industry trade index:

$$IIT^a_i = 100 - 100 * |\sum_j \text{Export}_{ij} - \sum_j \text{Import}_{ij}| / \sum_j (\text{Export}_{ij} + \text{Import}_{ij}) \quad (1)$$

Weighted intra-industry trade index:

$$IIT^b_i = 100 - 100 * \sum_j |\text{Export}_{ij} - \text{Import}_{ij}| / \sum_j (\text{Export}_{ij} + \text{Import}_{ij}) \quad (2)$$

where

i = intermediate input, private consumer product, government consumer product, or capital product

j = 1, ... , 12 (twelve manufacturing industries)

The unweighted and weighted intra-industry trade indexes for manufactured products traded between Japan and the five Asian countries indicate that intra-industry trade was more active for intermediate inputs than for capital products (Table 6). Indonesia, whose exports of intermediate inputs to Japan mainly consisted of primary products, had the lowest intra-industry trade indexes for manufactured intermediate inputs. Korea, which was the only net exporter of private consumer products to Japan, showed lower intra-industry indexes for these products than the other four countries because its exports substantially exceeded its imports.

b. Twelve-manufacturing industry analysis

We focus here on the secondary industry, analyzing the twelve major manufacturing industries mentioned at the beginning of this section. Many manufactured intermediate inputs are produced at the different production stages, thus, they include both capital- and labor-intensive products. Since intermediate inputs are broadly defined in the industrial classification used in this paper, statistics include most of these inputs

Table 6. Intra-Industry Trade Indexes for Manufactured Products, 1975

	Intermediate Input		Private Consumer Product		Government Consumer Product		Capital Product		Total	
	Weighted	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted	Unweighted
Indonesia	7.48	39.60	22.08	99.91	0.00	0.00	0.11	0.11	6.51	33.53
Korea	39.82	54.20	24.90	25.33	0.00	0.00	18.29	18.56	32.83	61.76
Malaysia	48.21	78.46	11.76	34.80	0.00	0.00	14.09	14.37	35.08	57.18
Singapore	0.78	73.76	19.13	79.50	0.00	0.00	14.53	14.57	11.01	64.92
Thailand	13.73	77.87	26.60	51.26	0.00	0.00	1.04	2.20	12.17	58.55

Source: Asian International Input-Output Table: 1975, Institute of Developing Economies.

and indicate that intra-industry trade in manufactured intermediate inputs take place actively between Japan and the five Asian countries. Tables 7 and 8 provide the data for this subsection.

Intermediate inputs have dominated trade between Japan and the five Asian countries, with total trade values highest for most of the twelve industries under review. Of the twelve manufactured products, Japan was a substantial net importer of labor- or natural resource-intensive products, e.g., food, lumber, petroleum, rubber and textiles. Japan's large net imports of these products is reflective of the differences in relative factor endowments and technology between it and the five Asian countries, as well as in the level of industrialization in the industries in which each country had a comparative advantage. Thus, between Japan and Indonesia, Japan mainly exported metal and transport equipment products and imported petroleum products. Between Japan and Korea, Japan mainly exported chemical and metal products and imported textile products, while with Malaysia, Japan both exported and imported large amounts of metal products. With Singapore, Japan mainly exported metal products and imported petroleum products and with Thailand it primarily exported metal products and imported food products.

In the 1960s, Japan had a comparative advantage in labor-intensive products such as apparel, rubber, plastic, textiles, and nonmetallic minerals. It also gained a comparative advantage in capital-intensive products such as machinery and transport equipment. By the 1970s, Japan lost its comparative advantage in labor-intensive products but consolidated its advantage in higher value-added capital-intensive products. In the 1980s, it enhanced its advantage in the capital-intensive products and gradually gained a comparative advantage in advanced technology products.

Japan's exports of intermediate inputs and capital products to the five Pacific Basin countries were in high demand, particularly for machinery and transport equipment products, while its imports of these products were low (but highest for metal intermediate inputs from Malaysia). Exports of machinery products accounted for more than 60 percent of Japan's exports of capital products, while transport equipment products accounted for 18-35 percent. These high levels of net exports suggest that Japan had a comparative advantage in capital-intensive products. Japan also exported other products utilized by the industries in which the countries had a comparative advantage, as elaborated above.

Indonesia is richly endowed with oil reserves, while in the 1960s neighboring Singapore had developed a petroleum refinery system. By 1975, Japan's imports of petroleum products from Indonesia and Singapore reached \$226 million and \$296 million, respectively. Most of the two countries' products were exported as intermediate inputs and private consumer products.

In the 1960s, Korea had begun to develop its textile industry through joint ventures with Japanese textile firms and with Korean government financial assistance. Korea's high net exports to Japan suggest that in the mid-1970s Korea had already overtaken Japan's comparative advantage in

Table 7. Pattern of Trade in Manufactured Products between Japan and the Five Asian Countries (1), 1975

(In US\$1,000)

Industry	Indonesia		Korea		Malaysia		Singapore		Thailand	
	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import
1. Intermediate Input										
Food	1,219	23,611	4,614	39,390	1,122	28,092	5,852	3,638	3,417	191,132
Textile	53,789	1,449	167,953	209,561	21,250	312	7,703	2,164	28,198	14,804
Lumber	566	1,618	468	39,493	63	15,329	304	2,084	160	3,741
Pulp	19,744	2	28,186	3,295	13,875	21	12,489	322	9,942	3
Chemical	172,962	2,362	439,012	24,802	59,877	984	2,324	32,351	141,375	2,617
Petroleum	8,230	201,688	100,399	39,871	1,521	2,017	1,167	253,178	4,846	0
Rubber	13,387	7,254	2,902	25,869	1,029	22,663	2,237	2,034	1,816	73,486
Nonmetallic mineral	33,153	2	46,708	12,058	5,463	0	19,005	452	7,380	13
Metal	363,339	29,090	340,386	28,210	98,590	92,235	273,104	7,044	171,098	31,461
Machinery	117,061	152	210,576	79,271	29,716	4,992	95,024	12,026	59,687	472
Transport equipment	293,505	0	27,731	357	21,098	0	24,308	1,407	68,282	0
Other manufacturing	7,121	213	33,720	19,196	5,005	291	39,563	2,325	4,537	1,542
TOTAL	1,083,476	267,441	1,402,655	521,373	258,609	166,936	483,080	319,025	500,738	319,271
2. Priv. Cons. Product										
Food	7,609	5,167	3,746	54,211	5,584	2,439	7,643	4,017	2,069	16,449
Textile	6,730	1,275	23,519	223,879	11,159	357	14,949	699	9,703	9,389
Lumber	229	12	153	359	27	186	102	26	143	185
Pulp	834	1	1,783	1,043	3,663	7	3,161	85	3,442	3
Chemical	7,198	203	1,265	1,396	8,159	26	8,888	4,106	13,183	222
Petroleum	2,272	35,461	0	7,104	347	421	857	45,599	2,058	0
Rubber	959	3,820	6	6,948	498	10,673	198	661	1,705	13
Nonmetallic mineral	1,957	0	608	1,203	1,117	0	10,232	120	2,787	0
Metal	3,983	1	124	961	2,068	10	9,713	262	3,495	58
Machinery	7,038	30	8,800	14,426	11,873	1,305	16,929	977	13,823	3
Transport equipment	4,255	1	989	874	25,666	0	3,524	534	25,745	6
Other manufacturing	3,301	309	9,026	32,558	4,461	294	14,057	2,444	8,813	3,644
TOTAL	46,365	46,280	50,019	344,962	74,622	15,718	90,253	59,530	86,966	29,972
3. Gov. Cons. Product										
Food	0	0	558	0	0	0	39	0	0	0
Textile	439	0	41	0	88	0	292	0	52	0
Lumber	10	0	20	0	3	0	1	0	0	0
Pulp	1,352	0	339	0	93	0	559	0	181	0
Chemical	7,979	0	1,488	0	312	0	437	0	2,093	0
Petroleum	573	0	1,327	0	265	0	27	0	485	0
Rubber	0	0	237	0	0	0	128	0	161	0
Nonmetallic mineral	67	0	55	0	0	0	119	0	9	0
Metal	255	0	1,646	0	1,188	0	48	0	90	0
Machinery	753	0	9,333	0	80	0	4,628	0	1,009	0
Transport equipment	3,811	0	598	0	1,777	0	566	0	0	0
Other manufacturing	1,815	0	734	0	179	0	146	0	440	0
TOTAL	17,054	0	16,376	0	3,985	0	6,990	0	4,520	0

Table 7 (Concluded). Pattern of Trade in Manufactured Products between Japan and the Five Asian Countries (1), 1975

(In US\$1,000)

4. Capital Product											
Food											
Textile	359	40	250	756	52	4	1,558	15	3	1,453	
Lumber	51	15	118	478	21	248	2	35	47	118	
Pulp	0	0	0	0	0	0	0	0	0	0	
Chemical	0	0	0	0	0	0	0	0	0	0	
Petroleum	0	0	0	0	0	0	0	0	0	0	
Rubber	5	0	0	0	0	0	15	0	610	0	
Nonmetallic mineral	34	0	0	0	0	0	120	0	378	0	
Metal	8,128	1	6,056	2,390	7,188	27	2,236	652	7,015	213	
Machinery	283,821	97	366,108	48,592	92,675	11,015	123,518	10,937	153,402	343	
Transport equipment	104,706	1	219,954	918	43,548		31,533	931	93,570	3	
Other manufacturing	14,711	66	16,951	9,202	4,088	132	13,652	992	3,490	744	
TOTAL	411,815	220	609,477	62,336	147,572	11,426	172,634	13,562	258,515	2,874	
5. Aggregate Product											
Food	8,828	28,778	8,918	93,601	6,706	30,531	13,534	7,655	5,486	207,581	
Textile	61,317	2,764	191,763	434,196	32,549	673	24,502	2,878	37,956	25,646	
Lumber	856	1,645	759	40,330	114	15,763	409	2,145	350	4,044	
Pulp	21,930	3	30,308	4,338	17,631	28	16,209	407	13,565	6	
Chemical	187,539	2,565	441,765	26,198	68,348	1,010	11,449	36,457	156,651	2,839	
Petroleum	11,075	237,149	101,726	46,975	2,133	2,438	2,051	298,777	7,389	0	
Rubber	14,351	11,074	3,145	32,817	1,527	33,336	2,578	2,695	4,292	73,499	
Nonmetallic mineral	35,211	2	47,371	13,261	6,580	0	29,476	572	10,554	13	
Metal	175,705	29,092	348,252	31,561	109,034	92,272	285,101	7,958	181,698	31,732	
Machinery	408,673	279	594,817	142,289	134,344	17,312	240,099	23,940	227,921	818	
Transport equipment	406,277	2	249,272	2,149	92,089	0	59,931	2,872	187,597	9	
Other manufacturing	26,948	388	60,431	60,936	13,733	717	67,418	5,761	17,280	5,930	
TOTAL	1,558,710	313,941	2,078,527	928,671	484,788	194,080	752,957	392,117	850,739	352,117	

Source: Asian International Input-Output Table: 1975, Institute of Developing Economies.

Table 8. Pattern of Trade in Manufactured Products between Japan and the Five Asian Countries, 1975

(In percent)

Industry	Indonesia		Korea		Malaysia		Singapore		Thailand	
	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import
1. Intermediate Input										
Food	0.001	0.088	0.003	0.076	0.004	0.168	0.012	0.011	0.007	0.599
Textile	0.050	0.005	0.120	0.402	0.082	0.002	0.016	0.007	0.056	0.046
Lumber	0.001	0.006	0.000	0.076	0.000	0.092	0.001	0.007	0.000	0.012
Pulp	0.018	0.000	0.020	0.006	0.054	0.000	0.026	0.001	0.020	0.000
Chemical	0.159	0.009	0.313	0.048	0.232	0.006	0.005	0.101	0.282	0.008
Petroleum	0.008	0.754	0.072	0.076	0.006	0.012	0.002	0.794	0.010	0.000
Rubber	0.012	0.027	0.002	0.050	0.004	0.136	0.005	0.006	0.004	0.230
Nonmetallic mineral	0.031	0.000	0.033	0.023	0.021	0.000	0.039	0.001	0.015	0.000
Metal	0.335	0.109	0.243	0.054	0.381	0.553	0.565	0.022	0.342	0.009
Machinery	0.108	0.001	0.150	0.152	0.115	0.030	0.197	0.038	0.119	0.001
Transport equipment	0.271	0.000	0.020	0.001	0.082	0.000	0.050	0.004	0.136	0.000
Other manufacturing	0.007	0.001	0.024	0.037	0.019	0.002	0.082	0.007	0.009	0.005
TOTAL	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2. Priv. Cons. Product										
Food	0.164	0.112	0.075	0.157	0.075	0.155	0.085	0.067	0.024	0.549
Textile	0.145	0.028	0.470	0.649	0.150	0.023	0.166	0.012	0.112	0.313
Lumber	0.005	0.000	0.003	0.001	0.000	0.012	0.001	0.000	0.002	0.006
Pulp	0.018	0.000	0.036	0.003	0.049	0.000	0.035	0.001	0.040	0.000
Chemical	0.155	0.004	0.025	0.004	0.109	0.002	0.098	0.069	0.152	0.007
Petroleum	0.049	0.766	0.000	0.021	0.005	0.027	0.009	0.766	0.024	0.000
Rubber	0.021	0.083	0.000	0.020	0.007	0.679	0.002	0.011	0.020	0.000
Nonmetallic mineral	0.042	0.000	0.012	0.003	0.015	0.000	0.113	0.002	0.032	0.000
Metal	0.086	0.000	0.002	0.003	0.028	0.001	0.108	0.004	0.040	0.002
Machinery	0.152	0.001	0.176	0.042	0.159	0.083	0.188	0.016	0.159	0.000
Transport equipment	0.092	0.000	0.020	0.003	0.344	0.000	0.039	0.009	0.296	0.000
Other manufacturing	0.071	0.007	0.180	0.094	0.060	0.019	0.156	0.041	0.101	0.122
TOTAL	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
3. Gov. Cons. Product										
Food	0.000		0.034		0.000		0.006		0.000	
Textile	0.026		0.003		0.022		0.042		0.012	
Lumber	0.001		0.001		0.001		0.000		0.000	
Pulp	0.079		0.021		0.023		0.080		0.040	
Chemical	0.468		0.091		0.078		0.063		0.463	
Petroleum	0.034		0.081		0.066		0.004		0.107	
Rubber	0.000		0.014		0.000		0.018		0.036	
Nonmetallic mineral	0.004		0.003		0.000		0.017		0.002	
Metal	0.015		0.101		0.298		0.007		0.020	
Machinery	0.044		0.570		0.020		0.662		0.223	
Transport equipment	0.223		0.037		0.446		0.081		0.000	
Other manufacturing	0.106		0.045		0.045		0.021		0.097	
TOTAL	1.000		1.000		1.000		1.000		1.000	

Table 8 (Concluded). Pattern of Trade in Manufactured Products between Japan and the Five Asian Countries, 1975

(In percent)

4. Capital Product										
Food	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Textile	0.001	0.182	0.000	0.012	0.000	0.000	0.009	0.001	0.000	0.506
Lumber	0.000	0.068	0.000	0.008	0.000	0.022	0.000	0.003	0.000	0.041
Pulp	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Chemical	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Petroleum	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rubber	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000
Nonmetallic mineral	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000
Metal	0.020	0.005	0.010	0.038	0.049	0.002	0.013	0.048	0.027	0.074
Machinery	0.689	0.441	0.601	0.780	0.628	0.964	0.715	0.806	0.593	0.119
Transport equipment	0.254	0.005	0.361	0.015	0.295	0.000	0.183	0.069	0.362	0.001
Other manufacturing	0.036	0.300	0.028	0.148	0.028	0.012	0.079	0.073	0.014	0.259
TOTAL	1.000									
5. Aggregate Product										
Food	0.006	0.092	0.004	0.101	0.014	0.157	0.018	0.020	0.006	0.590
Textile	0.039	0.009	0.092	0.468	0.067	0.003	0.033	0.007	0.045	0.073
Lumber	0.001	0.005	0.000	0.043	0.000	0.081	0.001	0.005	0.000	0.011
Pulp	0.014	0.000	0.015	0.005	0.036	0.000	0.022	0.001	0.016	0.000
Chemical	0.120	0.008	0.213	0.028	0.141	0.005	0.015	0.093	0.184	0.008
Petroleum	0.007	0.755	0.049	0.051	0.004	0.013	0.003	0.762	0.009	0.000
Rubber	0.009	0.035	0.002	0.035	0.003	0.172	0.003	0.007	0.005	0.209
Nonmetallic mineral	0.023	0.000	0.023	0.014	0.014	0.000	0.039	0.001	0.012	0.000
Metal	0.241	0.093	0.168	0.034	0.225	0.475	0.379	0.020	0.214	0.090
Machinery	0.262	0.001	0.286	0.153	0.277	0.089	0.310	0.061	0.268	0.002
Transport equipment	0.261	0.000	0.120	0.002	0.190	0.000	0.080	0.007	0.221	0.000
Other manufacturing	0.017	0.002	0.029	0.066	0.028	0.004	0.090	0.015	0.020	0.017
TOTAL	1.000									

Source: Asian International Input-Output Table: 1975, Institute of Developing Economies.

the production of final products. In 1975, Japan's net imports of textiles from Korea had reached \$242 million; most of the imports were used as intermediate inputs and private consumer products. Of the two types of products, the total trade value of intermediate inputs was higher than for private consumer products, with two-way flows of the former also being more active than the latter. In other words, the international division of labor between Japan and Korea was more evident in the different stages of production than at the same final stages. Furthermore, the fact that Korea was the only substantial net exporter of private consumer textile products suggests that the industrialization of its textile industry was more advanced than in the other four countries.

In the 1960s, Malaysia began to develop its metal products industry. By 1975, Japan's imports of intermediate metal products from Malaysia were high, at \$92 million, suggesting that the Malaysian metal products industry had advanced more rapidly than in the other four countries. Furthermore, two-way flows of metal products between Japan and Malaysia were larger than with the other four countries. These results suggest that an international division of labor had taken place at the different production stages, such that Japan exported higher value-added metal products to Malaysia, while Malaysia exported lower value-added metal products to Japan.

In the 1960s, Thailand initiated industrialization of its agricultural and food processing industries. By 1975, Japan was importing large quantities of manufactured food products from Thailand, with net imports reaching \$202 million. Japan imported these products mainly as intermediate inputs and private consumer products.

We now use the intra-industry index calculated for each industry. Intra-industry trade of industry j ($j = 1, \dots, 12$) is defined as the value of exports of the industry that is exactly matched by the value of imports of the same industry; thus, the index for the product measures the share of trade overlap in total trade value for the industry.

$$IIT_j = 100 - 100 * |Export_j - Import_j| / (Export_j + Import_j) \quad (3)$$

Among the twelve industries, Japan's intra-industry indexes for intermediate inputs and consumer products were higher with Korea and Singapore than with the other three countries (Table 9). The result indicates a more developed international division of labor had occurred between Japan and Korea and Singapore (the latter two being more abundantly endowed with capital- or skilled-labor) than with Indonesia, Malaysia, and Thailand. Further, in the case of private consumer products, the results show that the division of labor between Japan, Korea and Singapore had also developed at the same final production stages. Thus, Japan had higher intra-industry trade and had advanced the international division of labor more actively with Korea and Singapore than with the other three countries.

Table 9. Intra-Industry Indexes, 1975

Industry	Indonesia	Korea	Malaysia	Singapore	Thailand
1. Intermediate Input					
Food	9.82	20.97	7.68	76.67	3.51
Textile	5.25	88.98	2.89	43.86	68.85
Lumber	51.83	2.34	0.82	25.46	8.20
Pulp	0.02	20.93	0.30	5.03	0.06
Chemical	2.70	10.69	3.23	13.40	3.63
Petroleum	7.84	56.85	85.98	0.92	0.00
Rubber	70.29	20.17	8.69	95.25	4.82
Nonmetallic mineral	0.01	41.04	0.00	4.65	0.35
Metal	14.83	15.31	96.67	5.03	31.06
Machinery	0.26	54.70	28.77	22.47	1.57
Transport equipment	0.00	2.54	0.00	10.94	0.00
Other manufacturing	5.81	72.55	10.99	11.10	50.73
2. Priv. Cons. Product					
Food	80.89	12.93	60.80	68.90	22.35
Textile	31.86	19.01	6.20	8.93	98.36
Lumber	9.96	59.77	25.35	40.63	87.20
Pulp	0.24	73.81	0.38	5.24	0.17
Chemical	5.49	95.08	0.64	63.20	3.31
Petroleum	12.04	0.00	90.36	3.69	0.00
Rubber	40.13	0.17	8.92	46.10	1.51
Nonmetallic mineral	0.00	67.15	0.00	2.32	0.00
Metal	0.05	22.86	0.96	5.25	3.26
Machinery	0.85	75.78	19.81	10.91	0.04
Transport equipment	0.05	93.83	0.00	26.32	0.05
Other manufacturing	17.12	43.41	12.37	29.62	58.51
3. Gov. Cons. Product					
Food		0.00		0.00	
Textile	0.00	0.00	0.00	0.00	0.00
Lumber	0.00	0.00	0.00	0.00	
Pulp	0.00	0.00	0.00	0.00	0.00
Chemical	0.00	0.00	0.00	0.00	0.00
Petroleum	0.00	0.00	0.00	0.00	0.00
Rubber		0.00		0.00	0.00
Nonmetallic mineral	0.00	0.00		0.00	0.00
Metal	0.00	0.00	0.00	0.00	0.00
Machinery	0.00	0.00	0.00	0.00	0.00
Transport equipment	0.00	0.00	0.00	0.00	0.00
Other manufacturing	0.00	0.00	0.00	0.00	0.00
4. Capital Product					
Food					
Textile	20.05	49.70	14.29	1.91	0.41
Lumber	45.45	39.60	15.61	10.81	56.97
Pulp					
Chemical					
Petroleum					
Rubber	0.00			0.00	0.00
Nonmetallic mineral	0.00			0.00	0.00
Metal	0.02	56.33	0.75	45.15	5.89
Machinery	0.07	23.43	21.25	16.27	0.45
Transport equipment	0.00	0.83	0.00	5.74	0.01
Other manufacturing	0.89	70.37	6.26	13.55	35.14

Source: Asian International Input-Output Table: 1975, Institute of Developing Economies.

c. Summary

To summarize, Japan was a large net exporter of manufactured products to the five Asian countries and a large net importer of primary products, particularly from Indonesia. Among manufactured intermediate inputs, Japan was a substantial net exporter of capital-intensive products and a substantial net importer of labor- and natural resource-intensive products. As for private consumer products, Japan was a substantial net exporter of most of the twelve products, except in the case of Korea with which Japan achieved substantially high net imports in most of the products. Japan's net imports from Korea was particularly high for textile products. As for capital products, Japan was a substantial net exporter especially for capital-intensive products. Japan's international division of labor was centered around intermediate inputs such as metal products with Malaysia and textile products with Korea. These manufactured products had larger two-way flows for intermediate inputs than for final products. Trade flows of manufactured final products were rather unilateral, either from Korea to Japan or from Japan to the other four countries. In other words, the international division of labor took place at the different production stages rather than at the same final production stages.

2. Dynamic trade pattern--1975-85

The new trade theories have five implications for the dynamic pattern of trade between Japan and the five Asian countries. First, Japan remains a net exporter of manufactured products by moving into more advanced manufactured products and continues to be a substantial net importer of labor- or natural-intensive products. However, as industrialization progresses in the five Asian countries, their exports shift from primary to manufactured products and they increase exports of some capital-intensive products to Japan. Second, intra-industry trade increases if Japan increases imports of manufactured products produced by the five Asian countries, but decreases if Japan moves up the ladder by exporting more advanced manufactured products and achieves a comparative advantage in more sophisticated products. Third, intra-industry trade in manufactured intermediate inputs expands if the production process is subdivided, if production locations are spread across countries, and if each country specializes in the production of products at the different stages. Each of these processes enhance the international division of labor. Fourth, intra-industry trade in capital and consumer products increases if the five Asian countries increase exports of these products to Japan. Fifth, Japan remains a substantial net exporter of capital products unless the five Asian countries enhance competitiveness in these products.

a. Three-industry analysis--1975 and 1985

While Japan's export structure did not change much between 1975 and 1985, its import structure of primary, secondary and tertiary industry products changed significantly during the period (Tables 3 and 10). Japan remained a substantial net exporter of manufactured products; its total exports of manufactured products accounted for more than 90 percent of total

Table 10. Pattern of Trade between Japan and the Five Asian Countries (1), 1985

(In US\$1,000)

Partner Country	Industry	Intermediate Input		Final Product						Total Product		
		Export	Import	Private Consumer Product		Government Consumer Product		Capital Product		Export	Import	Net Export
				Export	Import	Export	Import	Export	Import			
Indonesia	Primary	3,216	7,708,903	496	59,220	0	12	0	44	3,712	7,768,179	(7,764,467)
	Secondary	1,685,825	1,292,085	89,294	25,112	21,219	1,089	476,112	3,093	2,272,450	1,321,379	951,071
	Tertiary	124,345	368,152	8,577	21,823	1,847	365	32,969	947	167,738	391,287	(223,549)
	Total	1,813,386	9,369,140	98,367	106,155	23,066	1,466	509,081	4,084	2,443,900	9,480,845	(7,036,945)
Korea	Primary	54,165	295,870	2,740	64,148	34	0	216	1,452	57,155	361,470	(304,315)
	Secondary	4,655,673	2,107,400	194,757	980,170	215,775	38,902	1,516,826	107,313	6,583,031	3,233,785	3,349,246
	Tertiary	406,751	243,032	26,851	97,082	16,083	2,465	113,973	7,202	563,658	349,771	213,887
	Total	5,116,589	2,646,292	224,348	1,141,400	231,892	41,367	1,631,015	115,967	7,203,844	3,945,026	3,258,818
Malaysia	Primary	4,176	2,885,125	2,177	13,981	8	4	86	23	6,447	2,899,133	(2,892,686)
	Secondary	1,631,184	1,104,664	296,559	26,377	180,415	362	724,152	5,581	2,832,310	1,136,984	1,695,326
	Tertiary	121,595	189,034	27,948	4,489	11,508	1,063	49,075	702	210,126	195,288	14,838
	Total	1,756,955	3,678,823	326,684	44,847	191,931	1,429	773,313	6,306	3,048,883	3,731,405	(682,522)
Singapore	Primary	2,688	4,349	2,100	1,609	225	12	0	40	5,013	6,010	(997)
	Secondary	1,459,038	1,260,478	403,195	50,791	103,539	42,449	520,913	40,303	2,486,685	1,394,021	1,092,664
	Tertiary	120,383	67,861	42,098	834	7,815	932	38,289	697	208,585	70,324	138,261
	Total	1,582,109	1,332,688	447,393	53,234	111,579	43,393	559,202	41,040	2,700,283	1,470,355	1,229,928
Thailand	Primary	2,634	158,180	1,541	26,166	0	79	97	24	4,272	184,449	(180,177)
	Secondary	1,031,029	653,503	200,153	102,631	16,778	239	753,037	5,810	2,000,997	762,183	1,238,814
	Tertiary	72,675	22,413	43,703	2,665	2,633	109	58,263	205	179,274	25,392	153,882
	Total	1,106,238	834,096	247,397	131,462	19,411	427	811,397	6,039	2,184,443	972,024	1,212,419

Source: Asian International Input-Output Table 1985, Institute of Developing Economies.

exports in both years (Tables 4 and 11). By contrast, Japan's total import shares of manufactured products increased significantly from Korea from 61 percent to 82 percent, Singapore from 85 percent to 95 percent, and Thailand from 53 percent to 78 percent.

Japan's import share of manufactured intermediate inputs increased substantially from Korea, Singapore, and Thailand. By contrast, its import share from Malaysia declined significantly, from 80 percent to 30 percent, since Japan had expanded its imports of primary products from 0.7 percent to 78 percent. This is because in the late 1970s, Malaysia had developed oil and natural gas for commercial purposes; since then, it became a net exporter of these natural resource-oriented products. Japan's import share from Indonesia increased only from 8 percent to 14 percent and its import share of primary products remained at more than 80 percent.

Japan significantly increased its import shares of manufactured private consumer products from Korea, Singapore, and Thailand, while decreasing those from Indonesia and Malaysia. From Korea, Singapore, and Thailand, Japan shifted its imports of private consumer products from primary products to manufactured products. Furthermore, the values of these imports from Korea and Thailand increased, respectively, from \$345 million to \$980 million and from \$30 million to \$103 million while that from Singapore declined from \$60 million to \$51 million. Meanwhile, the values of Japan's imports of manufactured private consumer products from Indonesia and Malaysia declined from \$46 million to \$25 million and from 15.7 million to 26 million, respectively. From Indonesia and Malaysia, Japan shifted its imports of private consumer products from manufactured to primary products.

As for capital products, Japan increased its import shares of manufactured products from the five Asian countries. The values of imports from Korea and Singapore were quite high, at \$107 million and \$40 million, respectively.

Japan's import share of intermediate inputs in its total manufactured imports increased significantly compared with its export share (Tables 5 and 12). As a result, its import shares of manufactured intermediate inputs from Indonesia, Malaysia, and Singapore reached more than 90 percent. Japan's import shares from Korea and Thailand were lower than from Indonesia, Malaysia, and Singapore because the former countries exported a larger amount of private consumer products to Japan than the latter.

Japan's unweighted intra-industry indexes for manufactured products with the five Asian countries increased mainly for intermediate inputs because imports increased more than exports (Tables 6 and 13). Its weighted indexes also showed an increasing trend except for the index with Singapore. Its unweighted and weighted indexes for private consumer products with Indonesia, Malaysia, and Singapore declined since the increase in Japan's exports exceeded the increase in imports. Japan's unweighted indexes with Korea increased for all types of products. However, Japan's weighted indexes with Korea declined for private consumer products and

Table 11. Pattern of Trade between Japan and the Five Asian Countries (2), 1985

(% percent)

Partner Country	Industry	Intermediate Input		Final Product						Aggregate Product	
		Export share	Import share	Priv. Consumer Product		Gov. Consumer Product		Capital Product		Export share	Import share
				Export share	Import share	Export share	Import share	Export share	Import share		
Indonesia	Primary	0.002	0.823	0.005	0.558	0.000	0.008	0.000	0.011	0.002	0.819
	Secondary	0.930	0.138	0.908	0.237	0.920	0.743	0.935	0.757	0.930	0.139
	Tertiary	0.069	0.039	0.087	0.206	0.080	0.249	0.065	0.232	0.069	0.041
	Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Korea	Primary	0.011	0.112	0.012	0.056	0.000	0.000	0.000	0.013	0.008	0.092
	Secondary	0.910	0.796	0.868	0.859	0.930	0.940	0.910	0.925	0.914	0.820
	Tertiary	0.079	0.092	0.120	0.085	0.069	0.060	0.070	0.062	0.078	0.089
	Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Malaysia	Primary	0.002	0.784	0.007	0.312	0.000	0.003	0.000	0.004	0.002	0.777
	Secondary	0.928	0.300	0.908	0.588	0.940	0.253	0.936	0.885	0.929	0.305
	Tertiary	0.069	0.051	0.086	0.100	0.060	0.744	0.063	0.111	0.069	0.052
	Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Singapore	Primary	0.002	0.003	0.005	0.030	0.002	0.000	0.000	0.001	0.002	0.004
	Secondary	0.922	0.946	0.901	0.954	0.928	0.978	0.932	0.982	0.921	0.948
	Tertiary	0.076	0.051	0.094	0.016	0.070	0.021	0.068	0.017	0.077	0.048
	Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Thailand	Primary	0.002	0.190	0.006	0.199	0.000	0.185	0.000	0.004	0.002	0.190
	Secondary	0.932	0.783	0.809	0.781	0.864	0.560	0.928	0.962	0.916	0.784
	Tertiary	0.066	0.027	0.185	0.020	0.136	0.255	0.072	0.034	0.082	0.026
	Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

source: Asian International Input-Output Table: 1985, Institute of Developing Economies.

Table 12. Pattern of Trade between Japan and the Five Asian Countries (3), 1985

(In percent)

Partner Country	Industry	Intermediate Input		Final Product						Aggregate Product	
		Export Share	Import Share	Priv. Consumer Product		Gov. Consumer Product		Capital Product		Export Share	Import Share
				Export Share	Import Share	Export Share	Import Share	Export Share	Import Share		
Indonesia	Primary	0.866	0.992	0.134	0.008	0.000	0.000	0.000	0.000	1.000	1.000
	Secondary	0.742	0.978	0.039	0.019	0.009	0.001	0.210	0.002	1.000	1.000
	Tertiary	0.741	0.941	0.051	0.056	0.011	0.001	0.197	0.002	1.000	1.000
	Total	0.742	0.988	0.040	0.011	0.009	0.000	0.208	0.000	1.000	1.000
Korea	Primary	0.948	0.819	0.048	0.177	0.001	0.000	0.004	0.004	1.000	1.000
	Secondary	0.707	0.652	0.030	0.303	0.033	0.012	0.230	0.033	1.000	1.000
	Tertiary	0.722	0.695	0.048	0.278	0.029	0.007	0.202	0.021	1.000	1.000
	Total	0.710	0.671	0.031	0.289	0.032	0.010	0.226	0.029	1.000	1.000
Malaysia	Primary	0.648	0.995	0.338	0.005	0.001	0.000	0.013	0.000	1.000	1.000
	Secondary	0.576	0.972	0.105	0.023	0.064	0.000	0.256	0.005	1.000	1.000
	Tertiary	0.579	0.968	0.133	0.023	0.055	0.005	0.234	0.004	1.000	1.000
	Total	0.576	0.986	0.107	0.012	0.063	0.000	0.254	0.002	1.000	1.000
Singapore	Primary	0.536	0.724	0.419	0.268	0.045	0.002	0.000	0.007	1.000	1.000
	Secondary	0.587	0.904	0.162	0.036	0.042	0.030	0.209	0.029	1.000	1.000
	Tertiary	0.577	0.965	0.202	0.012	0.037	0.013	0.184	0.010	1.000	1.000
	Total	0.586	0.906	0.166	0.036	0.041	0.030	0.207	0.028	1.000	1.000
Thailand	Primary	0.617	0.858	0.361	0.142	0.000	0.000	0.023	0.000	1.000	1.000
	Secondary	0.515	0.857	0.100	0.135	0.008	0.000	0.376	0.008	1.000	1.000
	Tertiary	0.405	0.883	0.255	0.105	0.015	0.004	0.325	0.008	1.000	1.000
	Total	0.506	0.858	0.113	0.135	0.009	0.000	0.371	0.006	1.000	1.000

Source: Asian International Input-Output Table: 1985, Institute of Developing Economies.

Table 13. Intra-Industry Trade Indexes for Manufactured Products, 1985

	Intermediate Input		Private Consumer Product		Government Consumer Product		Capital Product		Total	
	Weighted	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted	Unweighted
Indonesia	26.73	86.78	17.55	43.9	0.69	9.76	1.12	1.29	22.86	73.54
Korea	46.36	62.32	22.61	33.15	0.11	30.55	12.2	13.22	36.87	65.88
Malaysia	26.58	80.76	15.34	16.34	0.13	0.4	1.47	1.53	32.93	57.29
Singapore	22.66	92.7	18.33	22.38	0.19	58.15	14.36	14.36	20.11	71.84
Thailand	21.83	77.59	89.81	67.79	0.58	2.81	0.7	1.53	23.34	55.17

Source: Asian International Input-Output Table: 1985, Institute of Developing Economies.

capital products as the increase in its exports was higher than that of its imports.

b. Twelve-industry analysis--1975 and 1985

Between 1975 and 1985, Japan continued to be a substantial net exporter of chemicals, metals, machinery, and transport equipment and remained a large net importer of food, lumber, petroleum, textile and rubber products (Tables 7 and 14). While Japan's total net exports were high for metals, machinery and transport equipment in 1975, by 1985 an increase in total net exports of machinery became evident relative to the other two products. This is because Japan's exports of machinery grew much faster than its imports. Japan's imports of metals expanded significantly especially from Indonesia and Korea; consequently, the ratios of Japan's exports to its imports of metals with the two countries declined from 12.9 to 1.7 and from 11 to 2.5, respectively. Japan's imports of transport equipment from Indonesia and Malaysia remained at nearly zero, while from Singapore they hardly increased, and from Korea and Thailand they increased. As a result, the ratios of Japan's exports to its imports for the latter two countries declined from 116 to 59 and from 20,844 to 264, respectively.

Japan's total net imports of petroleum products remained high with Indonesia and Singapore, reaching \$733 million and \$982.7 million, respectively. A noticeable change was observed for Japan's total net imports of petroleum products from Korea, which turned from net exports of \$54 million to Korea to net imports of \$332 million from Korea. The large-scale increase was the outcome of the Korean Government's policy in the 1960s to establish a petroleum refinery system as one of the first major import-substitution projects in the country. Japan's total net imports of food and textile products from Korea also increased from \$84.7 million to \$326.6 million and from \$242 million to \$497.7 million, respectively.

A shift in Japan's import structure of intermediate inputs clearly emerged while its export structure remained more or less the same. Japan's import shares of metal products in total imports of manufactured intermediate inputs from Indonesia and Korea increased significantly, from 11 percent to 26 percent, and from 5.4 to 20 percent, respectively (Tables 8 and 15). Its import shares of rubber products from Malaysia and Thailand also increased substantially, from 13.6 percent to 15.4 percent and from 23 percent to 39.6 percent, respectively.

While Japan's export shares of intermediate inputs remained high for chemicals, metals, machinery, and transport equipment between 1975 and 1985, its export shares of machinery products had expanded substantially: for Indonesia from 10.8 percent to 18 percent, for Korea from 15 percent to 30.5 percent, for Malaysia from 11.5 percent to 22 percent, for Singapore from 19.7 percent to 43.6 percent, and for Thailand from 11.9 percent to 14.3 percent. Also, Japan's exports of transport equipment products to Malaysia expanded substantially, from 8.2 percent to 30.5 percent. Meanwhile, its exports of metal products to Malaysia and Singapore declined

Table 14. Pattern of Trade in Manufactured Products between Japan and the Five Asian Countries (1), 1985

(In US\$1,000)

Industry	Indonesia		Korea		Malaysia		Singapore		Thailand	
	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import
1. Intermediate Input										
Food	5,578	33,456	24,372	228,958	7,117	94,722	13,969	21,911	16,435	195,721
Textile	18,430	10,521	412,132	335,261	34,844	17,965	85,138	4,742	61,312	20,075
Lumber	211	130,918	3,420	30,222	1,583	75,475	2,108	6,467	238	12,199
Pulp	13,736	1,010	51,729	5,820	45,902	129	42,685	1,296	18,827	75
Chemical	119,906	9,750	983,611	149,611	114,213	43,028	112,874	98,927	241,620	10,825
Petroleum	13,777	732,207	169,501	477,871	4,481	64,284	7,860	947,946	9,166	164
Rubber	18,028	35,085	29,890	16,268	6,744	92,992	21,651	875	4,891	258,688
Nonmetallic mineral	108,398	552	139,817	97,347	43,293	412	67,501	2,327	10,089	34,721
Metal	539,684	334,198	1,032,678	422,793	482,196	163,631	397,021	40,995	397,522	66,829
Machinery	103,137	444	1,420,096	297,267	358,561	49,581	615,561	108,560	147,488	50,801
Transport equipment	283,239	11	162,478	5,470	497,005	12	15,270	4,904	100,416	1,193
Other manufacturing	41,701	3,932	225,849	40,512	35,244	2,433	57,400	21,528	23,025	2,212
TOTAL	1,685,625	1,292,085	4,655,673	2,107,400	3,631,194	804,864	1,659,038	1,260,478	1,031,029	653,503
2. Priv. Cons. Product										
Food	5,234	6,140	7,424	129,925	24,180	4,658	14,201	5,402	15,259	61,566
Textile	2,260	1,501	6,286	577,156	22,379	560	44,508	1,441	13,537	14,011
Lumber	135	636	747	6,337	1,167	463	4,494	747	65	2,377
Pulp	1,242	3	8,692	737	4,728	7	7,019	561	1,341	0
Chemical	21,260	433	3,602	1,777	21,584	9,192	10,519	19,372	28,873	874
Petroleum	184	13,873	3,268	319	1,476	3,082	10	344	523	62
Rubber	2,563	0	1,096	8,748	9,387	3,538	4,261	124	5,779	18
Nonmetallic mineral	974	4	5,481	23,187	9,968	191	6,150	60	4,235	9,512
Metal	9,395	6	6,476	1,801	14,746	539	10,467	109	7,723	73
Machinery	14,787	6	95,114	19,957	124,055	1,483	161,829	13,543	78,559	75
Transport equipment	889	21	236	199	26,259	28	42,695	7	28,990	23
Other manufacturing	10,381	2,489	56,335	190,027	36,630	2,639	97,042	9,079	15,271	14,040
TOTAL	89,294	25,112	194,757	980,170	296,559	26,377	403,195	50,791	200,153	102,631
3. Gov. Cons. Product										
Food	0	3	511		147	0	809	0	0	0
Textile	399	0	34	1,390	1,244	0	2,156	0	14	104
Lumber	3	0	17	138	1	0	0	11	0	16
Pulp	593	0	1,216	148	364	0	645	66	904	0
Chemical	4,462	0	2,949	4	5,739	26	8,333	0	2,812	0
Petroleum	21	1,030	9,353	36,246	39	279	15	42,316	643	0
Rubber	0	0	354	93	87	50	1,211	8	154	0
Nonmetallic mineral	268	0	38	244	313	0	0	0	16	100
Metal	405	0	2,223	142	2,491	7	27,188	7	4,303	7
Machinery	14,087	0	102,104	387	54,879	0	33,464	41	3,343	0
Transport equipment	636	0	93,158	0	112,799	0	10,756	0	21	0
Other manufacturing	345	56	3,818	113	2,312	0	18,962	0	4,566	12
TOTAL	21,219	1,089	215,775	38,902	180,415	362	103,539	42,449	16,778	239

Table 14 (Concluded). Pattern of Trade in Manufactured Products between Japan and the Five Asian Countries (1), 1985

(In US\$1,000)

4. Capital Product										
Food	0	0	0	0	0	0	0	0	0	0
Textile	104	7	521	2,933	741	8	89	6	2	1,421
Lumber	0	398	11	5,855	10	212	1,847	494	352	2,084
Pulp	0	0	0	0	215	0	0	0	21	0
Chemical	0	0	0	0	17	0	0	0	103	0
Petroleum	0	0	0	0	0	0	0	0	0	0
Rubber	0	0	0	0	0	0	168	0	1,501	0
Nonmetallic mineral	387	0	0	0	1,907	0	3,090	0	4,703	0
Metal	12,640	25	5,951	1,663	27,416	79	31,550	211	55,100	325
Machinery	376,236	76	1,263,852	87,986	590,159	2,633	329,490	35,621	476,801	1,677
Transport equipment	43,277	10	81,521	52	80,269	11	120,291	148	194,633	11
Other manufacturing	43,468	2,577	164,970	8,822	23,418	2,646	34,388	3,825	19,819	292
TOTAL	476,112	3,093	1,516,826	107,313	724,152	5,581	520,913	40,303	753,037	5,810
5. Aggregate Product										
Food	10,812	39,599	32,307	358,883	31,444	99,380	28,979	27,313	31,694	257,287
Textile	41,193	12,029	419,073	916,742	59,208	18,525	131,891	6,187	74,865	35,611
Lumber	369	131,952	4,195	42,549	2,761	76,150	8,449	7,719	655	16,676
Pulp	13,571	1,013	61,637	6,705	51,210	136	50,349	1,923	21,097	75
Chemical	145,628	10,183	990,162	151,393	141,553	52,246	131,726	118,299	273,408	11,699
Petroleum	13,982	747,110	182,122	514,436	5,996	67,645	7,385	990,606	10,332	226
Rubber	20,591	35,085	31,340	25,109	16,218	96,580	27,291	1,007	12,323	258,706
Nonmetallic mineral	110,027	557	145,336	120,778	55,481	603	76,741	2,387	19,043	44,333
Metal	562,124	334,229	1,047,328	426,399	526,849	164,256	466,226	41,322	464,648	67,234
Machinery	728,247	526	2,881,166	425,597	1,127,654	53,697	1,160,344	157,767	706,191	52,553
Transport equipment	328,041	42	337,393	5,721	716,332	48	189,012	5,059	324,060	1,227
Other manufacturing	95,865	9,054	450,972	239,474	97,604	7,718	207,792	34,432	62,681	16,556
TOTAL	2,272,450	1,321,379	6,583,031	3,233,785	1,201,126	636,984	2,486,685	1,394,021	2,000,997	762,183

Source: Asian International Input-Output Tables 1985, Institute of Developing Economies.

Table 15 (Concluded). Patterns of Trade in Manufactured Products between Japan and the Five Asian Countries, 1985

(In percent)

4. Capital product										
Food	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Textile	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.24
Lumber	0.00	0.13	0.00	0.05	0.00	0.04	0.00	0.01	0.00	0.36
Pulp	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chemical	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Petroleum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rubber	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nonmetallic mineral	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Metal	0.03	0.01	0.00	0.02	0.04	0.01	0.06	0.01	0.07	0.06
Machinery	0.79	0.02	0.83	0.82	0.81	0.47	0.63	0.88	0.63	0.29
Transport equipment	0.09	0.00	0.05	0.00	0.11	0.00	0.23	0.00	0.26	0.00
Other manufacturing	0.09	0.83	0.11	0.08	0.03	0.47	0.07	0.09	0.03	0.05
TOTAL	1.00									
5. Aggregate product										
Food	0.00	0.03	0.00	0.11	0.03	0.16	0.01	0.02	0.02	0.34
Textile	0.02	0.01	0.06	0.28	0.05	0.03	0.05	0.00	0.04	0.05
Lumber	0.00	0.10	0.00	0.01	0.00	0.12	0.00	0.01	0.00	0.02
Pulp	0.01	0.00	0.01	0.00	0.04	0.00	0.02	0.00	0.01	0.00
Chemical	0.15	0.01	0.15	0.05	0.12	0.08	0.05	0.08	0.14	0.02
Petroleum	0.01	0.57	0.03	0.16	0.00	0.11	0.00	0.71	0.01	0.00
Rubber	0.01	0.03	0.00	0.01	0.01	0.15	0.01	0.00	0.01	0.34
Nonmetallic mineral	0.03	0.00	0.02	0.04	0.05	0.00	0.03	0.00	0.01	0.06
Metal	0.25	0.25	0.16	0.13	0.44	0.26	0.19	0.03	0.23	0.09
Machinery	0.32	0.00	0.44	0.13	0.94	0.08	0.47	0.11	0.35	0.07
Transport equipment	0.14	0.00	0.05	0.00	0.60	0.00	0.08	0.00	0.16	0.00
Other manufacturing	0.04	0.01	0.07	0.07	0.08	0.01	0.08	0.02	0.03	0.02
TOTAL	1.00									

Source: Asian International Input-Output Table: 1985, Institute of Developing Economies.

considerably, from 38.1 percent to 29.6 percent, and from 56.5 percent to 27.2 percent, respectively.

In 1985, Japan's exports of private consumer products were concentrated in machinery products, which accounted for approximately 40 percent of total exports of manufactured private consumer products. In 1975, Japan's export shares were high for textile, chemical, machinery, and transport equipment products. Between 1975 and 1985, Japan's export shares of textile products declined especially for Korea, from 47 percent to 3.2 percent. Its export shares of chemical products declined for Malaysia and Thailand, but increased for Indonesia, and its export shares of transport equipment products declined with Malaysia and Thailand, but increased for Singapore.

Between 1975 and 1985, Japan increased its import shares of chemical private consumer products. From Malaysia and Singapore, Japan's import shares rose from 0.2 percent to 34.8 percent and from 6.9 percent to 38.1 percent, respectively, while its export shares of the same products declined, respectively, from 10.9 percent to 7.3 percent, and from 9.8 percent to 2.6 percent. In particular, Singapore even became a net exporter of chemical products to Japan. For the other three countries, Japan's imports of chemical intermediate inputs were higher than for private consumer products. Therefore, Japan actively developed the international division of labor with Indonesia, Korea, and Thailand at the different production stages, whereas with Malaysia and Singapore, it was developed at both the different intermediate and the final production stages.

Japan's export shares of private consumer machinery products with the five Asian countries expanded significantly and accounted for approximately 40 percent of total exports of private consumer products in 1985. In particular, Japan increased its exports to Malaysia and Thailand by decreasing its exports of transport equipment products, from 34.4 percent to 8.9 percent and from 29.6 percent to 14.5 percent, respectively.

The intra-industry indexes of intermediate inputs increased substantially for most of the twelve products over the period (Tables 9 and 16). Japan's indexes of chemical products increased significantly with Malaysia and Singapore since the increase in its imports was larger than of its exports. Its indexes of textile products expanded with Indonesia and Malaysia because imports increased more than exports. Japan's indexes of metal products with the five Asian countries increased, except with Malaysia where the increase in exports was much larger than for imports.

Japan's indexes with Korea were higher in both intermediate inputs and final products for most of the twelve products than with the other four countries, suggesting that the international division of labor had been developed more deeply with Korea than the other four countries. Furthermore, Japan's intra-industry trade indexes with Korea declined for textile private consumer products since its exports had declined and imports had increased substantially. By contrast, its indexes for textile

Table 16. Intra-Industry Indexes, 1985

Industry	Indonesia	Korea	Malaysia	Singapore	Thailand
1. Intermediate input					
Food	28.58	19.24	13.98	77.87	15.49
Textile	42.99	89.70	68.04	10.55	49.33
Lumber	0.32	20.33	4.11	49.17	3.83
Pulp	13.70	20.23	0.56	5.89	0.79
Chemical	5.92	26.40	54.73	93.42	8.58
Petroleum	3.69	52.37	13.03	1.64	3.52
Rubber	67.89	70.49	13.52	7.77	3.71
Nonmetallic mineral	1.02	82.09	1.89	6.66	45.03
Metal	76.49	58.10	50.67	18.72	28.78
Machinery	0.29	34.62	24.30	29.18	51.24
Transport equipment	0.01	6.51	0.00	48.62	2.35
Other manufacturing	17.23	30.42	12.92	54.55	17.53
2. Priv. Con. Product					
Food	92.03	10.81	32.30	55.11	39.72
Textile	79.82	2.15	4.88	6.27	98.28
Lumber	39.19	21.09	56.81	28.51	5.32
Pulp	0.48	15.63	0.30	14.80	0.00
Chemical	3.99	66.07	59.73	70.38	5.88
Petroleum	2.62	17.79	64.77	5.65	21.20
Rubber	0.00	22.27	54.75	5.66	0.62
Nonmetallic mineral	0.82	38.24	3.76	1.93	61.61
Metal	0.13	43.52	7.05	2.06	1.87
Machinery	0.03	59.16	2.36	15.45	0.19
Transport equipment	4.62	91.49	0.19	0.03	0.16
Other manufacturing	38.77	45.73	13.44	17.11	95.80
3. Gov. Con. product					
Food	0.00	0.00	0.00	0.00	
Textile	0.00	4.78	0.00	0.00	23.73
Lumber	0.00	22.37	0.00	0.00	0.00
Pulp	0.00	21.70	0.00	18.57	0.00
Chemical	0.00	0.27	0.90	0.00	0.00
Petroleum	4.00	41.02	24.53	0.07	0.00
Rubber		41.61	72.99	1.31	0.00
Nonmetallic mineral	0.00	26.95	0.00		27.59
Metal	0.00	12.01	0.56	0.05	0.32
Machinery	0.00	0.76	0.00	0.24	0.00
Transport equipment	0.00	0.00	0.00	0.00	0.00
Other manufacturing	27.93	5.75	0.00	0.00	0.52
4. Capital product					
Food					
Textile	12.61	30.15	0.00	8.60	0.28
Lumber	0.00	0.38	9.01	42.20	28.90
Pulp			0.00		0.00
Chemical			0.00		0.00
Petroleum					
Rubber				0.00	0.00
Nonmetallic mineral	0.00		0.00	0.00	0.00
Metal	0.39	43.68	0.57	1.33	1.17
Machinery	0.04	13.02	0.89	19.51	0.70
Transport equipment	0.05	0.13	0.03	0.25	0.01
Other manufacturing	11.19	10.15	20.30	20.02	2.90

Source: Asian International Input-Output Table: 1985, Institute of Developing Economies.

intermediate inputs remained the same since the increase in exports and imports was more or less similar. These results suggest that Japan had lost its comparative advantage over Korea in textile final products. By contrast, Japan maintained a comparative advantage in textile intermediate inputs by increasing the international division of labor with Korea at the different production stages.

c. Summary

To summarize, between 1975 and 1985, industrialization progressed in the five Pacific Basin countries and brought about a change in Japan's trade structure with them. In particular, Japan's import shares of manufactured products from these countries increased substantially, expanding intra-industry trade. Japan's inter-industry trade with Indonesia and Malaysia remained dominant since a large part of its import shares were concentrated on primary products and its export shares on manufactured products. However, as industrialization progressed in the two countries, Japan's imports of manufactured products increased significantly. In particular, Japan increased imports of intermediate inputs, with the result that the intra-industry indexes in manufactured intermediate inputs expanded between Japan and Indonesia and Malaysia. Thus, as industrialization took the international division of labor between Japan and the five Asian countries deepened through the process of dividing and relocating the production of intermediate inputs across several different countries.

Although Japan remained a substantial net exporter of capital-intensive manufactured products and a large net importer of labor- or natural resource-intensive manufactured products, its export and import structures shifted between 1975 and 1985. The import structure, in particular, underwent considerable change. Specifically, a concentration was observed in Japan's exports of machinery products in intermediate inputs and capital products, while its imports of intermediate inputs increased for metal products from Indonesia and Korea, and for rubber products from Malaysia and Thailand. Japan's imports of private consumer products also expanded for chemical products from Malaysia and Singapore. As a result, Japan's intra-industry trade indexes for these products increased to a considerable degree.

While Japan moved up the economic ladder by producing and exporting more sophisticated products, the five Asian countries shifted their exports from primary to manufactured products, and gradually from light or capital-intensive to more advanced or capital-intensive manufactured products. In fact, this sequential industrialization pattern has evolved remarkably smoothly over the past twenty-five years (the World Bank (1994b)). The World Bank publication points out on page 29 that "By moving to higher rungs, each economy left lower rungs of the ladder to less advanced economies. And countries all along the ladder have been able to upgrade their manufacturing relatively free of market constraints--as fast as their investment in technology and capital would permit."

IV. Import-Export Trade Structures of Japan's Manufacturing Industries

This section undertakes an overview of the trends in import-export trade of Japan's manufacturing industries in 1975 and 1985. It covers intermediate inputs imported by the Japanese manufacturing industries and manufactured intermediate inputs exported by them to the five Asian countries. Thus, subsection 1 focuses on trade flows of intermediate inputs produced by the manufacturing and nonmanufacturing industries in the five Asian countries and imported by the Japanese manufacturing industries. These trade flows have input relationships to the Japanese manufacturing industries. Subsection 2 analyzes trade flows of manufactured intermediate inputs produced by the Japanese manufacturing industries and exported to the manufacturing and nonmanufacturing industries in the five Asian countries. These trade flows have output relationships to the Japanese manufacturing industries.

The analysis presented here examines how the Japanese manufacturing industries increased their dependency on intermediate inputs produced by the manufacturing industries in the five Asian countries. It also examines how the Japanese manufacturing industries shifted the composition of their export products to the Asian industries (or, equivalently, how the Asian industries increased their dependency on intermediate inputs produced by Japan). An increase in trade flows reflects a greater international division of labor, achieved by subdividing the production process of a manufactured final product into a large number of distinct operations (Ethier (1979) and (1982)). This so-called "international" returns to scale is closely related to the behavior of multi-national corporations (MNCs) granting FDI.

1. Structure of import trade

In 1975 Japan's twelve manufacturing industries in the aggregate (hereafter called the Japanese aggregate manufacturing industry) imported mainly primary products from Indonesia and large amounts of manufactured intermediate products from the other four countries. Products from the latter countries included mainly petroleum products from Indonesia and Singapore, textiles from Korea, metals from Malaysia, and food products from Thailand (Tables 17-18). By 1985, the composition of trade between the Japanese aggregate industry and the five Asian countries mirrored the progression of industrialization in these countries--shifting toward more the production of more capital-intensive products, particularly in the areas where countries had gained a comparative advantage (Tables 19-21).

a. Import trade--1975

Imports of primary products accounted for 89 percent of Japan's total imports of intermediate inputs from Indonesia (Table 17). The Japanese manufacturing industries that imported substantial amounts of primary intermediate imports from Indonesia and their shares in total imports were: the food (46 percent), lumber (59 percent), metal (69 percent),

Table 17. Import Structure of Twelve Japanese Manufacturing Industries (1), 1975

(In percent)

	Food	Textile	Lumber	Pulp	Chemicals	Petroleum	Rubber	Nonmetallic	Metal	Machinery	Transport	Other	TOTAL
Indonesia													
Primary	0.46	0.14	0.59	0.63	0.14	0.99	0.06	0.04	0.69	0.00	0.00	0.26	0.89
Secondary	0.37	0.68	0.00	0.34	0.79	0.01	0.81	0.93	0.25	0.75	0.84	0.51	0.05
Tertiary	0.17	0.18	0.40	0.28	0.07	0.00	0.13	0.03	0.07	0.25	0.16	0.23	0.06
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Korea													
Primary	0.39	0.03	0.24	0.01	0.03	0.53	0.01	0.26	0.23	0.00	0.00	0.09	0.11
Secondary	0.33	0.87	0.46	0.72	0.65	0.22	0.84	0.47	0.39	0.82	0.78	0.62	0.69
Tertiary	0.28	0.10	0.31	0.28	0.31	0.25	0.15	0.27	0.38	0.18	0.22	0.29	0.20
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Malaysia													
Primary	0.10	0.03	0.33	0.00	0.00	0.14	0.02	0.07	0.13	0.00	0.00	0.04	0.07
Secondary	0.75	0.89	0.50	0.82	0.95	0.52	0.93	0.75	0.81	0.93	0.93	0.80	0.86
Tertiary	0.16	0.08	0.17	0.18	0.05	0.34	0.05	0.18	0.06	0.07	0.07	0.17	0.08
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Singapore													
Primary	0.03	0.02	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Secondary	0.77	0.75	0.62	0.81	0.88	0.88	0.84	0.89	0.84	0.85	0.83	0.82	0.85
Tertiary	0.20	0.23	0.21	0.19	0.12	0.11	0.16	0.11	0.16	0.15	0.17	0.17	0.14
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Thailand													
Primary	0.31	0.06	0.73	0.29	0.18	0.44	0.06	0.60	0.11	0.01	0.00	0.23	0.25
Secondary	0.53	0.62	0.15	0.47	0.52	0.21	0.60	0.04	0.76	0.85	0.89	0.61	0.55
Tertiary	0.17	0.32	0.13	0.24	0.30	0.35	0.34	0.36	0.13	0.14	0.11	0.16	0.21
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Source: Asian International Input-Output Table: 1975, Institute of Developing Economies.

Table 18. Import Structure of Twelve Japanese Manufacturing Industries (2), 1975

(In percent)

	Food	Textile	Lumber	Pulp	Chemicals	Petroleum	Rubber	Nonmetallic	Metal	Machinery	Transport	Other	TOTAL
Indonesia													
Primary	0.01	0.00	0.08	0.00	0.00	0.88	0.00	0.00	0.03	0.00	0.00	0.00	1.00
Secondary	0.10	0.04	0.01	0.02	0.30	0.14	0.01	0.07	0.20	0.08	0.02	0.02	1.00
Tertiary	0.04	0.01	0.79	0.01	0.03	0.03	0.00	0.00	0.05	0.02	0.00	0.01	1.00
Total	0.01	0.00	0.11	0.00	0.02	0.79	0.00	0.00	0.04	0.01	0.00	0.00	1.00
Korea													
Primary	0.39	0.10	0.06	0.00	0.02	0.20	0.00	0.04	0.16	0.00	0.00	0.03	1.00
Secondary	0.05	0.47	0.02	0.05	0.05	0.01	0.02	0.01	0.04	0.19	0.04	0.04	1.00
Tertiary	0.15	0.18	0.04	0.07	0.08	0.05	0.01	0.02	0.15	0.14	0.04	0.06	1.00
Total	0.11	0.37	0.03	0.05	0.05	0.04	0.02	0.02	0.08	0.16	0.04	0.04	1.00
Malaysia													
Primary	0.08	0.04	0.09	0.00	0.01	0.02	0.01	0.01	0.74	0.00	0.00	0.01	1.00
Secondary	0.05	0.08	0.01	0.06	0.16	0.00	0.02	0.01	0.35	0.20	0.05	0.02	1.00
Tertiary	0.11	0.07	0.04	0.14	0.09	0.03	0.01	0.02	0.27	0.15	0.04	0.04	1.00
Total	0.05	0.07	0.02	0.06	0.15	0.01	0.02	0.01	0.37	0.18	0.04	0.02	1.00
Singapore													
Primary	0.22	0.11	0.50	0.01	0.01	0.10	0.00	0.02	0.00	0.00	0.00	0.02	1.00
Secondary	0.05	0.04	0.02	0.03	0.33	0.17	0.01	0.08	0.12	0.10	0.03	0.03	1.00
Tertiary	0.08	0.07	0.03	0.04	0.26	0.13	0.01	0.06	0.14	0.11	0.04	0.04	1.00
Total	0.06	0.04	0.02	0.03	0.32	0.16	0.01	0.08	0.12	0.10	0.03	0.03	1.00
Thailand													
Primary	0.80	0.05	0.04	0.00	0.02	0.00	0.01	0.06	0.02	0.00	0.00	0.01	1.00
Secondary	0.62	0.21	0.00	0.00	0.02	0.00	0.04	0.00	0.06	0.03	0.00	0.01	1.00
Tertiary	0.51	0.29	0.01	0.00	0.04	0.00	0.06	0.05	0.03	0.01	0.00	0.01	1.00
Total	0.64	0.19	0.01	0.00	0.03	0.00	0.03	0.03	0.04	0.02	0.00	0.01	1.00
TOTAL	0.18	0.07	0.09	0.01	0.04	0.43	0.01	0.01	0.10	0.03	0.01	0.01	1.00

Source: Asian International Input-Output Table: 1975, Institute of Developing Economies.

petroleum (99 percent), and pulp (63 percent) industries. Of the primary intermediate imports from Indonesia, the Japanese petroleum industry imported 88 percent, mostly petroleum and natural gas (Table 18). The industry's high imports were closely related to Japan's FDI, which actively supported resource acquisition in Indonesia.

By contrast, more than 55 percent of total imports by the Japanese aggregate manufacturing industry from the other four countries consisted of manufactured intermediate products. The aggregate industry's import shares were particularly high for Malaysia (accounting for 86 percent) and for Singapore (accounting for 85 percent).

Broken down by Japanese manufacturing industry, the major importers of manufactured intermediate inputs were: the chemical industry, which imported mainly petroleum products from Indonesia (30 percent) and Singapore (33 percent); the textile industry, which imported textile products from Korea (47 percent); the metal industry, which imported metal products from Malaysia (35 percent); and the food industry imported food products from Thailand (62 percent).

b. Import trade--1975 and 1985

Between 1975 and 1985, the Japanese aggregate manufacturing industry increased its imports of manufactured intermediate inputs from the Asian countries, with the exception of imports from Malaysia. On a country basis, the shares of imports of manufactured intermediate inputs in total imports from Indonesia rose from 5 percent to 16 percent, for Korea from 69 percent to 78 percent, for Singapore from 85 percent to 95 percent, and for Thailand from 55 percent to 79 percent (Tables 17 and 19). In 1985, the aggregate industry mainly imported petroleum and metal products from Indonesia, metal products from Korea, petroleum products from Singapore, and rubber products from Thailand. By contrast, from Malaysia, the industry increased its share of imports of primary intermediate inputs in total imports from 7 percent to 73 percent.

The Japanese petroleum manufacturing industry remained the largest importer of the sum of primary, secondary and tertiary intermediate products and services supplied by the five Asian countries, with an import share of 38 percent (Table 20). The industry accounted for 86 percent of imports of primary intermediate inputs from Indonesia and 55 percent from Malaysia.

Replacing the Japanese food manufacturing industry, the Japanese metal manufacturing industry became the second largest importer of total intermediate products and services supplied by the five Asian countries; its import share increased from 10 percent to 15 percent (Tables 18 and 20). The industry accounted for a substantial amount of imports of manufactured intermediate inputs, mainly metal products: 40 percent from Indonesia, 20 percent from Korea, and 27 percent from Malaysia.

Imports by the four other major Japanese manufacturing industries continued to grow. The Japanese machinery and textile manufacturing

Table 19. Import Structure of Twelve Japanese Manufacturing Industries (1), 1985

(In percent)

	Food	Textile	Lumber	Pulp	Chemicals	Petroleum	Rubber	Nonmetallic	Metal	Machinery	Transport	Other	TOTAL
Indonesia													
Primary	0.58	0.01	0.50	0.01	0.27	0.99	0.00	0.52	0.37	0.02	0.19	0.48	0.79
Secondary	0.13	0.85	0.23	0.81	0.62	0.01	0.81	0.38	0.53	0.78	0.62	0.22	0.16
Tertiary	0.29	0.14	0.27	0.18	0.11	0.00	0.19	0.09	0.10	0.20	0.19	0.30	0.05
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Korea													
Primary	0.39	0.04	0.27	0.06	0.15	0.00	0.00	0.30	0.01	0.00	0.00	0.07	0.13
Secondary	0.43	0.92	0.59	0.71	0.80	0.95	0.87	0.57	0.92	0.92	0.92	0.86	0.78
Tertiary	0.18	0.04	0.14	0.23	0.05	0.05	0.13	0.14	0.06	0.08	0.08	0.07	0.09
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Malaysia													
Primary	0.26	0.00	0.90	0.05	0.36	0.99	0.00	0.66	0.35	0.00	0.05	0.18	0.73
Secondary	0.66	0.87	0.01	0.71	0.53	0.00	0.94	0.17	0.60	0.79	0.46	0.60	0.21
Tertiary	0.08	0.13	0.09	0.24	0.11	0.00	0.06	0.17	0.05	0.20	0.49	0.22	0.06
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Singapore													
Primary	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.01	0.00
Secondary	0.88	0.92	0.58	0.94	0.99	0.99	0.59	0.82	0.86	0.88	0.89	0.94	0.95
Tertiary	0.09	0.06	0.42	0.06	0.01	0.01	0.41	0.12	0.14	0.12	0.11	0.06	0.05
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Thailand													
Primary	0.44	0.17	0.17	0.36	0.21	0.25	0.00	0.22	0.08	0.02	0.01	0.19	0.19
Secondary	0.53	0.82	0.77	0.39	0.75	0.65	1.00	0.71	0.90	0.93	0.95	0.78	0.79
Tertiary	0.03	0.01	0.05	0.24	0.04	0.10	0.00	0.07	0.02	0.06	0.05	0.03	0.02
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Source: Asian International Input-Output Table: 1985, Institute of Developing Economies.

Table 20. Import Structure of Twelve Japanese Manufacturing Industries (2), 1985

(In percent)

	Food	Textile	Lumber	Pulp	Chemicals	Petroleum	Rubber	Nonmetallic	Metal	Machinery	Transport	Other	TOTAL
Indonesia													
Primary	0.04	0.00	0.01	0.00	0.03	0.86	0.00	0.01	0.06	0.00	0.00	0.00	1.00
Secondary	0.05	0.04	0.01	0.06	0.29	0.05	0.04	0.02	0.40	0.04	0.00	0.00	1.00
Tertiary	0.33	0.02	0.05	0.04	0.17	0.04	0.03	0.01	0.25	0.03	0.00	0.02	1.00
Total	0.06	0.01	0.01	0.01	0.08	0.69	0.01	0.01	0.12	0.01	0.00	0.00	1.00
Korea													
Primary	0.65	0.06	0.02	0.00	0.15	0.00	0.00	0.08	0.01	0.00	0.00	0.03	1.00
Secondary	0.11	0.21	0.01	0.00	0.13	0.01	0.00	0.02	0.20	0.21	0.04	0.06	1.00
Tertiary	0.42	0.07	0.01	0.01	0.08	0.01	0.00	0.05	0.12	0.15	0.03	0.04	1.00
Total	0.21	0.18	0.01	0.00	0.13	0.01	0.00	0.03	0.17	0.17	0.03	0.05	1.00
Malaysia													
Primary	0.02	0.00	0.36	0.00	0.02	0.55	0.00	0.00	0.05	0.00	0.00	0.00	1.00
Secondary	0.19	0.04	0.02	0.02	0.10	0.01	0.17	0.00	0.27	0.15	0.01	0.02	1.00
Tertiary	0.08	0.02	0.47	0.02	0.07	0.02	0.04	0.02	0.08	0.13	0.02	0.02	1.00
Total	0.06	0.01	0.30	0.01	0.04	0.40	0.04	0.01	0.09	0.04	0.00	0.01	1.00
Singapore													
Primary	0.30	0.07	0.00	0.02	0.26	0.00	0.00	0.24	0.02	0.03	0.00	0.06	1.00
Secondary	0.04	0.02	0.00	0.04	0.60	0.05	0.00	0.01	0.06	0.12	0.03	0.04	1.00
Tertiary	0.08	0.03	0.02	0.05	0.12	0.01	0.01	0.04	0.19	0.34	0.07	0.05	1.00
Total	0.04	0.02	0.00	0.04	0.57	0.05	0.00	0.02	0.06	0.13	0.03	0.04	1.00
Thailand													
Primary	0.82	0.03	0.01	0.00	0.04	0.00	0.00	0.03	0.04	0.01	0.00	0.02	1.00
Secondary	0.24	0.04	0.01	0.00	0.04	0.00	0.41	0.02	0.11	0.08	0.03	0.02	1.00
Tertiary	0.42	0.02	0.03	0.02	0.07	0.00	0.00	0.08	0.10	0.18	0.06	0.03	1.00
Total	0.35	0.04	0.01	0.00	0.04	0.00	0.33	0.02	0.09	0.07	0.03	0.02	1.00
TOTAL	0.11	0.04	0.07	0.01	0.11	0.73	0.03	0.01	0.15	0.06	0.01	0.02	1.00

Source: Asian International Input-Output Table: 1985, Institute of Developing Economies.

industries were the two largest importers of manufactured intermediate inputs; their import shares accounted for 21 percent, respectively (Table 20). The Japanese chemical manufacturing industry remained the largest importer of manufactured inputs from Singapore, importing mainly petroleum products. The Japanese rubber manufacturing industry became the largest importer of manufactured inputs from Thailand mainly of rubber products, increasing from 4 percent to 41 percent.

We now focus on imports of manufactured intermediate inputs from the five Asian countries, and set the import share of total intermediate inputs at one hundred. Figure 1 shows changes in the import shares of manufactured intermediate inputs by the Japanese aggregate manufacturing industry between 1975 and 1985. It shows that the Japanese aggregate manufacturing industry increased the import shares of metal products, from Indonesia by 23 percent, and from Korea by 17 percent (Table 21). In turn, the Japanese aggregate manufacturing industry decreased the import share of petroleum products from Indonesia by 15 percent, and of textile products from Korea by 25 percent. From Thailand, the Japanese aggregate manufacturing industry increased the import share of rubber products by 20 percent but decreased that of food products by 36 percent. From Malaysia, it increased the import shares of chemical, petroleum, and transport equipment products respectively by 7 percent, 6 percent, and 6 percent, but decreased the share of metal products by 25 percent.

The Japanese metal and machinery industries in particular increased their import shares of metal products from Indonesia by 40 percent and 25 percent, respectively. Also, the Japanese metal and transport equipment industries increased import shares of metal products from Korea by 28 percent and 42 percent, respectively. The Japanese chemical industry increased the import share of Malaysian chemical products by 56 percent.

We now analyze some selected Japanese manufacturing industries to see how the industries shifted their import structures between 1975 and 1985. The Japanese textile manufacturing industry showed a clear shift in its import shares of rubber to textile products (Figure 2). Its import shares increased largely for Malaysia and Thailand, by 82 percent and 63 percent, respectively. These numbers suggest strong development of the textile industry in these countries.

From Indonesia, Korea, and Singapore, the Japanese metal industry clearly shifted its imports from petroleum to metal products (Figure 4). The shift was notably large for imports from Singapore; the metal industry increased its imports of metal products by 67 percent and reduced its petroleum products by 66 percent.

The Japanese rubber industry shifted its imports of rubber from Korea and Singapore to chemical products (Figure 3). It increased imports of chemical products from the two countries by 29 percent and 22 percent, respectively, and reduced rubber products by 18 percent and 27 percent, respectively. From Indonesia, the Japanese rubber industry increased its

Table 21. Changes in Manufactured Import Shares of Twelve Japanese Manufacturing Industries, 1975-85

(In percent)

	Food	Textile	Lumber	Pulp	Chemical	Petroleum	Rubber	Nonmetallic	Metal	Machinery	Transport	Other	TOTAL
Indonesia													
Food	-0.03	0.10	0.00	0.00	-0.24	-0.01	0.00	0.00	-0.00	0.00	0.00	-0.00	-0.11
Textile	-0.00	0.22	-0.02	-0.01	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.01	-0.07	0.01
Lumber	0.00	0.00	0.77	-0.05	0.00	0.00	0.00	0.00	0.00	-0.00	0.00	0.13	0.02
Pulp	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chemical	0.01	-0.01	-0.12	-0.03	0.01	-0.00	-0.03	-0.00	-0.00	-0.00	-0.01	-0.04	-0.00
Petroleum	0.02	0.24	-0.59	0.11	0.26	0.02	-0.27	0.01	-0.40	-0.23	0.57	0.14	-0.15
Rubber	-0.00	-0.57	-0.01	-0.01	-0.00	-0.00	0.30	-0.00	-0.00	-0.02	-0.44	0.02	-0.00
Nonmetallic	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
Metal	-0.00	-0.00	-0.06	-0.04	-0.02	0.00	0.00	-0.02	0.40	0.25	-0.15	-0.22	0.23
Machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	0.00	-0.00
Transport	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.02	0.01	-0.00	0.00	0.00	-0.00	0.00	0.00	0.00	0.04	0.04	0.00
Korea													
Food	0.15	-0.05	0.00	0.00	-0.03	-0.00	0.00	0.00	0.00	0.00	0.00	-0.02	0.04
Textile	-0.02	0.07	-0.18	0.06	-0.04	-0.01	-0.28	-0.11	-0.07	-0.01	-0.06	-0.34	-0.25
Lumber	-0.00	0.00	0.27	-0.84	-0.00	-0.00	0.00	-0.00	-0.01	-0.01	0.00	-0.04	-0.05
Pulp	-0.00	-0.00	-0.01	0.31	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	-0.01	-0.00
Chemical	-0.06	0.03	-0.14	0.26	-0.23	-0.16	0.29	-0.06	-0.01	-0.00	-0.01	0.46	0.03
Petroleum	-0.01	0.01	0.00	0.14	0.36	0.21	0.06	-0.35	-0.13	0.00	0.05	-0.01	0.07
Rubber	-0.01	-0.06	-0.00	-0.00	-0.04	-0.00	-0.18	-0.01	-0.01	-0.01	-0.16	-0.01	-0.05
Nonmetallic	-0.01	0.00	0.04	0.05	0.00	-0.00	0.08	0.56	-0.03	0.01	-0.00	-0.00	0.03
Metal	-0.03	-0.00	0.03	0.00	-0.01	-0.00	0.03	-0.02	0.28	0.04	0.42	-0.01	0.18
Machinery	0.00	0.00	0.00	0.00	-0.00	-0.00	0.00	-0.01	-0.01	-0.01	-0.30	0.04	0.00
Transport	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00
Other	-0.01	0.00	-0.00	0.02	-0.01	-0.01	-0.01	0.00	-0.00	-0.01	-0.02	-0.07	-0.00
Malaysia													
Food	0.03	0.01	0.00	0.00	-0.80	-0.66	0.00	0.00	0.00	0.00	0.00	-0.00	0.01
Textile	0.00	0.82	-0.00	-0.00	-0.00	0.00	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	0.03
Lumber	-0.00	0.00	0.15	-0.25	-0.00	-0.00	0.00	0.07	0.00	-0.01	0.02	0.04	-0.03
Pulp	0.00	0.00	-0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	0.00
Chemical	0.01	0.06	-0.00	0.09	0.56	-0.02	-0.00	0.25	0.00	0.02	0.06	0.22	0.07
Petroleum	0.01	0.04	-0.00	0.19	0.40	0.69	-0.00	0.47	0.01	0.01	0.13	0.04	0.06
Rubber	-0.02	-0.93	-0.03	-0.01	-0.03	-0.01	0.00	-0.04	-0.00	-0.01	0.07	0.00	0.04
Nonmetallic	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.01	0.00
Metal	-0.01	-0.01	-0.12	-0.03	-0.14	-0.00	0.00	-0.80	-0.01	-0.49	-0.23	-0.74	-0.25
Machinery	0.00	0.00	0.00	0.00	-0.00	0.00	0.00	-0.01	-0.00	0.49	0.05	0.19	0.07
Transport	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	-0.00	0.26	0.00

Table 21 (Concluded). Changes in Manufactured Import Shares of Twelve Japanese Manufacturing Industries, 1975-85

(In percent)

Singapore													
Food	0.51	-0.06	0.00	0.00	-0.01	-0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.01
Textile	0.00	-0.03	-0.00	-0.00	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.01
Lumber	0.00	0.00	0.68	-0.30	-0.00	0.00	0.00	0.01	0.00	-0.00	0.00	0.01	-0.01
Pulp	-0.00	-0.00	-0.00	-0.02	-0.00	0.00	0.00	-0.00	-0.00	-0.00	0.00	-0.00	-0.00
Chemical	-0.14	-0.13	-0.56	-0.16	-0.13	-0.04	0.22	-0.01	-0.01	-0.01	-0.09	-0.16	-0.06
Petroleum	-0.33	0.39	-0.20	0.48	0.14	0.05	-0.11	-0.01	-0.66	-0.24	-0.08	-0.37	-0.02
Rubber	-0.00	-0.16	-0.00	-0.00	-0.00	0.00	-0.27	-0.00	-0.00	-0.00	-0.07	-0.00	-0.01
Nonmetallic	-0.01	0.00	0.01	0.00	-0.00	0.00	0.03	0.01	0.00	-0.00	0.03	0.01	0.00
Metal	-0.02	-0.01	0.01	-0.00	-0.00	-0.00	0.11	-0.00	0.67	-0.07	-0.12	-0.02	0.02
Machinery	0.00	0.00	0.06	0.00	-0.00	0.00	0.00	0.01	0.00	0.35	0.27	0.04	0.06
Transport	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00
Other	-0.00	-0.01	-0.00	-0.00	-0.00	-0.00	0.02	0.00	0.00	-0.02	-0.03	0.52	0.02
Thailand													
Food	-0.01	0.22	0.00	0.00	0.01	-0.21	0.00	0.00	-0.00	0.00	0.00	0.03	-0.37
Textile	-0.00	0.63	-0.37	-0.51	-0.01	0.03	-0.01	-0.12	-0.02	-0.01	-0.27	-0.14	0.00
Lumber	0.00	0.00	0.42	-0.05	-0.00	0.00	0.00	-0.04	-0.00	-0.01	-0.00	-0.04	0.01
Pulp	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	0.00
Chemical	0.01	0.01	0.01	0.15	0.14	-0.52	-0.00	-0.02	0.00	0.00	-0.01	0.07	0.01
Petroleum	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.00	0.70	0.00	0.00	0.00	0.00
Rubber	-0.00	-0.88	-0.04	0.03	-0.08	-0.24	0.01	-0.08	0.02	-0.03	0.01	0.38	0.21
Nonmetallic	0.00	0.00	0.08	0.34	0.09	0.60	0.00	0.70	0.09	0.05	0.02	0.05	0.04
Metal	-0.00	-0.00	-0.10	-0.12	-0.16	0.00	0.00	-0.44	-0.10	-0.66	-0.62	-0.29	0.02
Machinery	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.66	0.83	0.07	0.09
Transport	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00
Other	0.00	0.02	-0.00	0.02	-0.00	0.03	-0.00	0.00	0.00	-0.00	-0.02	-0.13	0.00

Source: Asian International Input-Output Table: 1975 and 1985, Institute of Developing Economies.

imports of rubber products by 30 percent and decreased petroleum products by 27 percent.

From Malaysia, Singapore, and Thailand, the Japanese machinery industry made a clear shift in its imports from metal to machinery products (Figure 5). The shift was substantial for Thailand with the industry increasing imports of their machinery products by 66 percent and reducing that of metal products by 66 percent.

The Japanese transport equipment industry increased its imports of machinery products from Singapore and Thailand, metal products from Korea, and petroleum products from Indonesia (Figure 6). The industry's increase in imports of machinery products from Korea was notably large and imports of metal products grew by 83 percent.

c. Summary

Between 1975 and 1985, the Japanese aggregate manufacturing industry continued to depend heavily on primary products imported from Indonesia, but by 1985 it had increased its dependence on products coming from Malaysia. The industry, typically the petroleum manufacturing industry, mainly imported petroleum and natural gas as raw materials for the production of its products. Meanwhile, the Japanese aggregate manufacturing industry, typically the chemical manufacturing industry, continued to import large amounts of petroleum intermediate inputs from Indonesia and from Singapore, which had developed a petroleum refinery system. Therefore, Japan's trade relations particularly with Indonesia, Malaysia, and Singapore were based on the comparative advantage each country had gained on the basis of relative factor endowments and technology.

On the other hand, the Japanese manufacturing industry increased its dependence on intermediate manufactured products produced by the five Asian countries, of more capital-intensive products, such as chemicals, machinery, and metals. Also, some Japanese industries increased imports of products produced by the same industry in the five Asian countries. For example, the Japanese textile industry increased its imports of textile products from Malaysia and Thailand, which in the 1980s had increased competitiveness in the textile industry. The Japanese metal industry increased its imports of metal products from Indonesia, Korea, and Singapore, and from Malaysia, Singapore, and Thailand, the Japanese machinery industry increased imports of machinery products. In particular, the machinery industries in Malaysia and Thailand were successfully developed and exports to the Japanese transport equipment industry correspondingly increased. These results suggest that the rapid pace of industrialization in the five Asian countries not only increased the dependence of the Japanese manufacturing industry on their capital-intensive manufactured products, but also enhanced the intra-industry international division of labor.

Figure 1. Changes in the Import Shares of Manufactured Intermediate Inputs by the Japanese Aggregate Manufacturing Industry, 1975 and 1985.

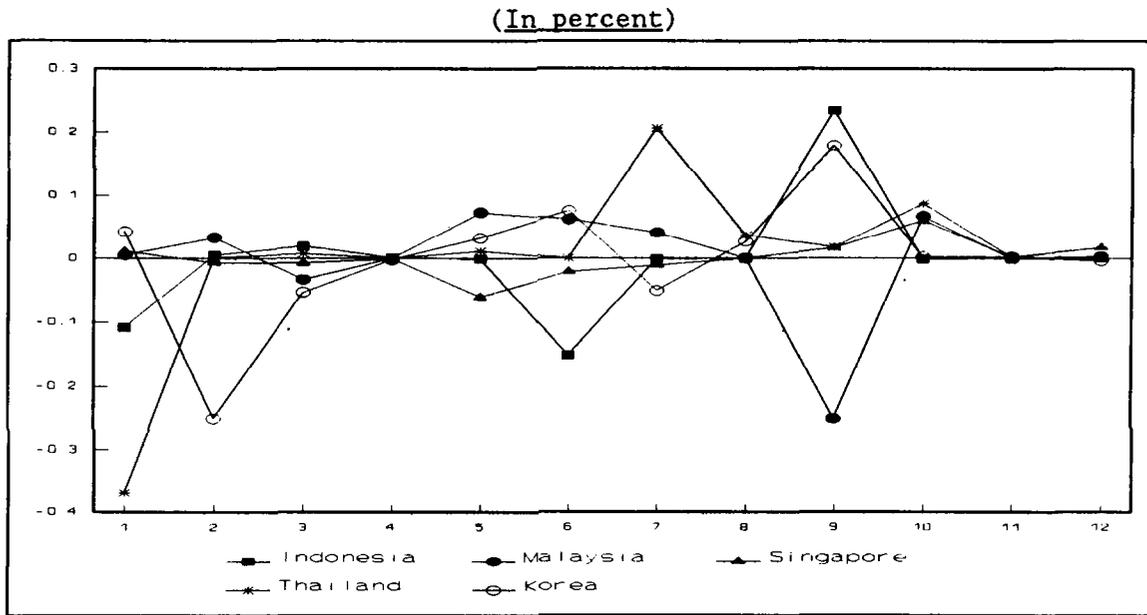
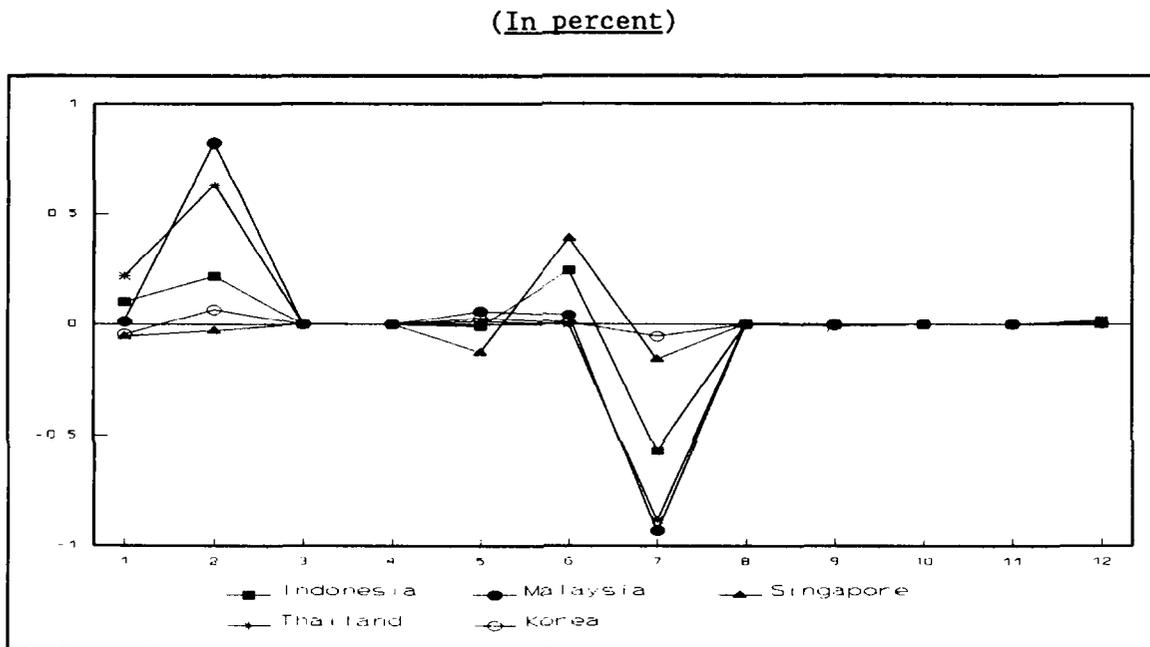


Figure 2. Changes in the Import Shares of Manufactured Intermediate Inputs by the Japanese Textile Industry, 1975 and 1985.



Source: Asian International Input-Output Table: 1975 and 1985, Institute of Developing Economies.

Figure 3. Changes in the Import Shares of Manufactured Intermediate Inputs by the Japanese Rubber Industry, 1975 and 1985.

(In percent)

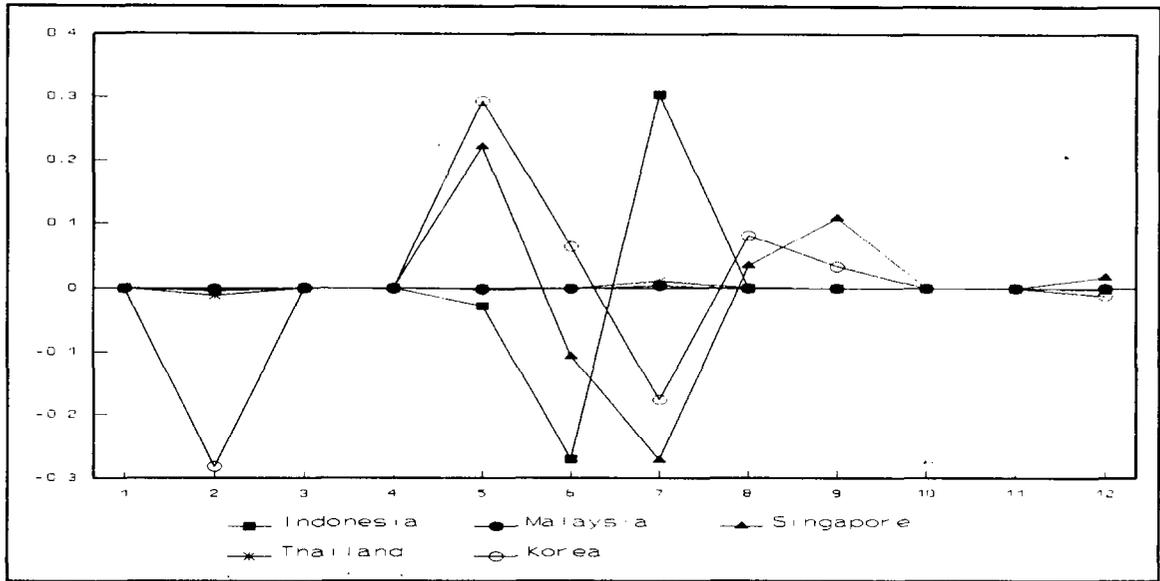
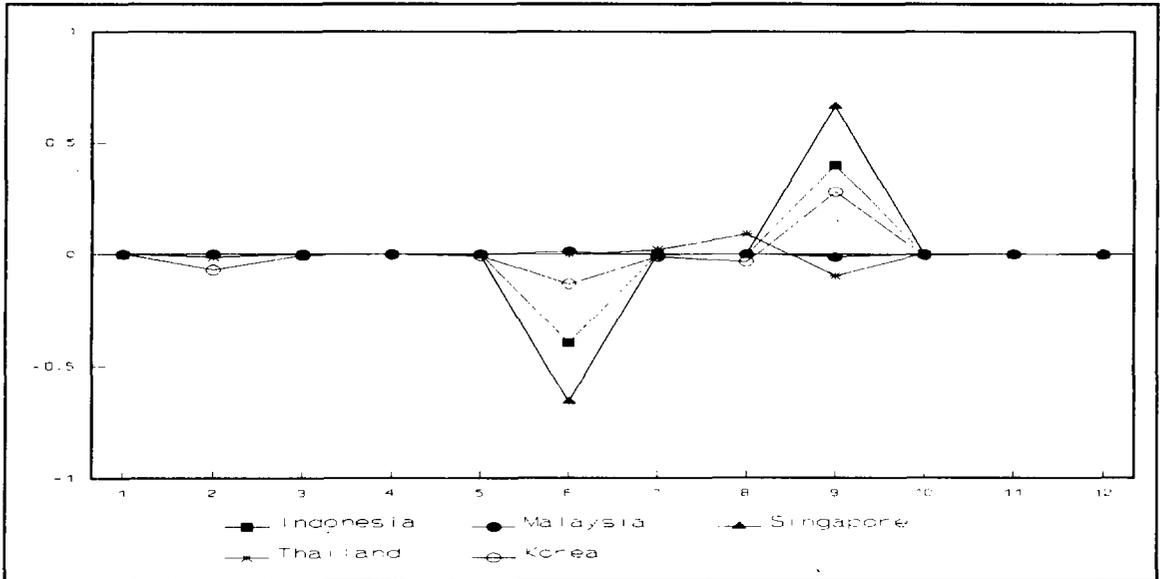


Figure 4. Changes in the Import Shares of Manufactured Intermediate Inputs by the Japanese Metal Industry, 1975 and 1985.

(In percent)



Source: Asian International Input-Output Table: 1975 and 1985, Institute of Developing Economies.

Figure 5. Changes in the Import Shares of Manufactured Intermediate Inputs by the Japanese Machinery Industry, 1975 and 1985.

(In percent)

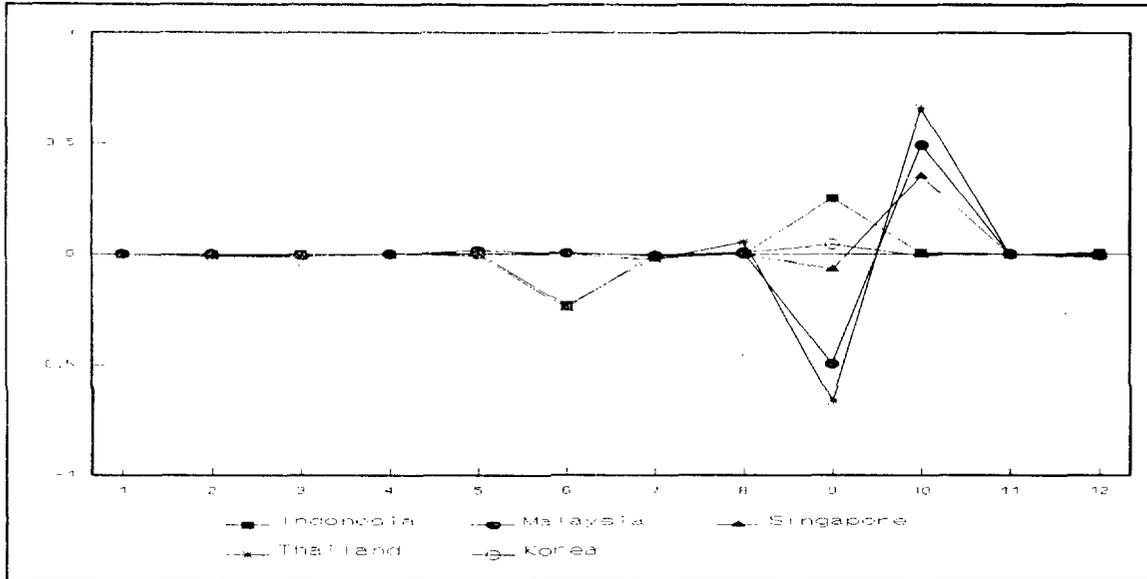
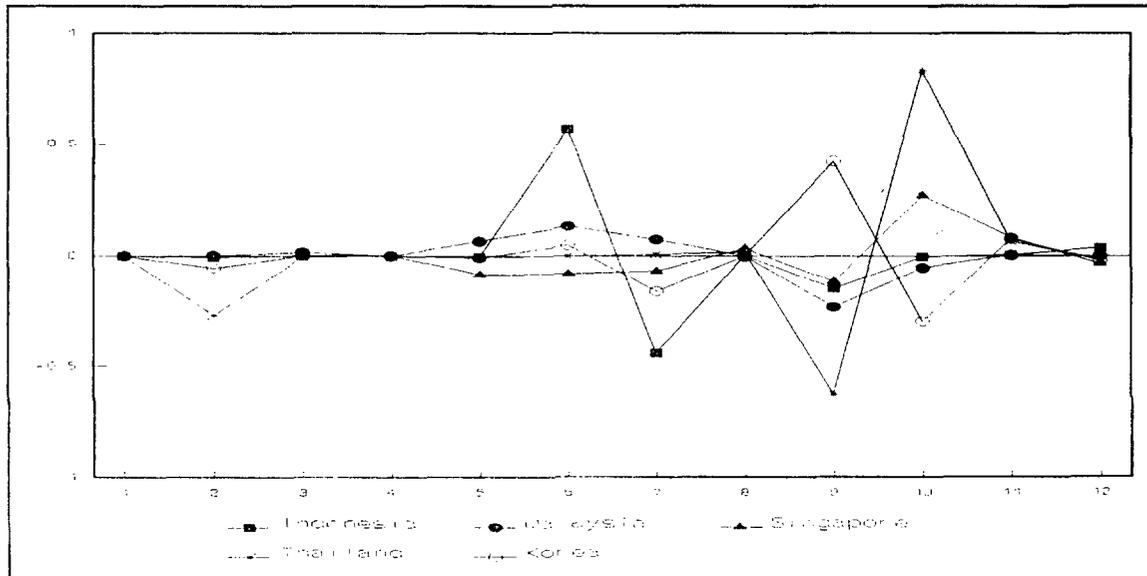


Figure 6. Changes in the Import Shares of Manufactured Intermediate Inputs by the Japanese Transport Equipment Industry, 1975 and 1985.

(In percent)



Source: Asian International Input-Output Table: 1975 and 1985, Institute of Developing Economies.

2. Structure of export trade

Between 1975 and 1985, the Japanese aggregate manufacturing industry continued to export more than 65 percent of its products to manufacturing industries in the five Asian countries (Tables 22 and 24). In particular, the industry exported more than 84 percent of its manufactured products to the Korean manufacturing industry in 1975 and 91 percent by 1985. The Japanese metal manufacturing industry was the largest exporter to the Asian countries in 1975, but by 1985, although still the largest, its export share had declined from 33 percent to 27 percent. The second largest exporter was the Japanese chemical industry in 1975, which was replaced by the machinery industry in 1985. The Japanese machinery industry became one of the largest exporters by 1985 and its export share increased from 12 percent to 27 percent. Tables 22 and 24 support the discussion in subsection a below and Tables 23, 25 and 26 refer to subsection b.

a. Export trade--1975

Of the twelve Japanese manufacturing industries, the metal manufacturing industry accounted for the largest share (33 percent) of total manufactured exports to the Asian countries (Table 23). In particular, the metal industry exported mainly to the manufacturing industries in Malaysia, Singapore, and Thailand, the industry's export shares accounting for 30 percent, 50 percent, and 30 percent of total exports to each country, respectively.

The Japanese chemical industry was the second largest exporter to the five Asian countries, with an export share of 24 percent of total manufactured exports. The industry was the largest exporter to the Korean manufacturing sector and had an export share of 35 percent of total exports to the country. More than half of these chemical products were purchased by the Korean chemical manufacturing industry.

The Japanese machinery and transport equipment manufacturing industries were also large exporters to the five Asian countries; their export shares accounted for 12 percent, respectively. The export share of the Japanese machinery manufacturing industry accounted for 8 to 14 percent of total exports to the manufacturing industries in the five Asian countries. The export share of the Japanese transport equipment industry was largest to the Indonesian manufacturing industry, accounting for 40 percent. In fact, the Indonesian transport equipment industry imported all of the products produced by the same Japanese industry.

b. Export trade--1975 and 1985

The Japanese aggregate manufacturing industry continued to export a large portion of its products to the Asian manufacturing industries (Tables 22 and 24). In particular, its exports to the Korean manufacturing industry, which was the largest market for Japanese manufactured products, increased from 84 percent to 91 percent in the ten-year period.

Table 24. Export Structure of Twelve Japanese Manufacturing Industries (1), 1985

(In percent)

	Food	Textile	Lumber	Pulp	Chemicals	Petroleum	Rubber	Nonmetallic	Metal	Machinery	Transport	Other	TOTAL
Indonesia													
Primary	0.06	0.00	0.00	0.00	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Secondary	0.83	0.98	0.66	0.87	0.86	0.46	0.48	0.07	0.39	0.76	0.99	0.72	0.66
Tertiary	0.12	0.02	0.34	0.13	0.06	0.53	0.52	0.93	0.61	0.24	0.01	0.28	0.33
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Korea													
Primary	0.06	0.00	0.00	0.00	0.00	0.11	0.01	0.00	0.00	0.00	0.02	0.00	0.01
Secondary	0.86	1.00	0.68	0.78	0.96	0.35	0.98	0.83	0.93	0.91	0.96	0.94	0.91
Tertiary	0.08	0.00	0.32	0.22	0.04	0.54	0.01	0.17	0.06	0.09	0.02	0.06	0.08
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Malaysia													
Primary	0.17	0.01	0.03	0.00	0.11	0.12	0.11	0.01	0.02	0.05	0.02	0.02	0.04
Secondary	0.73	0.88	0.42	0.82	0.81	0.22	0.31	0.42	0.48	0.70	0.86	0.62	0.68
Tertiary	0.10	0.10	0.55	0.18	0.08	0.66	0.58	0.57	0.50	0.25	0.12	0.36	0.28
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Singapore													
Primary	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.00
Secondary	0.61	0.81	0.85	0.76	0.86	0.97	0.57	0.39	0.52	0.93	0.28	0.63	0.75
Tertiary	0.37	0.19	0.15	0.24	0.13	0.03	0.41	0.60	0.48	0.07	0.71	0.36	0.25
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Thailand													
Primary	0.12	0.00	0.03	0.00	0.14	0.00	0.04	0.00	0.01	0.01	0.00	0.04	0.04
Secondary	0.16	0.99	0.30	0.79	0.79	0.09	0.81	0.30	0.67	0.81	0.79	0.64	0.73
Tertiary	0.72	0.01	0.67	0.21	0.07	0.90	0.16	0.70	0.32	0.18	0.21	0.32	0.22
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Source: Asian International Input-Output Table: 1985, Institute of Developing Economies.

By 1985, the Japanese machinery manufacturing industry became one of the largest exporters to the five Asian countries; the industry's export share in total exports increased from 12 percent to 27 percent. In particular, the industry's exports to the Korean and Singaporean manufacturing industries increased from 14 percent to 30 percent and from 18 percent to 54 percent, respectively (Tables 23 and 25). Although the Japanese metal manufacturing industry remained the largest exporter to the five Asian countries, the industry's export share declined from 33 percent to 27 percent in 1985. The industry's export share to the Thai manufacturing industry remained at around 35 percent.

The Japanese transport equipment manufacturing industry remained the largest exporter to the Indonesian manufacturing industry, although its export share declined from 40 percent to 25 percent. The industry became the largest exporter to the Malaysian manufacturing industry, its export share increasing from 6 percent to 38 percent. These transport equipment products were imported largely by the parallel industries in Indonesia and Malaysia: since the 1960s, the two countries have imposed high tariffs on imports of complete products. Accordingly, Japan's exports of parts and intermediate inputs have increased to assembly plants in these countries. However, Indonesia and Malaysia have gradually increased the production of these products and as a consequence, between 1981 and 1984, the local content ratios of parts production from the ASEAN countries as a whole increased from 0 percent to 1.5 percent while the procurement ratio from Japan declined from 100 percent to 75.3 percent (Uriu, Koishi, and Shinohara (1991)).

We now focus on Japan's exports of manufactured intermediate inputs to the five Asian manufacturing industries, and set the total exports of these inputs at one hundred. Figure 7 shows the change in the export shares of Japan's total manufactured intermediate inputs which were exported to the twelve Asian manufacturing industries between 1975 and 1985. The figure and Table 26 show that exports by the Japanese aggregate manufacturing industry increased to the Singaporean machinery industry by 35.7 percent but decreased to the transport equipment industry by 22.3 percent. The exports to the Malaysian transport equipment industry increased by 24 percent.

Major export products of the Japanese manufacturing industries were chemicals, machinery, metals, and transport equipment in 1985. The Japanese chemical industry increased its exports to the Indonesian, Malaysian, and Singaporean chemical industries by 20 percent, 27 percent, and 17 percent, respectively. Indonesia and Malaysia, both major importers of Japanese chemical products, shifted away from the machinery to the chemical industry (Figure 8). For Singapore, also a major importer of chemical products, the shift was from the lumber to the chemical industry.

The Japanese machinery manufacturing industry increased its exports to the Indonesian, Korean, and Thai machinery industries but decreased them to their transport equipment industries (Figure 10). Japan's export shares in these two industries increased respectively by 19 percent and 8.4 percent.

Table 25. Export Structure of Twelve Japanese Manufacturing Industries (2), 1985

(In percent)

	Food	Textile	Lumber	Pulp	Chemicals	Petroleum	Rubber	Nonmetallic	Metal	Machinery	Transport	Other	TOTAL
Indonesia													
Primary	0.01	0.00	0.00	0.00	0.88	0.00	0.00	0.00	0.05	0.05	0.00	0.00	1.00
Secondary	0.00	0.03	0.00	0.01	0.25	0.01	0.01	0.01	0.19	0.21	0.25	0.03	1.00
Tertiary	0.00	0.00	0.00	0.00	0.04	0.01	0.02	0.18	0.59	0.13	0.00	0.02	1.00
Total	0.00	0.02	0.00	0.01	0.19	0.01	0.01	0.06	0.32	0.18	0.17	0.02	1.00
Korea													
Primary	0.04	0.01	0.00	0.01	0.02	0.58	0.01	0.00	0.06	0.19	0.08	0.02	1.00
Secondary	0.00	0.10	0.00	0.01	0.22	0.01	0.01	0.03	0.23	0.30	0.04	0.05	1.00
Tertiary	0.01	0.00	0.00	0.03	0.11	0.24	0.00	0.06	0.18	0.32	0.01	0.03	1.00
Total	0.01	0.09	0.00	0.01	0.21	0.04	0.01	0.03	0.22	0.31	0.03	0.05	1.00
Malaysia													
Primary	0.02	0.01	0.00	0.00	0.22	0.01	0.01	0.01	0.20	0.32	0.20	0.01	1.00
Secondary	0.00	0.03	0.00	0.03	0.08	0.00	0.00	0.02	0.21	0.22	0.38	0.02	1.00
Tertiary	0.00	0.01	0.00	0.02	0.02	0.01	0.01	0.05	0.53	0.20	0.13	0.03	1.00
Total	0.00	0.02	0.00	0.03	0.07	0.00	0.00	0.03	0.30	0.22	0.30	0.02	1.00
Singapore													
Primary	0.11	0.09	0.00	0.00	0.13	0.00	0.15	0.12	0.07	0.20	0.10	0.03	1.00
Secondary	0.01	0.06	0.00	0.03	0.09	0.01	0.01	0.02	0.19	0.54	0.00	0.03	1.00
Tertiary	0.01	0.04	0.00	0.03	0.04	0.00	0.02	0.11	0.53	0.12	0.03	0.06	1.00
Total	0.01	0.06	0.00	0.03	0.08	0.01	0.01	0.05	0.27	0.44	0.01	0.04	1.00
Thailand													
Primary	0.05	0.00	0.00	0.00	0.81	0.00	0.00	0.00	0.09	0.02	0.01	0.02	1.00
Secondary	0.00	0.08	0.00	0.02	0.25	0.00	0.01	0.00	0.35	0.16	0.10	0.02	1.00
Tertiary	0.05	0.00	0.00	0.02	0.07	0.04	0.00	0.03	0.55	0.12	0.09	0.03	1.00
Total	0.02	0.06	0.00	0.02	0.23	0.01	0.00	0.01	0.39	0.14	0.10	0.02	1.00
TOTAL	0.01	0.06	0.00	0.02	0.17	0.02	0.01	0.04	0.27	0.27	0.10	0.04	1.00

Source: Asian International Input-Output Table: 1985, Institute of Developing Economies.

Table 26. Changes in Manufactured Export Shares of Twelve Japanese Manufacturing Industries, 1975-85

(In percent)

	Food	Textile	Lumber	Pulp	Chemical	Petroleum	Rubber	Nonmetallic	Metal	Machinery	Transport	Other	TOTAL
Indonesia													
Food	-0.362	0.000	-0.053	-0.025	-0.007	-0.190	0.000	-0.046	-0.007	0.007	0.000	-0.116	-0.002
Textile	0.003	-0.412	0.455	-0.001	-0.097	-0.077	-0.011	-0.038	-0.000	0.016	0.000	-0.098	-0.059
Lumber	0.000	0.001	-0.090	0.003	-0.021	-0.025	0.013	-0.011	-0.001	0.000	0.000	-0.072	-0.004
Pulp	0.003	-0.000	0.000	-0.087	-0.074	-0.043	0.000	-0.011	-0.000	-0.000	0.000	-0.022	-0.023
Chemical	0.369	0.000	0.031	0.024	0.201	0.056	0.017	0.177	-0.002	0.001	0.000	-0.049	0.065
Petroleum	0.000	0.002	0.000	-0.001	-0.037	-0.267	0.000	-0.006	0.001	0.000	0.000	-0.001	-0.007
Rubber	0.000	0.355	0.000	0.000	0.023	0.045	0.051	-0.021	0.028	0.001	0.000	-0.003	0.022
Nonmetallic	0.000	0.000	0.000	0.036	0.011	0.053	0.000	-0.092	0.000	0.002	0.000	-0.006	0.005
Metal	0.000	0.003	-0.005	0.002	0.022	0.130	-0.002	-0.008	-0.187	-0.064	0.000	-0.075	-0.035
Machinery	-0.010	0.028	0.000	-0.001	-0.041	0.456	0.082	-0.038	-0.028	0.187	0.002	-0.096	0.111
Transport	0.000	0.001	-0.288	0.011	0.009	-0.135	-0.190	0.098	0.189	-0.148	-0.002	0.509	-0.089
Other	-0.004	0.022	-0.049	0.039	0.011	-0.003	0.041	-0.004	0.008	-0.001	0.000	0.029	0.016
Korea													
Food	-0.195	-0.004	-0.025	0.026	0.001	-0.002	-0.140	-0.003	-0.004	-0.005	0.000	0.002	-0.005
Textile	0.094	0.025	0.002	0.061	-0.058	-0.048	-0.234	-0.002	-0.005	-0.027	0.000	-0.114	-0.070
Lumber	0.003	0.001	-0.027	-0.028	-0.002	-0.001	-0.027	-0.029	0.002	-0.001	0.000	0.004	-0.003
Pulp	0.024	-0.000	0.000	-0.350	0.026	0.006	-0.007	-0.016	-0.003	0.000	0.000	0.004	-0.006
Chemical	-0.017	-0.003	-0.024	-0.044	-0.038	0.245	-0.002	-0.011	-0.000	-0.001	0.000	-0.004	-0.078
Petroleum	-0.002	0.000	0.000	0.002	-0.003	0.142	-0.013	-0.000	-0.000	-0.001	0.000	-0.002	-0.000
Rubber	0.008	0.029	0.001	0.017	0.027	0.001	-0.031	-0.576	0.002	-0.002	0.000	0.008	-0.016
Nonmetallic	0.004	-0.000	0.000	0.005	0.003	-0.010	-0.012	0.052	0.000	-0.002	0.004	0.001	0.001
Metal	0.015	-0.000	0.074	0.022	0.008	-0.317	0.016	0.071	-0.127	-0.006	0.000	-0.000	-0.045
Machinery	0.040	-0.001	-0.049	0.166	0.027	-0.026	0.025	0.437	0.129	0.049	0.023	0.073	0.186
Transport	0.017	-0.001	0.052	0.038	-0.004	-0.004	0.450	0.042	0.006	-0.020	-0.033	0.034	0.035
Other	0.010	-0.045	-0.005	0.085	0.013	0.014	-0.025	0.035	0.001	0.016	0.005	-0.006	0.002
Malaysia													
Food	0.108	0.016	0.106	0.141	0.140	0.336	-0.001	-0.147	0.034	0.040	0.009	0.037	0.047
Textile	0.001	-0.069	0.036	0.016	-0.104	0.007	-0.015	0.234	0.000	-0.000	-0.006	-0.228	-0.111
Lumber	-0.004	0.004	0.146	0.000	-0.020	-0.070	-0.027	0.005	0.003	-0.003	-0.049	-0.021	-0.011
Pulp	0.000	0.004	-0.083	-0.248	-0.003	-0.001	-0.035	0.003	0.001	-0.006	-0.018	-0.007	-0.042
Chemical	-0.062	0.013	0.023	0.032	0.268	0.058	0.011	-0.095	0.024	0.013	-0.006	-0.015	-0.011
Petroleum	-0.043	-0.000	0.000	0.001	0.002	0.002	0.000	0.002	-0.000	-0.011	-0.005	-0.015	-0.003
Rubber	0.000	0.013	-0.165	0.009	-0.054	0.095	0.316	0.030	0.016	-0.001	0.003	-0.013	-0.036
Nonmetallic	0.000	-0.003	0.014	0.025	-0.009	-0.196	0.000	0.042	-0.003	-0.011	-0.014	-0.004	-0.003
Metal	0.000	0.013	0.059	0.007	-0.003	-0.127	-0.138	0.058	0.135	0.064	-0.022	0.085	-0.008
Machinery	0.000	-0.004	-0.068	-0.003	-0.148	-0.078	-0.293	-0.056	-0.080	-0.052	-0.039	0.175	-0.029
Transport	0.000	0.003	0.003	0.002	-0.001	-0.012	0.207	0.003	-0.146	-0.023	0.148	-0.007	0.242
Other	0.000	0.010	-0.070	0.017	-0.068	-0.015	-0.025	-0.078	0.014	-0.008	-0.002	0.013	-0.035

Table 26 (Continued). Changes in Manufactured Export Shares of Twelve Japanese Manufacturing Industries, 1975-85

(In percent)

Singapore													
Food	0.038	-0.054	-0.096	-0.104	-0.079	-0.091	0.061	0.014	-0.008	-0.021	-0.012	-0.078	-0.030
Textile	-0.063	-0.079	-0.023	-0.028	-0.096	-0.292	-0.003	-0.008	-0.001	-0.004	-0.002	-0.110	0.015
Lumber	0.000	0.060	0.268	0.016	-0.213	-0.062	0.047	-0.007	-0.022	-0.007	-0.000	-0.030	-0.044
Pulp	0.002	-0.000	-0.001	0.138	0.002	-0.005	0.053	0.000	0.001	0.001	0.009	-0.038	0.006
Chemical	0.017	0.030	-0.075	-0.041	0.168	-0.033	0.141	0.028	0.004	0.002	0.026	-0.026	-0.007
Petroleum	0.000	-0.009	0.000	-0.002	0.039	0.750	0.056	0.028	-0.013	0.003	0.002	-0.040	0.005
Rubber	0.000	0.016	0.018	0.001	0.004	0.000	-0.328	0.003	0.001	0.001	0.015	-0.000	0.001
Nonmetallic	0.000	-0.002	0.002	-0.006	-0.005	-0.138	0.080	0.025	0.029	0.001	0.031	-0.001	0.004
Metal	0.000	0.000	0.001	0.007	-0.027	-0.076	0.092	0.055	0.144	0.002	0.050	0.018	-0.078
Machinery	0.000	0.017	-0.057	0.019	0.087	-0.029	0.065	-0.134	0.233	0.008	-0.325	0.277	0.357
Transport	0.000	-0.002	-0.017	0.002	-0.006	-0.019	-0.063	-0.017	-0.405	0.003	0.197	0.017	-0.223
Other	0.005	0.022	-0.018	-0.002	0.128	-0.005	-0.200	0.013	0.037	0.010	0.010	0.011	-0.006
Thailand													
Food	-0.040	-0.008	0.145	0.037	0.036	-0.256	0.071	0.126	0.017	0.006	0.000	-0.001	0.017
Textile	0.015	0.093	-0.154	0.003	-0.074	-0.084	0.000	0.000	0.001	0.031	0.000	-0.003	-0.008
Lumber	0.000	-0.001	0.329	-0.001	-0.005	-0.037	0.000	0.003	0.002	-0.000	0.000	0.004	-0.001
Pulp	0.019	-0.000	0.000	-0.093	0.015	-0.059	0.000	0.000	0.002	-0.001	0.000	-0.031	-0.001
Chemical	-0.030	0.000	-0.089	0.028	-0.032	-0.054	-0.031	-0.177	-0.001	0.000	0.000	-0.064	-0.017
Petroleum	0.000	0.000	0.000	0.000	-0.010	-0.168	0.000	0.000	0.003	0.000	0.000	-0.004	-0.002
Rubber	0.001	-0.081	-0.013	0.001	0.043	-0.020	-0.066	0.001	0.001	-0.000	0.001	-0.006	0.005
Nonmetallic	0.000	-0.000	0.001	0.002	0.020	0.518	0.000	0.015	0.002	0.001	0.000	-0.007	0.006
Metal	0.000	-0.000	-0.052	0.006	-0.014	-0.042	0.000	0.006	-0.169	-0.000	0.000	-0.019	-0.033
Machinery	0.000	-0.000	0.083	0.005	0.036	0.087	-0.040	0.002	0.018	0.084	0.003	-0.018	0.051
Transport	0.000	0.000	0.098	0.012	0.045	0.132	0.282	-0.079	0.137	-0.124	-0.004	-0.039	-0.005
Other	0.036	-0.003	-0.349	-0.000	-0.060	-0.017	-0.217	0.102	-0.014	0.003	0.000	0.188	-0.013

Source: Asian International Input-Output Table: 1975 and 1985, Institute of Developing Economies.

The Japanese metal manufacturing industry increased its exports to the Singaporean machinery industry by 23.3 percent but decreased them to the transport equipment industry by 40 percent (Figure 9). It also increased exports to the Indonesian and Thai transport equipment industries by 18.9 percent and 13.7 percent, respectively.

The Japanese transport equipment manufacturing industry shifted its exports from the machinery to the transport equipment industry in Singapore (Figure 11). Its export share of the Singaporean transport equipment industry increased by 20 percent (Table 26). Its exports to the Malaysian transport equipment industry also increased, with the export share expanding by 15 percent.

c. Summary

The Japanese aggregate manufacturing industry continued to be an important supplier of manufactured intermediate inputs to the manufacturing industries in the five Asian countries. The Japanese capital-intensive industries, such as chemicals, machinery, metals, and transport equipment, in particular, remained large exporters to these countries.

Some Japanese manufacturing industries increased their exports to the counterpart industry in the five Asian countries. For example, the Japanese chemical industry increased its export products to the chemical industries in Indonesia, Malaysia, and Singapore. Similarly, the Japanese machinery industry increased its exports to the machinery industries in Indonesia, Korea, and Thailand. The Japanese transport equipment industry also increased its exports to the transport equipment industries in Malaysia and Singapore. The results suggest increases in the intra-industry trade and in the international division of labor between 1975 and 1985. This growth can be largely attributed to the increase in Japan's FDI to these capital-intensive industries.

V. Trade Since 1985

This section undertakes an overview of the trends in intra-industry trade in recent years on a selected industry basis. The appreciation of the yen since 1985 has accelerated the change in the structure of international trade that has already in evidence in the years between 1975 and 1985. The high and rising production costs in Japan caused many Japanese firms to shift their production locations to the five Asian countries to establish complete production networks between the countries. Consequently, the structural change in trade between Japan and these countries intensified further.

Traditionally, Japan exported capital-intensive manufactured intermediate inputs and capital products, and imported labor-intensive manufactured inputs. However, as a result of industrialization, which was accelerated by Japan's rising FDI in these countries, the Asian countries increased production of many capital-intensive intermediate inputs and

capital products. Therefore, Japan began to increase imports of many manufactured intermediate inputs and manufactured final products it used to procure domestically. This expansion in imports of manufactured products from the Asian countries promoted intra-industry trade in the region.

Some of the recent structural changes were observed prior to 1985. For example, Japan's intra-industry trade in textile manufactured products from Indonesia began to rise after 1982. As a result of the increase in imports of these products, the level of intra-industry trade between Japan and Indonesia reached that attained with Korea in 1987 (Figure 12). Japan's intra-industry trade for metal manufactured products with Indonesia began to increase in 1983. (Figure 13). The same intra-industry trade with Korea experienced two expansion phases: one in 1979 and the other in 1987. Japan's intra-industry trade in machinery products with Thailand started to grow in 1983 (Figure 14). Its intra-industry trade with Korea for the same product underwent two expansion periods, in 1972 and 1987, while that for transport equipment increased significantly in the late 1980s. In the case of chemical manufactured products, Japan's intra-industry trade with Korea swelled two times--in 1972 and in 1985 (Figure 15). Japan's intra-industry trade for the same products with Indonesia and Malaysia has been rising since 1985, while its intra-industry trade with Korea increased significantly for transport equipment products in the late 1980s (Figure 16).

VI. Conclusions

This paper has examined whether the international trade linkages between Japan and the five Asian countries were deepened between 1975 and 1985. In particular, it has analyzed what the pattern of trade was in 1975 and how it had shifted by 1985. The paper has shown that in 1975, Japan was a substantial net exporter of manufactured products and a substantial net importer of primary products. In particular, inter-industry trade was dominant between Japan and Indonesia in both 1975 and 1985 and between Japan and Malaysia in 1985 since Japan exported a large amount of manufactured products to Indonesia and Malaysia, and imported from them a large amount of primary products as raw materials for its manufacturing industries. By contrast, intra-industry trade in manufactured products was more actively observed between Japan and the other three countries. Japan was a net exporter of capital-intensive manufactured products, such as chemicals, machinery, metals, and transport equipment, and a net importer of labor- or natural resource-intensive products, such as food, lumber, petroleum, pulp, and textile products. 1/

1/ The Economic Planning Agency (1991) showed that the intra-industry trade index of Japan was smaller relative to that of other developed countries although the index increased in recent years. Saxonhouse (1989) attributed the low index of Japan to an increase in inter-industry trade after the oil crisis and the resulting specialization in the machinery industry.

Figure 7. Changes in the Export Shares of Manufactured Intermediate Inputs by the Japanese Aggregate Industry, 1975 and 1985.

(In percent)

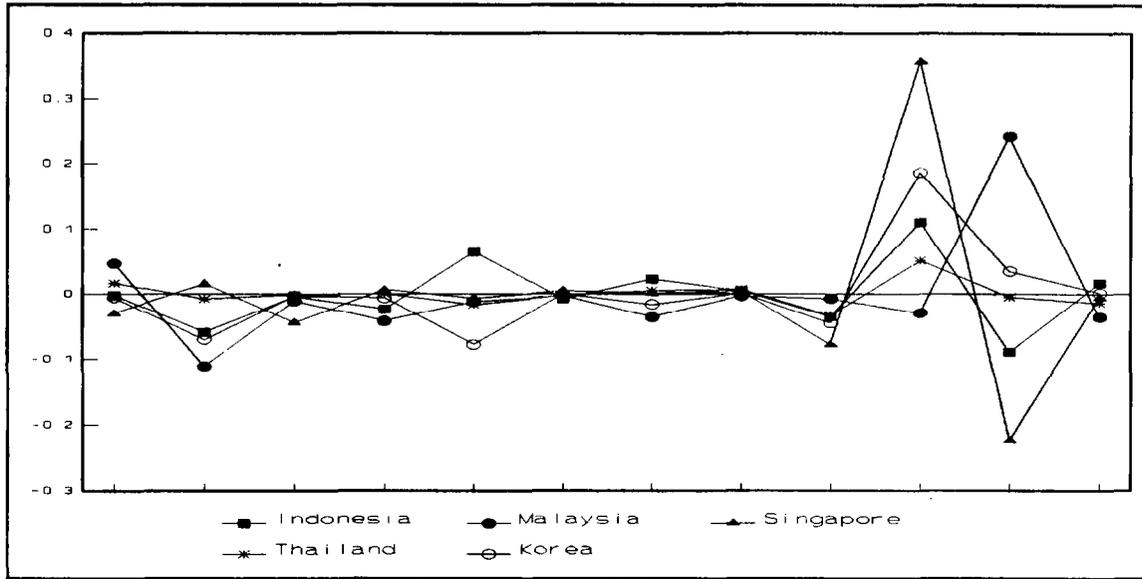
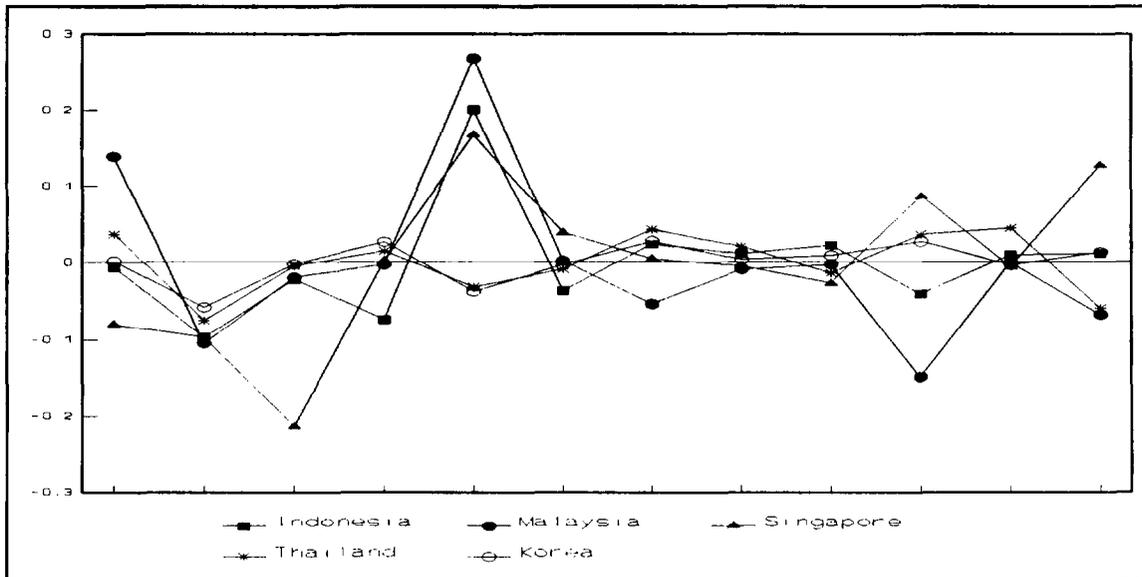


Figure 8. Changes in the Export Shares of Manufactured Intermediate Inputs by the Japanese Chemical Industry, 1975 and 1985.

(In percent)



Source: Asian International Input-Output Table: 1975 and 1985, Institute of Developing Economies.

Figure 9. Changes in the Export Shares of Manufactured Intermediate Inputs by the Japanese Metal Industry, 1975 and 1985.

(In percent)

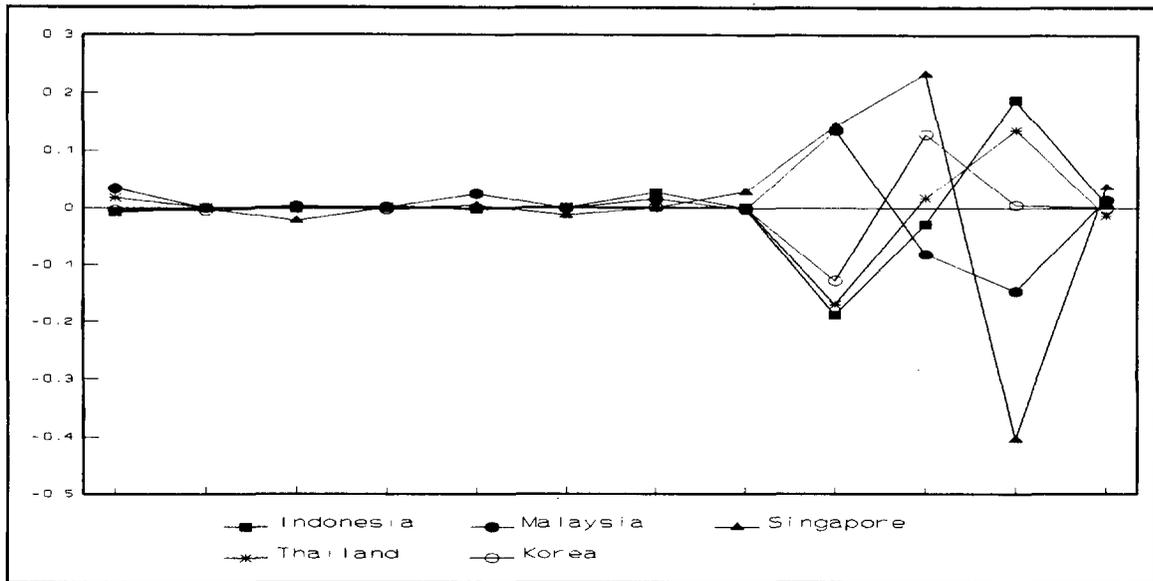
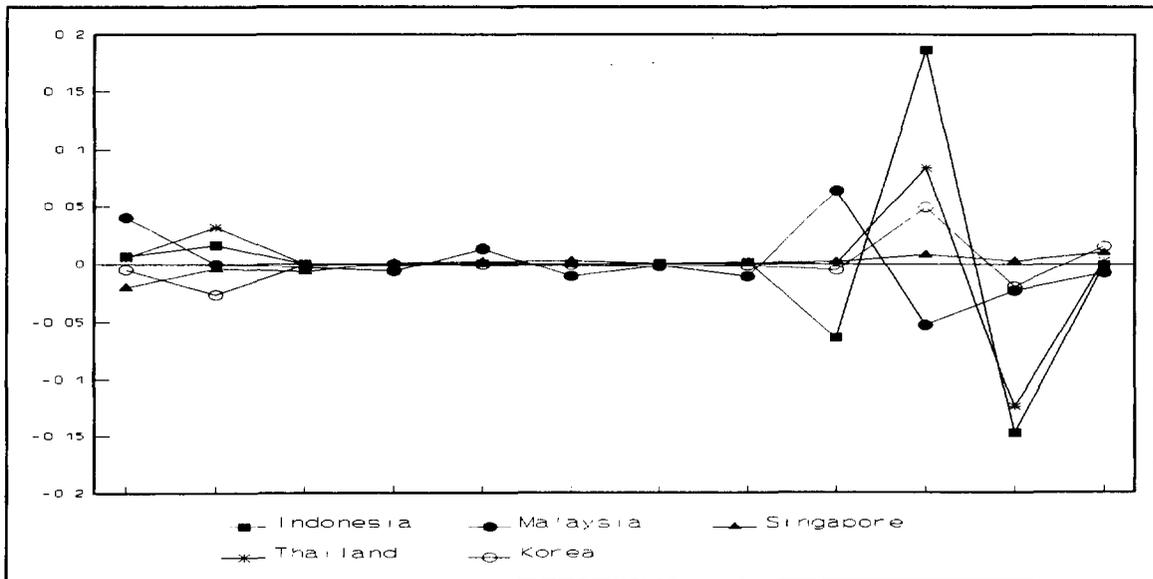


Figure 10. Changes in the Export Shares of Manufactured Intermediate Inputs by the Japanese Machinery Industry, 1975 and 1985.

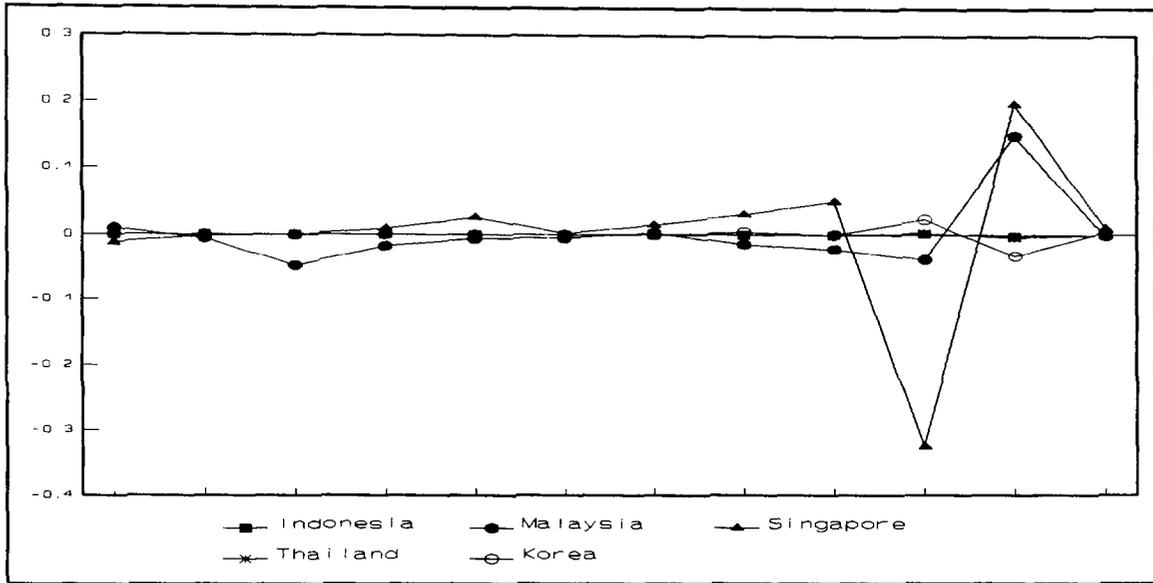
(In percent)



Source: Asian International Input-Output Table: 1975 and 1985, Institute of Developing Economies.

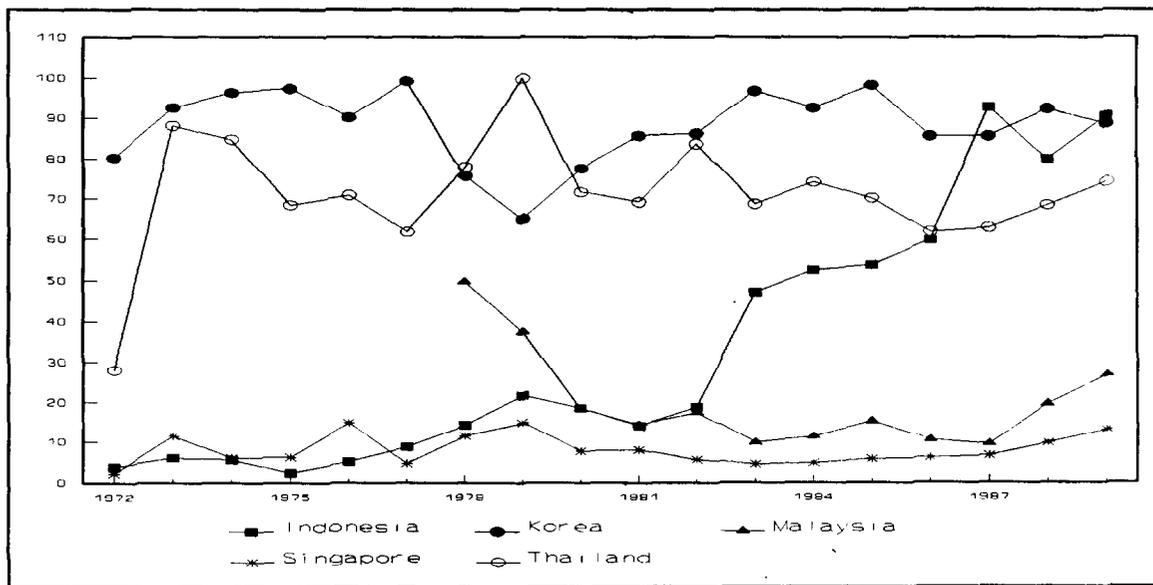
Figure 11. Changes in the Export Shares of Manufactured Intermediate Inputs by the Japanese Transport Equipment Industry, 1975 and 1985.

(In percent)



Source: Asian International Input-Output Table: 1975 and 1985, Institute of Developing Economies.

Figure 12. Intra-industry Trade Indexes in Textile Manufactured Products, 1972-89.



Source: Trade Analysis and Reporting System, the World Bank.

Figure 13. Intra-industry Trade Indexes in Metal Manufactured Products, 1972-89.

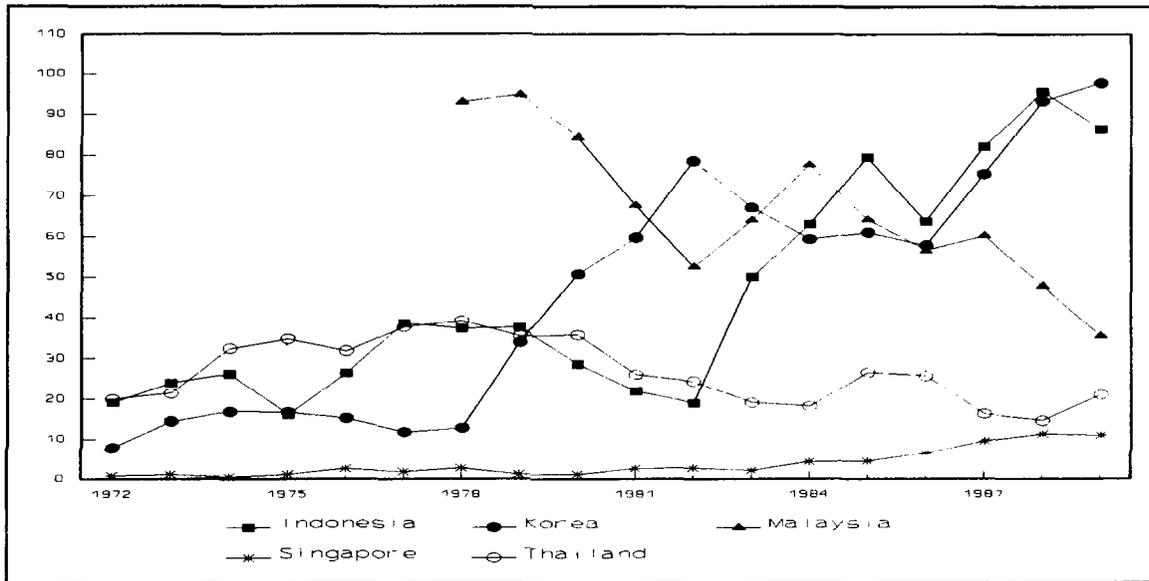
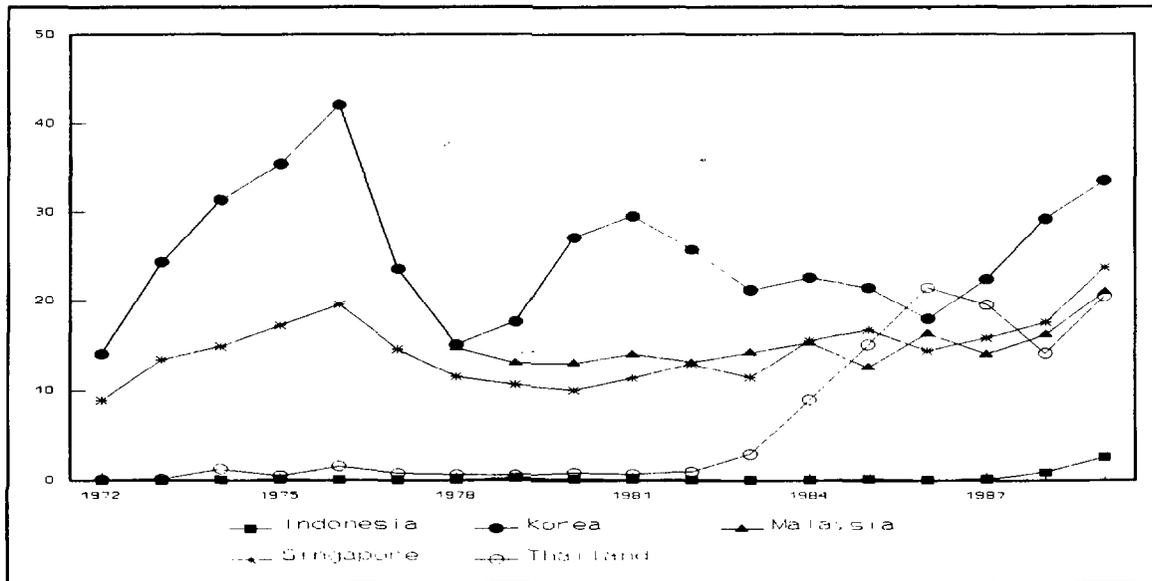


Figure 14. Intra-industry Trade Indexes in Machinery Manufactured Products, 1972-89.



Source: Trade Analysis and Reporting System, the World Bank.

Figure 15. Intra-industry Trade Indexes in Chemical Manufactured Products, 1972-89.

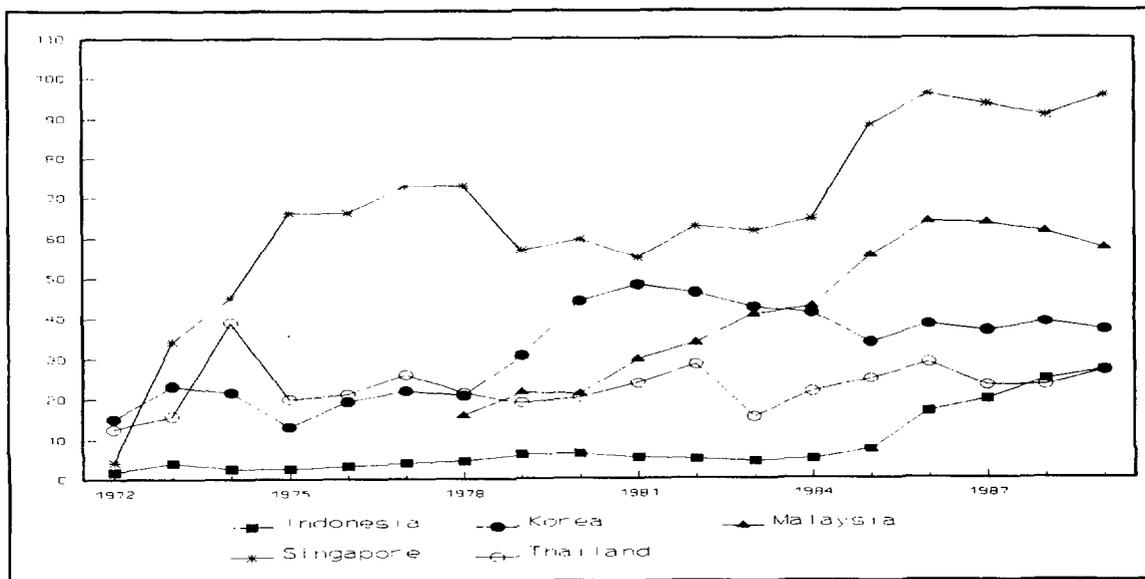
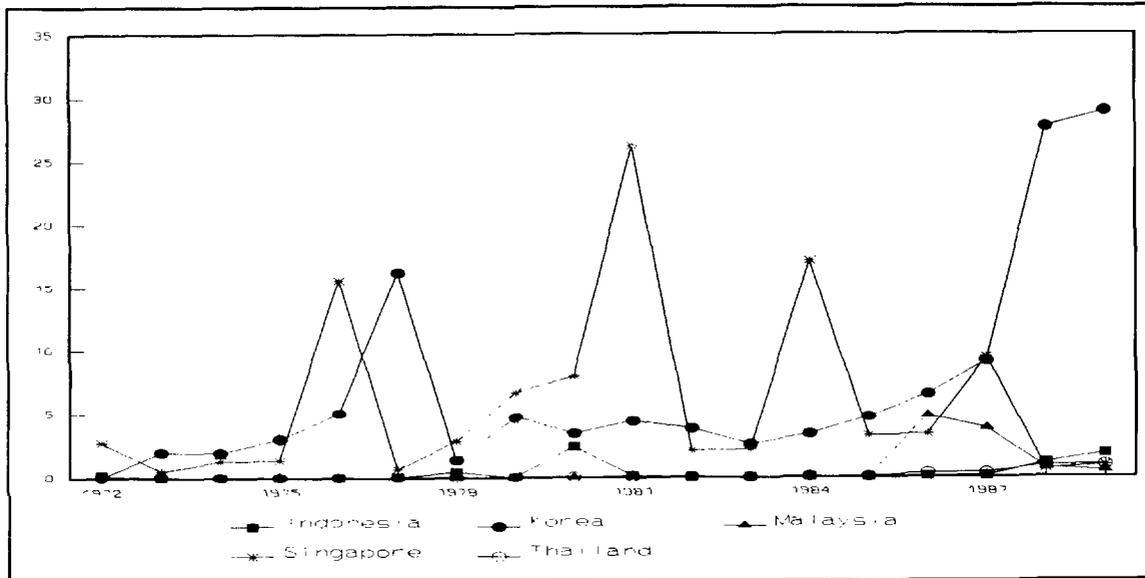


Figure 16. Intra-industry Trade Indexes in Transport Equipment Manufactured Products, 1972-89.



Source: Trade Analysis and Reporting System, the World Bank.

By 1985, Japan had increased its imports of manufactured products from the five Asian countries, particularly of intermediate inputs. Thus, as a result of the rapid pace of industrialization that took place in these Asian countries, intra-industry trade in manufactured products expanded. This tendency toward intra-industry trade was also observed between Japan and natural resource-rich countries such as Indonesia and Malaysia.

Trade flows for consumer products were rather unilateral, coming from Korea to Japan or going from Japan to the other four countries. Trade flows for capital products were also unilateral from Japan to the five Asian countries. Namely, trade flows of final products were rather unilateral while those for intermediate inputs were bilateral. These results may be related to three factors. First, intermediate inputs in an industry include all products produced at the different stages of production. Thus, they include both higher and lower value-added products or capital- and labor-intensive products. Therefore, an increase in intra-industry trade in intermediate inputs may simply suggest an exchange between products with different factor intensities or with more advanced technological skills. Second, intermediate inputs may be more differentiated vertically and horizontally than final products are (Ethier (1979) and (1982)). Third, Japanese consumers prefer final consumer products produced in Japan over those produced by the Asian countries because of differences in quality, design, and so on. Nevertheless, in recent years Japanese consumers' demand for the products produced in these Asian countries has increased as the quality and variety of their products have improved through the transfer of technology from Japan and sales tie-ups with Japanese manufacturers and distributors.

This paper has shown that the Japanese manufacturing industries increased their dependency on manufactured intermediate inputs produced in the five Asian countries. In particular, they increased their imports of more capital-intensive products such as chemicals, machinery, and metals. Furthermore, the Japanese manufacturing industries also increased imports of manufactured intermediate inputs produced by the same industries in the Asian countries. At the same time, these Japanese industries increased their exports of manufactured intermediate inputs to counterpart industries in the Asian countries. This increase in two-way flows of products between parallel industries (or, the intra-industry international division of labor) can be attributed to an increase in intra-firm trade of Japanese MNCs, owing to the expansion of Japan's FDI in the five Asian countries.

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