The changing pattern of spatial economic structure in the Asia-Pacific region: an analysis by using the 1985, 1990, 1995 and 2000 Asian International Input-Output Tables

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1 Introduction

The Institute of Developing Economies (IDE) has been drawing up international input-output tables for East Asia as a tool for the analysis of economic interdependence and its changes among countries/regions in the Asia-Pacific region. In January 2006, IDE completed the 2000 Asian International Input-Output Table (hereafter abbreviated as AIO table), which covers eight East Asian countries/regions (South Korea, China, Taiwan, the Philippines, Malaysia, Singapore, Thailand and Indonesia) as well as Japan and the United States. With the completion of the 2000 AIO table, the IDE now has AIO tables covering most of Asia-Pacific countries/regions for five different time points (1975, 1985, 1990, 1995, and 2000). The table below compares the 2000 AIO table with tables drawn up for earlier years.

Table 1: Comparison between AIO Tables at 5 Different Time Points

Table	Countries/Regions	Sector Classification	Value-added Items	Final Demand Items
1975	8[1]	56	4	4
1985	10[2]	24[3]	4	4
1990	10	78	4	4
1995	10	78	4	4
2000	10	76[4]	4	5[5]

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[1]Indonesia, Malaysia, the Philippines, Singapore, Thailand, South Korea, Japan, and the U.S.

[2]The above countries plus China and Taiwan.

[3]While the number of sectors published was only 24, the number of sectors actually worked on was 77, almost corresponding to the number of sectors for the 1990 table.

[4]While the number of sectors dropped in for primary industries, electronics and electric machinery and services were added.

[5]Another item was added for Singapore and China.

This paper attempts to examine changes in industrial structures in Asian countries/regions by using the just-completed 2000 AIO table. Through time, Asian countries over the past 20 years have achieved a certain degree of economic growth and at the same time deepened spatial interdependence (integration), though in varying degrees for each country or each period. Thus, this paper was prepared with contributions from a number of authors for the purpose of describing and understanding industrial structures of Asian countries from the perspectives of growth and integration.

In this paper, (1) the composition of the 2000 AIO table and the process of drawing it up (Satoshi Inomata) are introduced first. Then, as examples of data-based analysis, (2) industrial structures and (3) trade structures (Bo Meng) are observed from the perspective of growth, and (4) backward linkage (Hajime Sato) and (5) interdependence (Jun Nakamura) are discussed from the perspective of integration. Finally, results of the analysis are summarized, and research issues for the future are discussed. The overall process of preparing this paper was coordinated by Hiroshi Kuwamori. [6]

2 Composition and Drawing-Up Process of the 2000 AIO Table

2.1 Composition of the AIO Table

The AIO table is sort of a compact sketch of the international economy and describes economic cycles (interactions) within a country or between countries in the Asia-Pacific region, including the Untied States. With demand sectors for goods and services shown in vertical rows and supply sectors shown in horizontal rows, intersecting points indicate amounts of transactions between the corresponding sectors. The overall table has five categories of intermediate demand transactions, final demand transactions, exports, value added, and value of domestic production, i.e., value of total input/value of total output, shown for each of the 10 countries/regions under review (Indonesia, Malaysia, the Philippines, Singapore, Thailand, China, Taiwan, South Korea, Japan, and the United States).

The leftmost column in the appended Figure 1 shows the composition of intermediate input in Indonesian industry. The uppermost item A^{II} indicates the composition of Indonesian goods and services put in by each industrial sector of Indonesia, i.e., a transaction table for domestic products. The item A^{MI} below that indicates the composition of Malaysian goods and services put in by each industrial sector of Indonesia, i.e., a table for imports from Malaysia. In the same manner, superscripts show which country imports come from, with A^{PI} indicating a table for imports from the Philippines and A^{SI} indicating a table for imports from Singapore.

Incidentally, A^{II} through A^{UI} are expressed in producer prices net of tax. Thus, international freight & insurance for imports of goods and duties & import commodity taxes are respectively recorded in vector BA^I and vector DA^I.

[6] While the analysis work was done by the above six authors, the table was prepared with the participation of prof. Sano Takao (Gifu Shotoku Gakuen University), Kazuhiko Oyamada (expatriate researcher of IDE in Saint Paul), and Yoko Uchida (expatriate researcher of IDE in West Lafayette).

Meanwhile, A^{HI}, A^{OI} and A^{WI} (import vectors for Hong Kong, the European Union (EU) and "rest of the world") are valued at CIF prices. But duties & import commodity taxes on them are recorded in DA^I similarly to that with A^{II} through A^{UI}.

V^I indicates the sum of value added for each industrial sector of Indonesia, and the bottom item X^I indicates value of total input. By definition, value of total input equals value of total output for each industrial sector, while value added includes vertical statistical error.

Next, let's examine the 11th column from the left, which shows total final demand of Indonesia. The uppermost item F^{II} shows the composition of final demand for goods and services produced in Indonesia, followed by Indonesian final demand for imports from nine other countries/regions under review, with F^{MI} showing final demand for goods and services produced in Malaysia and F^{PI} showing final demand for goods and services produced in the Philippines.

Like intermediate transactions, F^{II} through F^{UI} are also expressed in producer prices net of tax. Thus, international freight & insurance and duties & import commodity taxes on these transactions are recorded in the corresponding vectors (BF^I and DF^I) below, respectively. F^{HI}, F^{OI}, and F^{WI} show Indonesian final demand for goods and services produced in Hong Kong, the EU, and "rest of the world," all expressed on a net of tax, CIF basis.

Above, intermediate demand and final demand of Indonesia are described. Exactly the same interpretation is applicable to the nine other countries/regions under review.

Following total final demand for each country, the 21st through 23rd columns show exports to Hong Kong, the EU, and "rest of the world." In other words, from Indonesia at the top to the United States at the bottom, total value of exports to countries other than the 10 countries/regions under review of goods and services produced in each country are shown here. Value of transactions is all expressed at producer prices.

In the table, the rightmost column X indicates value of total output (value of domestic production) of each industrial sector of each country. As stated earlier, by definition, this corresponds to value of total input by each industrial sector. The column Q, to the left of X, records statistical errors arising from such things as inventories at sea and intermediary trade.

2.2 The Process to Draw Up the Tables

The 1995 AIO table was drawn up in three years' time in view of requests from many users for the table's early release, adopting some figures estimated with mathematical techniques. For the latest 2000 AIO table, we basically followed a survey-based approach and conducted surveys on a majority of countries/regions under review. Below, we briefly describe the process of compiling the latest table as points to remember for those who use the table for analytical purposes.[7]

(1) Compilation of each national I-O table

For Indonesia, Thailand, Malaysia, the Philippines, South Korea, and Japan, domestic

[7]For details, refer to the Explanatory Notes on the 2000 AIO table.

			Intermediate Demand (A)										Final Demand (F)										Export (L)				
		code	Indonesia (AI)	Malaysia (AM)	Philippines (AP)	Singapore (AS)	Thailand (AT)	China (AC)	Taiwan (AN)	Korea (AK)	Japan (AJ)	U.S.A. (AU)	Indonesia (FI)	Malaysia (FM)	Philippines (FP)	Singapore (FS)	Thailand (FT)	China (FC)	Taiwan (FN)	Korea (FK)	Japan (FJ)	U.S.A. (FU)	Export to Hong Kong (LH)	Export to EU (LO)	Export to R.O.W. (LW)	Statistical Discrepancy (QX)	Total Outputs (XX)
	Indonesia	(AI)	A^{II}	A^{IM}	A^{IP}	A^{IS}	A^{IT}	A^{IC}	A^{IN}	A^{IK}	A^{IJ}	A^{IU}	F^{II}	F^{IM}	F^{IP}	F^{IS}	F^{IT}	F^{IC}	F^{IN}	F^{IK}	F^{IJ}	F^{IU}	L^{IH}	L^{IO}	L^{IW}	Q^{I}	X^{I}
	Malaysia	(AM)	A^{MI}	A^{MM}	A^{MP}	A^{MS}	A^{MT}	A^{MC}	A^{MN}	A^{MK}	A^{MJ}	A^{MU}	F^{MI}	F^{MM}	F^{MP}	F^{MS}	F^{MT}	F^{MC}	F^{MN}	F^{MK}	F^{MJ}	F^{MU}	L^{MH}	L^{MO}	L^{MW}	Q^{M}	X^{M}
	Philippines	(AP)	A^{PI}	A^{PM}	A^{PP}	A^{PS}	A^{PT}	A^{PC}	A^{PN}	A^{PK}	A^{PJ}	A^{PU}	F^{PI}	F^{PM}	F^{PP}	F^{PS}	F^{PT}	F^{PC}	F^{PN}	F^{PK}	F^{PJ}	F^{PU}	L^{PH}	L^{PO}	L^{PW}	Q^{P}	X^{P}
	Singapore	(AS)	A^{SI}	A^{SM}	A^{SP}	A^{SS}	A^{ST}	A^{SC}	A^{SN}	A^{SK}	A^{SJ}	A^{SU}	F^{SI}	F^{SM}	F^{SP}	F^{SS}	F^{ST}	F^{SC}	F^{SN}	F^{SK}	F^{SJ}	F^{SU}	L^{SH}	L^{SO}	L^{SW}	Q^{S}	X^{S}
	Thailand	(AT)	A^{TI}	A^{TM}	A^{TP}	A^{TS}	A^{TT}	A^{TC}	A^{TN}	A^{TK}	A^{TJ}	A^{TU}	F^{TI}	F^{TM}	F^{TP}	F^{TS}	F^{TT}	F^{TC}	F^{TN}	F^{TK}	F^{TJ}	F^{TU}	L^{TH}	L^{TO}	L^{TW}	Q^{T}	X^{T}
	China	(AC)	A^{CI}	A^{CM}	A^{CP}	A^{CS}	A^{CT}	A^{CC}	A^{CN}	A^{CK}	A^{CJ}	A^{CU}	F^{CI}	F^{CM}	F^{CP}	F^{CS}	F^{CT}	F^{CC}	F^{CN}	F^{CK}	F^{CJ}	F^{CU}	L^{CH}	L^{CO}	L^{CW}	Q^{C}	X^{C}
	Taiwan	(AN)	A^{NI}	A^{NM}	A^{NP}	A^{NS}	A^{NT}	A^{NC}	A^{NN}	A^{NK}	A^{NJ}	A^{NU}	F^{NI}	F^{NM}	F^{NP}	F^{NS}	F^{NT}	F^{NC}	F^{NN}	F^{NK}	F^{NJ}	F^{NU}	L^{NH}	L^{NO}	L^{NW}	Q^{N}	X^{N}
	Korea	(AK)	A^{KI}	A^{KM}	A^{KP}	A^{KS}	A^{KT}	A^{KC}	A^{KN}	A^{KK}	A^{KJ}	A^{KU}	F^{KI}	F^{KM}	F^{KP}	F^{KS}	F^{KT}	F^{KC}	F^{KN}	F^{KK}	F^{KJ}	F^{KU}	L^{KH}	L^{KO}	L^{KW}	Q^{K}	X^{K}
	Japan	(AJ)	A^{JI}	A^{JM}	A^{JP}	A^{JS}	A^{JT}	A^{JC}	A^{JN}	A^{JK}	A^{JJ}	A^{JU}	F^{JI}	F^{JM}	F^{JP}	F^{JS}	F^{JT}	F^{JC}	F^{JN}	F^{JK}	F^{JJ}	F^{JU}	L^{JH}	L^{JO}	L^{JW}	Q^{J}	X^{J}
	U.S.A.	(AU)	A^{UI}	A^{UM}	A^{UP}	A^{US}	A^{UT}	A^{UC}	A^{UN}	A^{UK}	A^{UJ}	A^{UU}	F^{UI}	F^{UM}	F^{UP}	F^{US}	F^{UT}	F^{UC}	F^{UN}	F^{UK}	F^{UJ}	F^{UU}	L^{UH}	L^{UO}	L^{UW}	Q^{U}	X^{U}
Freight and Insurance		(BF)	BA^{I}	BA^{M}	BA^{P}	BA^{S}	BA^{T}	BA^{C}	BA^{N}	BA^{K}	BA^{J}	BA^{U}	BF^{I}	BF^{M}	BF^{P}	BF^{S}	BF^{T}	BF^{C}	BF^{N}	BF^{K}	BF^{J}	BF^{U}					
Import from Hong Kong		(CH)	A^{HI}	A^{HM}	A^{HP}	A^{HS}	A^{HT}	A^{HC}	A^{HN}	A^{HK}	A^{HJ}	A^{HU}	F^{HI}	F^{HM}	F^{HP}	F^{HS}	F^{HT}	F^{HC}	F^{HN}	F^{HK}	F^{HJ}	F^{HU}					
Import from EU		(CO)	A^{OI}	A^{OM}	A^{OP}	A^{OS}	A^{OT}	A^{OC}	A^{ON}	A^{OK}	A^{OJ}	A^{OU}	F^{OI}	F^{OM}	F^{OP}	F^{OS}	F^{OT}	F^{OC}	F^{ON}	F^{OK}	F^{OJ}	F^{OU}					
Import from the R.O.W.		(CW)	A^{WI}	A^{WM}	A^{WP}	A^{WS}	A^{WT}	A^{WC}	A^{WN}	A^{WK}	A^{WJ}	A^{WU}	F^{WI}	F^{WM}	F^{WP}	F^{WS}	F^{WT}	F^{WC}	F^{WN}	F^{WK}	F^{WJ}	F^{WU}					
Import Duty and Sales Tax		(DT)	DA^{I}	DA^{M}	DA^{P}	DA^{S}	DA^{T}	DA^{C}	DA^{N}	DA^{K}	DA^{J}	DA^{U}	DF^{I}	DF^{M}	DF^{P}	DF^{S}	DF^{T}	DF^{C}	DF^{N}	DF^{K}	DF^{J}	DF^{U}					
Value Added		(VV)	V^{I}	V^{M}	V^{P}	V^{S}	V^{T}	V^{C}	V^{N}	V^{K}	V^{J}	V^{U}															
Total Inputs		(XX)	X^{I}	X^{M}	X^{P}	X^{S}	X^{T}	X^{C}	X^{N}	X^{K}	X^{J}	X^{U}															

Figure 1: Layout of the Asian International Input-Output Table 2000

tables for 2000 were drawn up with a survey-based method.[8]

(2) Compilation of extended tables

Since there were no tables available for the year under review for Singapore, Taiwan, China, and the United States, we used the latest tables available for updating. We took the approach of gathering data for CT, final demand, value added, and exports and imports from primary data sources and obtained updated I-O tables with the modified RAS method in accordance with structures of tables for respective countries.

(3) Compilation of national tables (noncompetitive) for other countries

For countries other than Singapore, Taiwan, China, the United States, and Japan, we conducted surveys on imported goods and estimated import tables in collaboration with joint research institutions, and those tables were then converted to meet the format of AIO tables.

(4) Estimation on international freight & insurance

For international freight & insurance rates, related information was available for the following nine countries: Japan, the United States, the Philippines, Indonesia, Malaysia, China, Singapore, Thailand, and South Korea. For Taiwan, for which absolutely no data were available, and for other missing data, we used the information for the above-mentioned nine countries to make estimates. More specifically, assuming that international freight is in proportion to distance,[9] we used the least-squares method to estimate sector-by-sector parameters and obtained the missing data by substituting distances among countries concerned.

(5) Linkage and adjustment work

Since each national table has distinctive format and idea, we conducted surveys on each country's I-O data and made conceptual adjustments for the purpose of standardization (Inomata, 2005). We then linked the above-described country data together, picked away international freight & insurance from them, and converted them to producer prices of the 10 countries/regions under review, using domestic trade and transportation margins of countries from which goods were being imported . For errors due to discrepancy in trade, we examined converters for I-O sectoral classification and trade statistics and adjusted differences in line with the sectoral classification of producing countries/regions.[10]

(Satoshi Inomata)

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[8]For these countries, those institutions that drew up the master tables are joint research institutions.

[9]Although we assume that international freights for cement, sand, and gravel strongly reflect weight, we could not find a method for estimation that reflects weight, presumably because of two-way (for example, between Japan and the United States) discrepancy in trade statistics.

[10]There is a tacit assumption that goods produced are of in identical classification with regard to row indications.

3 Industrial Structures and Growth Patterns of Asian Countries

Industrial structure analysis is used to shed light on characteristics of an industry in a given country or region. We go back to the Petty=Clark's empirical rule which is regarded as a pioneering study of the field. It is a theory that when per capita income increases as a result of economic development, the industrial structure evolves, and labor migrates from primary industry to secondary industry and then to tertiary industry. Later, depending on varying research purposes, a variety of factors beyond labor were used as the measuring standard of industrial structure, including income, gross output, value added, and investment. In this section, we attempt to summarize the characteristics of industrial structures of East Asian countries/regions and their dynamic changes by basically using the share of gross output by country or by industrial sector in the 1985, 1990, 1995, and 2000 AIO tables.

3.1 Industrial Structure Defined by Gross Domestic Output

In order to outline industrial structures and their changes in countries/regions covered in the AIO tables, we here use Figure 2 which shows the contribution ratios on gross domestic output in accordance with the broadest measure of industrial classification (primary, secondary, and tertiary industries)[11]. To summarize their characteristics, first of all, the contribution from primary industry tended to decline in all the countries/regions. The contribution from secondary industry continued to shrink in Japan, the United States, Taiwan, and Singapore and also began declining in Korea in 1990. The contribution from secondary industry tended to increase in China, Malaysia, and Thailand until 1995 but then peaked and began to show signs of decline by 2000. It continued to expand in Indonesia and the Philippines, though with relative volatility. The contribution from tertiary industry has been increasing relatively rapidly in Japan, Korea, Taiwan, Singapore, and the Untied States, while the momentum of increase began to show basically from 1990 in other countries. Generally speaking, countries with large economic scale tend to show relatively stable changes, and countries with small economic scale tend to be unstable, and yet, changes in development stage in line with the empirical rule of Petty=Clark can be observed for all countries/regions coverd in the AIO tables, in principle.

Figure 3 shows the contribution of gross domestic output by country and industrial sector for 1995 and 2000 based on the 8-industry classification of the AIO tables, with the manufacturing sector divided further into light industry and heavy industry & chemical industry.[12] Industry codes are 1 for agriculture (agriculture, livestock, forestry and fishery); 2 for mining and quarrying; 3 for light industry; 4 for heavy industry & chemical industry; 5 for energy (electricity, gas and water supply); 6 for construction; 7 for trade and transport; and 8 for services.

[11] "Electricity, gas ,and water services" is classified as secondary industry in accordance with the classification by Colin Clark.

[12] The breakdown into light industry and heavy and chemical industry was made in reference to the classification of Japan's manufacturing statistics.

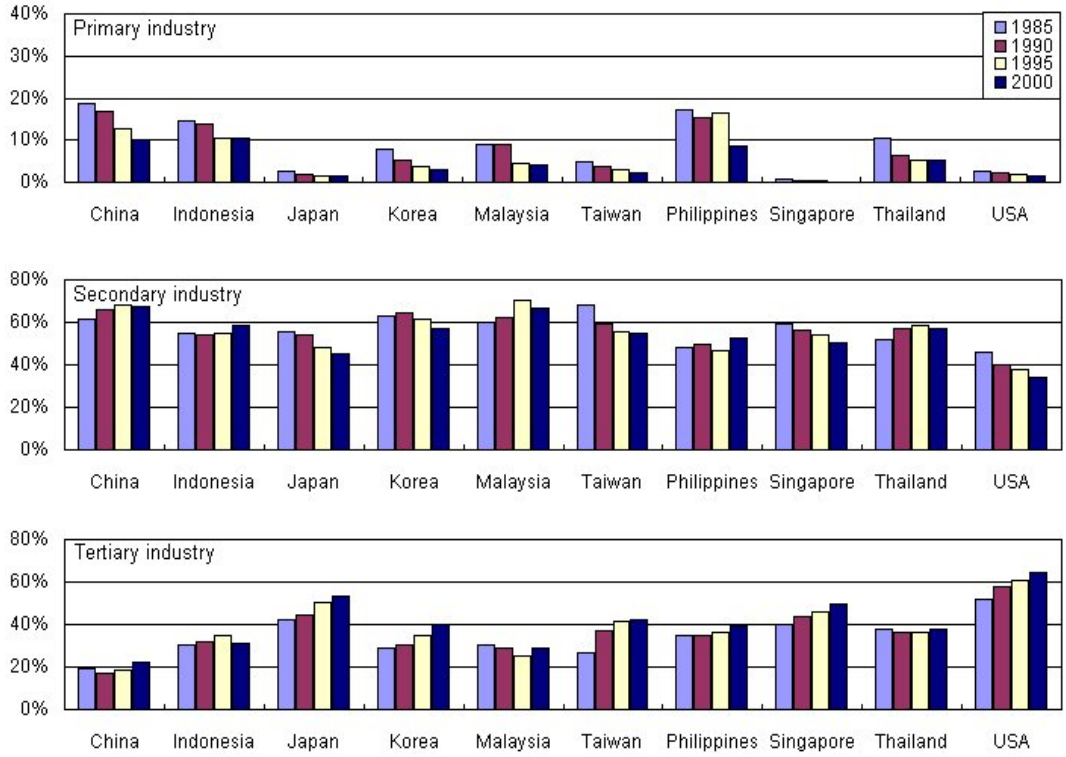

Figure 2: Contribution of Gross Domestic Output, by Industry (3 Industries)

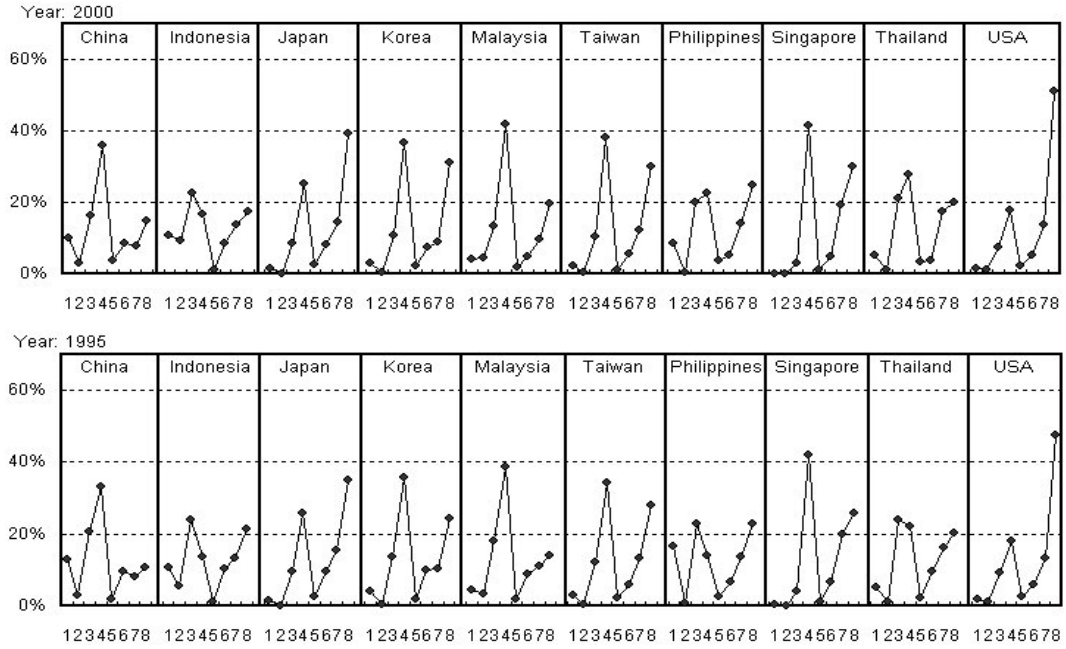

Figure 3: Contribution of Gross Domestic Output, by Industry (8 Industries)

As an overall trend, industrialized countries have a greater tendency to specialize in the service sector. Figure 3 indicates the overwhelming share of the service sector for both Japan and the United States. Korea, Taiwan, and Singapore in the group of newly industrializing economies (NIES) are characterized by the tendency to specialize in both heavy industry & chemical industry as well as the service sector. Developing countries (including Indonesia, China, the Philippines, and Thailand) tend to have a relatively high contribution from agriculture. Comparison between the contributions of 1995 and 2000 shows that while there is not much change in the industrial structures of Japan and the United States, the relative size of the service sector grew. China is characterized by the decline in contribution from agriculture and light industry, with increasing contribution from the service sector. Indonesia features an increase in the contribution from heavy industry, while the service sector expanded in Korea and Malaysia. The Philippines and Thailand saw the contributions from light industry and heavy industry & chemical industry reversed.

In order to break down the countries/regions covered in the AIO tables into patterns by characteristics of industrial structure, we conducted a simple cluster analysis here with the countrywise and industrywise contributions of the 24-sector AIO table for the years of 1985 and 2000 as input data. The analysis results are shown in Figure 4.

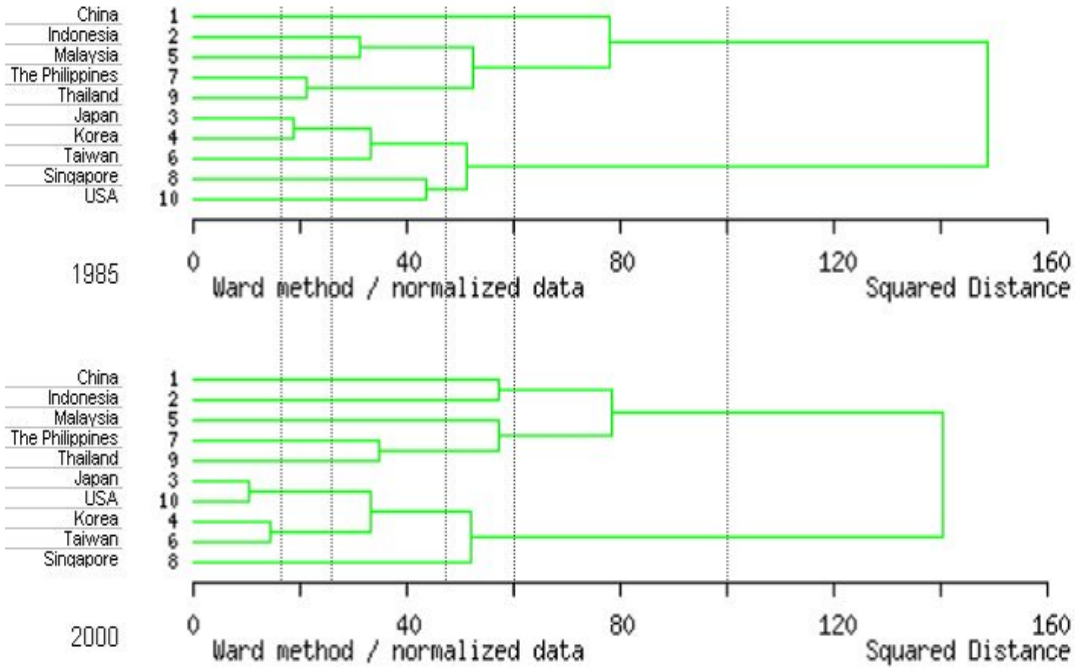

Figure 4: Typology of Industrial Structure

In the figure for 2000, the coordinate distance of 80 or more divides the countries/regions covered in the AIO table into two groups. One group consists of the industrialized countries Japan and the United States and the three NIES Korea, Taiwan, and Singapore, while the other group includes the five developing countries. The coordinate distance of 70 divides the group of the developing countries into two subgroups. One is made up

of China and Indonesia, and the other comprises Malaysia, the Philippines, and Thailand. The much shorter coordinate distance breaks the 10 countries/regions into more small groups: while China, Indonesia, and Singapore all stand alone, Malaysia and the Philippines, Japan and the United States, and Korea and Taiwan are put together in respective two-member groups. The same division can be applied to the year of 1985. It is obvious that China stands along as a relatively independent one-country group in 1985. By comparison of the two years, we can say that under the rapid economic growth, China has been joining or approaching the group of ASEAN. This cluster analysis is nothing more than the typological classification of countries/regions by contribution from total industrial output. Still, this classification is broadly consistent with our intuitive characterization of these countries.

3.2 Industrial Structure Defined by Specialization Coefficient

The specialization coefficient is often used to underline industrial sectors toward which a given country's industrial structure is skewed. In this section, we obtain specialization coefficients for 1995 and 2000 of countries/region covered in the 24-sector AIO tables other than Japan and the United States to examine the degree and changes in industrial specialization by country.[13]

As Figure 5 indicates, China in 2000 has a high degree of specialization in agriculture (1, 2, 3[14]), other mining (7), textiles (9), cement and glassware (15), electricity, gas and water supply (20) and construction (21). In contrast, the coefficient is the lowest for services (22, 23, 24). Compared with 1995, the specialization coefficient increased remarkably for paddy (1) in agriculture. The specialization coefficient for the entire industry shows less variation, indicating that China's industrial composition has become relatively balanced compared with 1995.

Indonesia has a high degree of specialization in natural resource-related sectors such as forestry (4), crude petroleum and natural gas (6), and timber and wooden products (10). This tendency is becoming increasingly pronounced.

Little change can be observed in Korea's specialization coefficients for 1995 and 2000, except for the falling contribution from agriculture. Korea shows a strong tendency toward specialization in pulp, paper and printing (11), metal products (16), transport machinery (18), and services (23).

Malaysia's industrial composition is quite varied, with a particularly high degree of specialization in forestry (4), crude petroleum and natural gas (6), timber and wood products (10), and machinery (17). Compared with 1995, Malaysia shows an increasingly high specialization in timber and wood products (10) in 2000, as against a conspicuous decline in rubber products (14).

Taiwan in 2000 had a relatively high degree of specialization in pulp, paper and printing (11), chemical products (12), metal products (16), machinery (17), precision equipment

[13]A specialization coefficient is obtained by dividing the contribution from industry in a given region by the average contribution for the whole region. A larger coefficient is interpreted as showing a greater degree of specialization in a particular industry.

[14]sector code by 24-sector classification

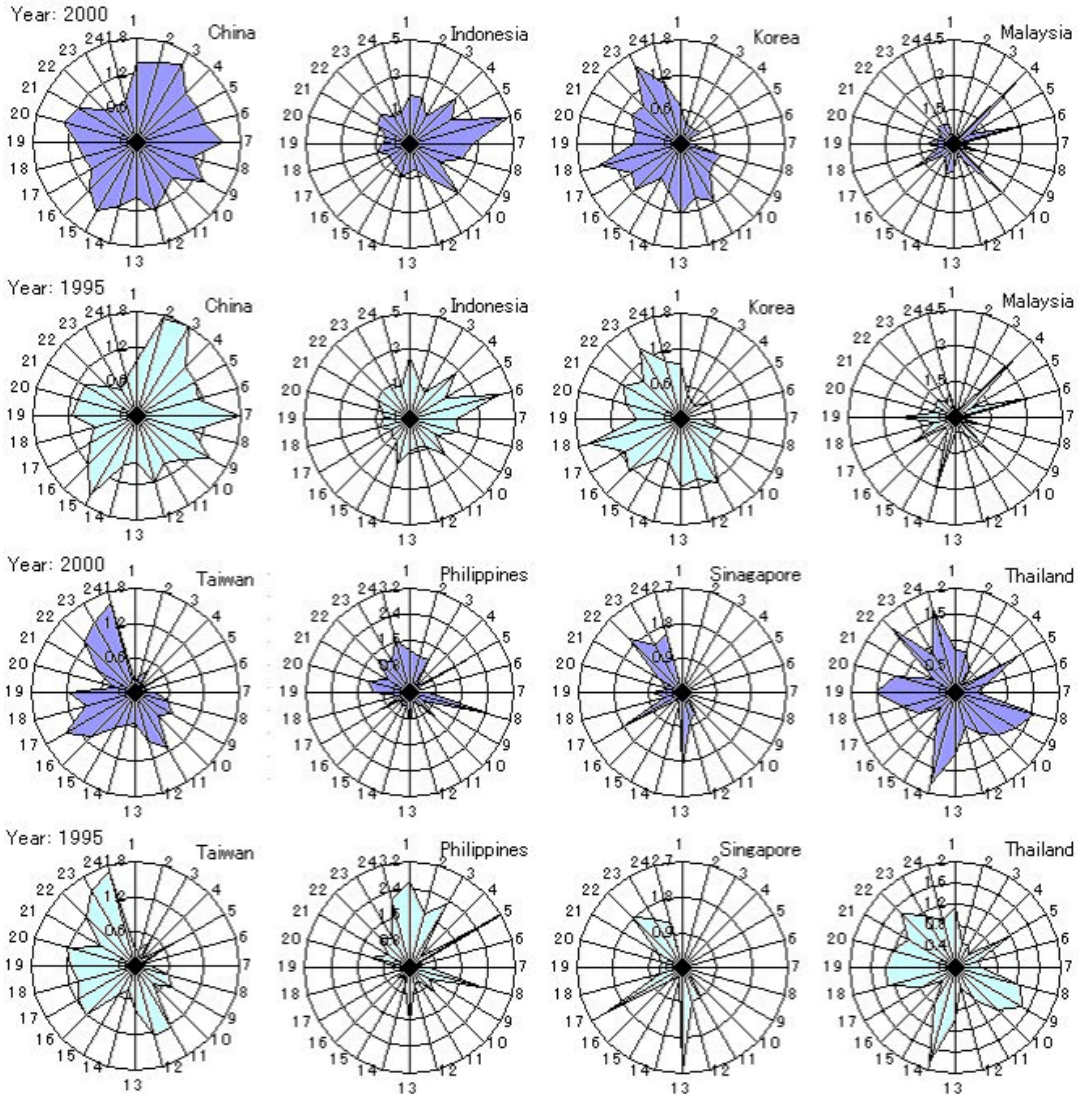

Figure 5: Specialization Coefficients of Industry

(19), and services (22, 23, 24). Compared with 1995, its specialization increased in machinery (17) but declined in chemical products (12) and energy (20).

The Philippines in 1995 had a high degree of specialization in agriculture (1, 2, 3), forestry (4), food, beverages, and tobacco (8), petroleum and petro products (13), electricity, gas and water supply (20), and services (22, 24). By 2000, the degree of specialization declined for agriculture (1, 2, 3) and petroleum and petro products (13), but remarkably grew for food, beverages, and tobacco (8).

Singapore had a high degree of specialization in petroleum and petro products (13), machinery (14), and services (22, 23, 24) in 1995. The degree of specialization dropped for petroleum and petro products (13) by 2000, but further boosted the specialization in services (22, 23, 24).

Thailand had the high degree of specialization in textiles (9), rubber products (14), transport machinery (18), precision equipment (19), and services (22) in 1995. By 2000,

the specialization became more pronounced in food, beverages, and tobacco (8), precision equipment (19), and services (24).

Table 2: Variation in Industrial Specialization

	China	Indonesia	Korea	Malaysia	Taiwan	Philippines	Singapore	Thailand
CV (2000)	0.23	0.91	0.52	1.04	0.63	0.76	1.22	0.49
CV (1995)	0.30	0.93	0.56	1.05	0.65	0.78	1.22	0.53
Δ	-29.7%	5.7%	6.8%	11.4%	6.6%	-10.5%	-6.9%	2.3%

The coefficient of variation of specialization coefficients is used here to measure the degree of variation in specialization and its changes. The coefficients of variation (CV2000, CV1995) in Table 2 indicate that China has the lowest degree of variation in specialization, followed by Korea, Taiwan, and Thailand, in that order. Singapore has the most biased industrial specialization, followed by Malaysia, Indonesia, and the Philippines, in that order. The above-mentioned patterns of change primarily depend on the economic scale but seem to be deeply related to the initial economic endowment as well. In terms of change (Δ) in variation, China's variation narrowed by 29.7%, indicating a leveling trend in the balance of industrial structure. In contrast, Malaysia's variation increased by 11.4%, showing an increasingly higher degree of specialization.

(Bo Meng)

4 Asian Countries' Trade Structures and Patterns of Change

Newly industrializing economies (NIES) of Asia had been registering rapid economic growth from the 1970s, and the Association of Southeast Asian Nations (ASEAN) had been doing the same from the 1980s. Since the yen's sharp appreciation in 1985, Japanese companies, particularly manufacturers, accelerated production activities overseas, contributing to the virtuous circle of the economies of East Asian countries in the form of increased direct investment. Since the bursting of its bubble economy, however, Japan had slipped into a prolonged slump. In contrast, the Chinese economy began its substantial growth in the mid-1980s, and China made a full-fledged foray into global trade in the 1990s, subsequently raising its share in international trade. In the meantime, the East Asian economies have become a driver of global economic growth, increasingly gaining in importance in the world economy. But the Asian currency crisis in 1997 affected these economies through the links of regional trade and investment. After the crisis, Asian countries stepped up trade liberalization and moved toward regional economic integration in order to achieve a quick recovery from the crisis and prevent a recurrence of crisis. Such international economic cooperation significantly reshaped regional trade in Asia.

Given the dynamic changes in the economies of East Asia, this section attempts to summarize the characteristics of trade structures of the countries/regions covered in the AIO table and the patterns of change from the three viewpoints of time, space, and industry, using the AIO table for 1985, 1990, 1995, and 2000.

4.1 Changes in Regional Trade in East Asia

The countries/regions in the AIO table include China (C), Japan (J), the United States (U), and the three NIES Korea (K), Taiwan (T), and Singapore (S), as well as Indonesia (I), Malaysia (M), the Philippines (P), and Thailand (T), all of which are ASEAN members. The patterns of trade among these countries/regions underwent significant changes between 1985 and 2000. In order to give a brief description of these changes, we integrated the AIO tables for the four years into one industry per country, and obtained the contribution of each country's value of trade to total value of trade among the countries/regions covered in the table, as shown in Figure 6 below.

While Japan and the United States still maintain overwhelmingly high shares in export, their shares have been steadily declining over the past 20 years. In particular, Japan has seen the rapid loss of its export share. However, the other countries/regions covered in the AIO table, with the exception of Indonesia, have achieved steady expansion of their export shares. While some countries were slower than others in freeing themselves from the impact of the 1997 Asian currency crisis, the overall trend of increase in their export shares is obvious. Figure 6 also shows that import shares of the countries/regions covered in the AIO table basically had the patterns of change similar to those of exports, with the substantial decline in the U.S. import share standing out.

Next, in order to examine changes in the structure of trade between countries/regions under review, the percentage of bilateral trade to the total value of trade among countries/regions covered in the AIO table, excluding intra-country trade, is shown by contour

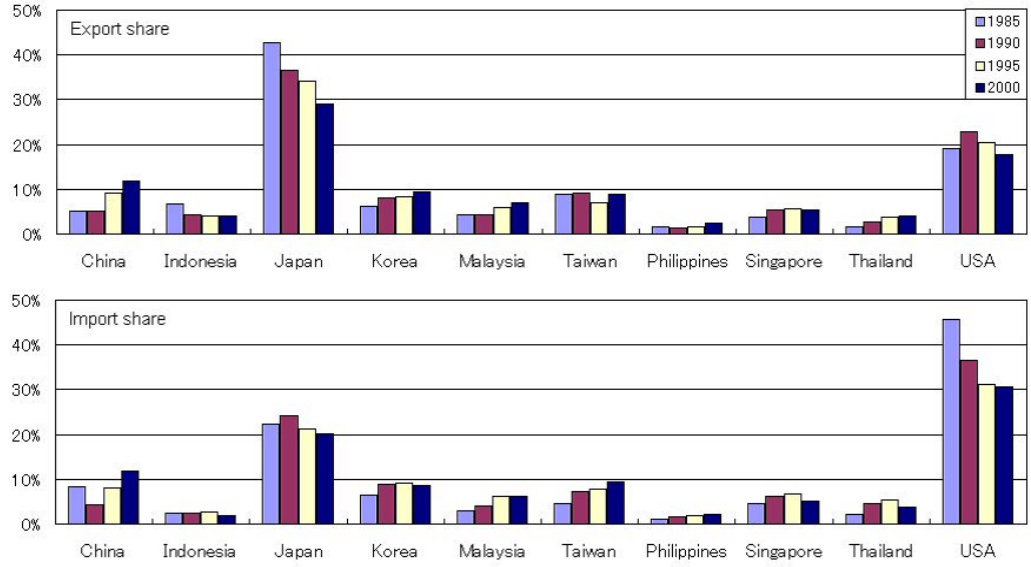

Figure 6: Export and Import Share

maps in Figure 7.

The horizontal axis and vertical axis in Figure 7 show destinations and origins, respectively. Changes in color and scope of contour lines year to year indicate the changes in interdependence in regional trade in East Asia. The coefficient of variation (for each survey year) in regional trade, excluding intracountry trade is as follows:

$$CV(1985) = 2.89, \quad CV(1990) = 2.27, \quad CV(1995) = 1.75, \quad CV(2000) = 1.56.$$

The decline in the coefficient of variation can be interpreted as showing the narrowing variation in intercountry trade in East Asia or the growing relationship of interdependence through trade.

In the sense that a country's exports are equal to its trade partner's imports from the country in question, we examine only country-by-country imports here. In 1985, China's main trading partners were Japan and the United States. The percentages of China's imports from these two countries of the total value of trade among the countries/regions covered in the AIO table are $C \leftarrow J(1985) = 5.78\%$ [15], $C \leftarrow U(1985) = 1.86\%$, respectively. The shares of China's trade with Japan and the United States dwindled sharply

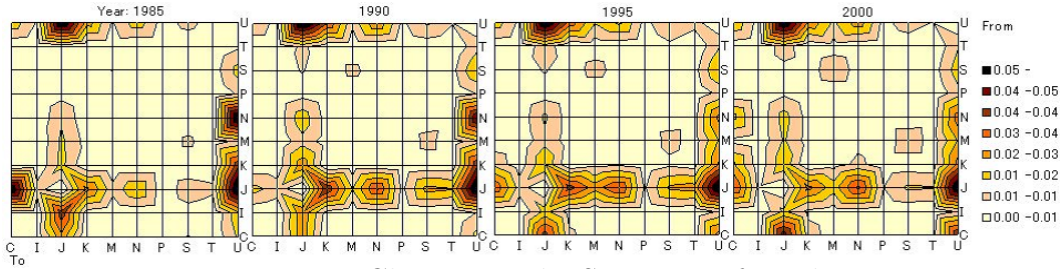

Figure 7: Changes in the Structure of Trade

[15]For the sake of convenience, the description $C \leftarrow J(1985) = 5.78\%$ represents the percentage of

as a result of economic sanctions imposed against China following the 1989 Tiananmen Square Incident ($C \leftarrow J(1990) = 1.65\%$, $C \leftarrow U(1990) = 1.39\%$). By 1995, the shares of trade with them had recovered ($C \leftarrow J(1995) = 3.38\%$, $C \leftarrow U(1995) = 1.79\%$), and the normalization of diplomatic relations between China and Korea in 1992 caused the share of China's trade with Korea to rise sharply from $C \leftarrow K(1990) = 0.15\%$ to $C \leftarrow K(1995) = 1.16\%$. In 2000, the share of China's trade with Korea rose further to $C \leftarrow K(2000) = 2.22\%$, and China's imports from China also began to surge ($C \leftarrow N(2000) = 2.34\%$). Consequently, China's import structure shifted from heavy dependence on Japan and the United States in 1985 to a much broader pattern that includes Korea and Taiwan as well as Japan and the Untied States.

Indonesia basically continued its Japan-dependent pattern of imports. In the 1997 Asian currency crisis, however, Indonesia was hit hardest economically among ASEAN countries and Korea that were particularly affected, with its GDP shrinking by 13.13% in 1998. The import share in 2000 declined from 1995,[16] apparently because of slowness to recover from the currency crisis. While imports from the United States fell in 2000, those from China increased remarkably.

Japan's import structure has several characteristics. First, its dependence on the United States steadily declined since 1990 ($J \leftarrow U(1985) = 11.26\%$, $J \leftarrow U(2000) = 6.83\%$). However, Japan's imports from China continued to expand, though they slowed temporarily in the aftermath of the 1989 Tiananmen Square Incident ($J \leftarrow C(1985) = 2.54\%$, $J \leftarrow C(2000) = 4.64\%$). While $J \leftarrow I(1985) = 3.90\%$ basically reflected energy-related imports, the import percentage declined to $J \leftarrow I(2000) = 1.54\%$ in 2000, apparently reflecting the progress in energy-saving production and consumption patterns in Japan.

While Korea's import structure is still characterized by its high dependence on Japan and the United States, imports from China increased noticeably following the normalization of diplomatic relations between Korea and China ($K \leftarrow C(1995) = 0.86\%$, $K \leftarrow C(2000) = 1.04\%$). In contrast, Korea's imports from the Untied States continued to dwindle ($K \leftarrow U(1995) = 3.23\%$, $K \leftarrow U(2000) = 2.70\%$).

Malaysia's economic development continued to expand its import share. While Japan and the United States remain the main sources of imports for Malaysia, its imports from Singapore tended to increase remarkably ($M \leftarrow S(1985) = 0.72\%$, $M \leftarrow S(2000) = 1.20\%$).

Taiwan's import structure basically depends on Japan and the United States ($N \leftarrow J(1985) = 2.09\%$, $N \leftarrow U(1985) = 1.79\%$), and its economic development has increased that dependence further ($N \leftarrow J(2000) = 3.66\%$, $N \leftarrow U(2000) = 2.49\%$). Increasing imports from China and Korea are also of note.

The Philippines basically depends on Japan and the United States. The contour maps do not indicate any noticeable changes in its import structure because of its relatively small economic scale. But the share of its imports to the total value of trade among the countries/regions covered in the AIO table increased substantially from 1.00% in 1985 to

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China's imports from Japan in 1985 of the total value of trade among the countries/regions (excluding intracountry trade) in the AIO table in the same year.

[16] As the AIO table is denominated in U.S. dollars, Indonesia's import share in 2000 may be underestimated because of the decline of the rupiah following the currency crisis.

2.28% in 2000.

Though Singapore's main sources of imports are still Japan and the United States, the contour maps clearly show increasing imports from Malaysia ($S \leftarrow M(1985) = 0.86\%$, $S \leftarrow M(2000) = 1.20\%$. Comparison between 1995 and 2000 reveals the shrinkage of the import share, apparently owing in part to delayed recovery from the 1997 Asian currency crisis.

Thailand accepted International Monetary Fund (IMF)-led international financial assistance following the 1997 currency crisis and implemented austere fiscal policies as advised by the IMF. Because of this, the domestic economy stagnated sharply in 1998, suffering negative growth of 10.8%. Thailand's import share remains relatively low, and its import pattern is basically dependent on Japan and the Untied States. Its import share shrank significantly after 1997 and appears to be still struggling to recover as of 2000.

The import structure of the United States underwent a variety of changes. In 1985 the share of imports from Japan was overwhelmingly high ($U \leftarrow J(1985) = 27.69\%$), followed by that from Taiwan ($U \leftarrow N(1985) = 6.52\%$) and Korea ($U \leftarrow K(1985) = 4.03\%$). By 2000, however, the shares of these countries/regions declined significantly ($U \leftarrow J(2000) = 12.83\%$, $U \leftarrow N(2000) = 3.19\%$, $U \leftarrow K(2000) = 3.11\%$). In contrast, U.S. imports from China continued to steadily increase ($U \leftarrow C(1985) = 1.55\%$, $U \leftarrow C(2000) = 4.27\%$).

4.2 Dispersion Power and Sensitivity Degree by Country

For measuring the interacting magnitude from the view point of international trade, we calculate the index of dispersion power and the index of sensitivity degree for all the countries/regions covered in AIO tables. Such kinds of index are most frequently used in the analysis of backward and forward linkages at sector level in national I-O's framework. Here we just apply the same calculation to country level.

If we express the index of sensitivity degrees(α_i) and the index of dispersion power(β_j) in equation form, we have the following:

$$\alpha_i = \frac{\sum_{j=1}^{n} B_{ij}}{\frac{1}{n}\sum_{i=1}^{n}\sum_{j=1}^{n} B_{ij}}, \qquad \beta_j = \frac{\sum_{i=1}^{n} B_{ij}}{\frac{1}{n}\sum_{j=1}^{n}\sum_{i=1}^{n} B_{ij}}. \tag{1}$$

Where, i represents the row country, j represents the column country, n is the number of countries in the AIO table, B_{ij} is the total (direct and indirect) requirement coefficient in each cell of the inverse matrix of the AIO transaction table (one country per sector).

In the framework of a multi-national I-O model, production by a particular country has the above two kinds of economic effects on other countries in the global economy. If country j increased its output, this means there will be increased import demands from country j (as a purchaser) on the countries (i) whose products are used as inputs to production in country j. β_j is used to measure the strength of this kind of interconnection of a particular country (j) to those countries from which it purchases inputs. On the other hand, increased output in country j also means additional amounts of product j that are available to be used as inputs to other countries (i) for their own production. So there will be increased supplies from country j (as a seller) for the countries (i) which use product j in their production. α_i is used to measure this kind of interconnection from the viewpoint of country i.

The following figure summarizes and standardizes the two indexes for each country and thus shows the strength of each country in the international trade.

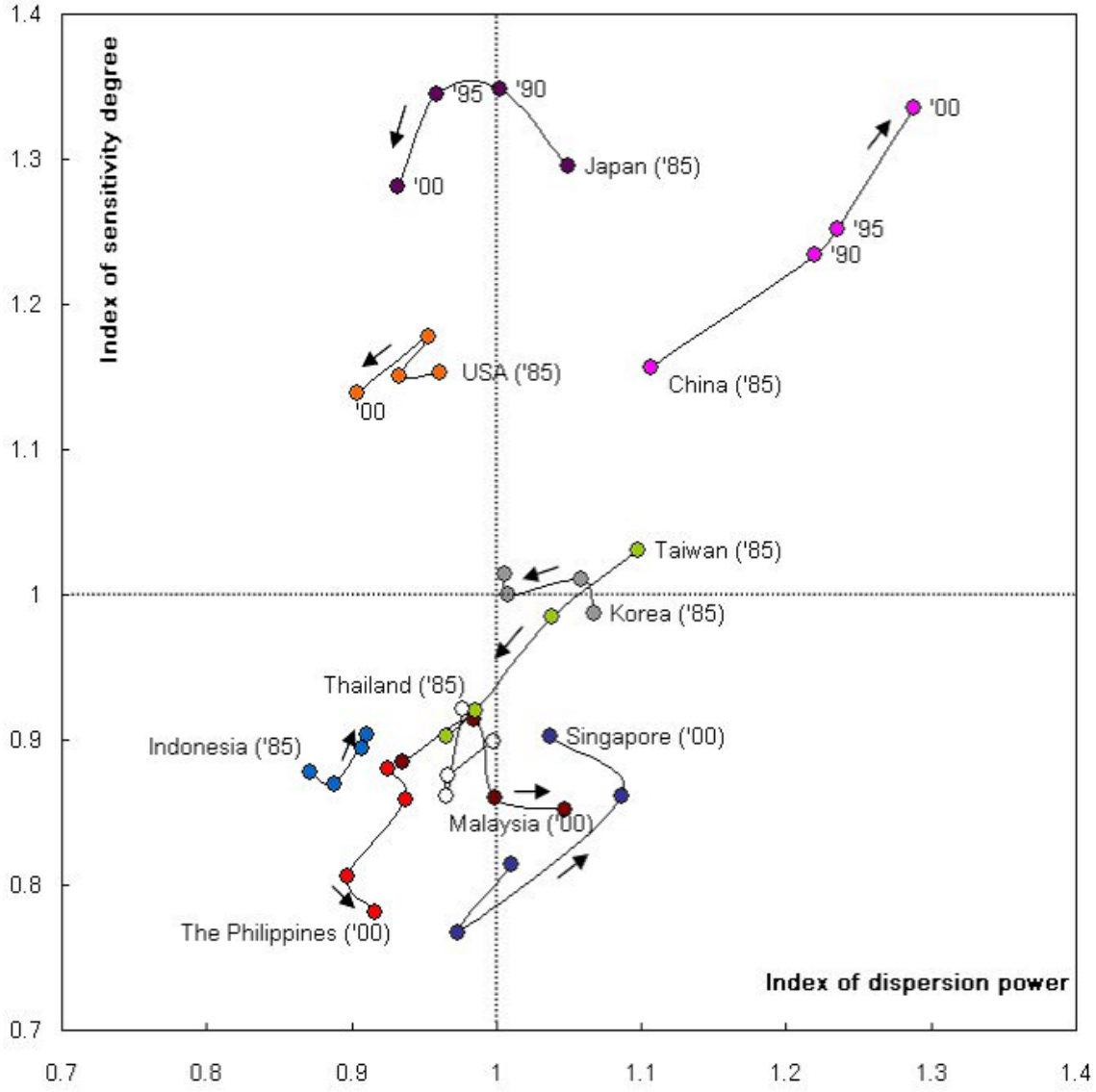

Figure 8: Index of dispersion power and sensitivity degree by country

Five distinct patterns emerge, (1) the countries with relatively large economic scale like Japan, USA and China have higher sensitivity degree indices than the average. (2) Developed countries like Japan and USA have mature economic structures, but their dispersion power indices show a decreasing trend. (3) China strengthens not only its dispersion power but also its sensitivity degree, and show a rapid increasing trend. (4) Since those of the NICs 3 that are successfully carrying out import substitution industrialization and export-oriented industrialization before 1985, they all have relatively high dispersion power indices. But Taiwan and Korean is losing their dispersion power rapidly, contrastively, Singapore still has a relatively high dispersion power and strengthen its

sensitivity degree continuously. (5) ASEAN 4 still trying to implement their power, but just Malaysia shows relatively high dispersion power after 1995.

From equation (1), it is easy to understand that the indices not only include the effects from other countries but also contain the domestic effect from its own country. For separating the effect coming from the domestic side, we define new indices respectively naming self-sensitivity degree(α'_i) and self-dispersion power(β'_j) as the following form:

$$\alpha'_i = \frac{B_{ii}}{\sum_{j=1}^{n} B_{ij}}, \qquad \beta'_j = \frac{B_{jj}}{\sum_{i=1}^{n} B_{ij}}. \tag{2}$$

By using such index we can have some new knowledge on the changing pattern of the interdependence among countries covered in AIO table. The following figure shows the changing route of the two kinds of index.

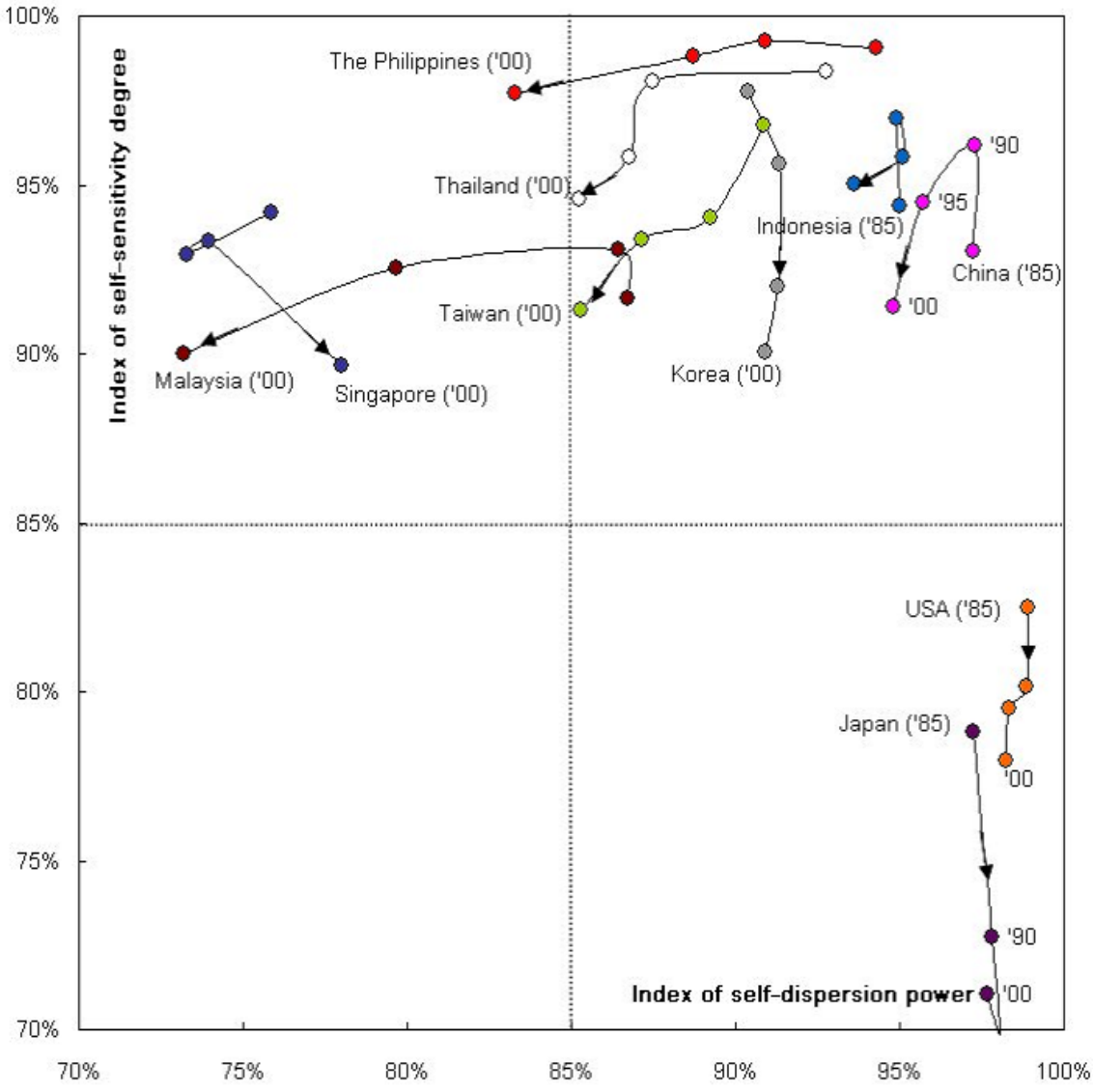

Figure 9: Index of self-dispersion power and self-sensitivity degree by country

Several distinct features emerge, (1) Larger economy has relatively bigger self-dispersion power, such as USA, Japan, China as well as Indonesia. It also means that self-dispersion power depends on the economic scale at some extent, and the domestic side has a major contribution on the backward linkage. In contrast, smaller economy has relatively lower self-dispersion power and the power has gone down rapidly during the 20 years. This fact implies that small economy in Asia-Pacific region becomes more open and has more affecting power on other overseas economies. (2) The developed country has a relatively lower self-sensitivity degree, such as USA and Japan, and there self-sensitivity degrees go down continually during the 2 decades. This fact means that developed countries in AIO table become much sensitive to accept influence from other developing counties. In contrast, developing country has relatively higher self-sensitivity degree. Generally speaking, from 1985 to 2000, relatively larger economy becomes much easier to accept effects overseas, relatively smaller economy continuously increases its affecting power on other economies.

4.3 Structural Changes in Interindustry Trade

In the previous section, we integrated the AIO table into one industry per country, and explained the structure of intercountry trade and its changes while passing over details about industry. In this section, we focus on details of interindustry trade, while ignoring the relationship between countries, by using the 7-sector AIO table.

Table 3: Interindustry Trade Structure

1985(%)	To: AGR	MIN	MNF	ELE	CON	TRD	SRV	**sum**
From: AGR	0.15	0.00	7.37	0.00	0.31	0.00	0.30	**8.14**
MIN	0.00	0.10	9.09	3.90	0.02	0.00	0.03	**13.14**
MNF	1.08	0.48	52.87	1.15	5.50	2.68	4.95	**68.71**
TRD	0.15	0.05	7.96	0.24	0.54	0.21	0.51	**9.67**
SRV	0.01	0.00	0.19	0.01	0.03	0.03	0.06	**0.34**
sum	**1.40**	**0.63**	**77.48**	**5.30**	**6.40**	**2.93**	**5.86**	**100.00**
1990								
AGR	0.20	0.00	5.64	0.00	0.01	0.00	0.39	**6.25**
MIN	0.00	0.02	5.37	2.39	0.05	0.05	0.01	**7.89**
MNF	1.07	0.32	58.13	0.88	5.52	2.78	8.72	**77.42**
TRD	0.14	0.02	6.13	0.15	0.49	0.22	0.92	**8.08**
SRV	0.00	0.00	0.11	0.01	0.06	0.03	0.15	**0.36**
sum	**1.42**	**0.37**	**75.38**	**3.42**	**6.14**	**3.07**	**10.19**	**100.00**
1995								
AGR	0.12	0.00	2.81	0.00	0.02	0.00	0.41	**3.38**
MIN	0.00	0.02	2.51	1.36	0.02	0.01	0.00	**3.93**
MNF	0.77	0.19	63.63	0.44	5.20	2.89	9.40	**82.51**
TRD	0.17	0.02	7.69	0.12	0.67	0.28	1.17	**10.11**
SRV	0.00	0.00	0.03	0.00	0.00	0.00	0.03	**0.07**
sum	**1.06**	**0.24**	**76.67**	**1.91**	**5.91**	**3.19**	**11.02**	**100.00**
2000								
AGR	0.19	0.00	1.80	0.00	0.01	0.00	0.27	**2.27**
MIN	0.00	0.04	2.21	1.35	0.03	0.00	0.00	**3.64**
MNF	0.63	0.43	66.67	0.51	4.29	2.69	8.23	**83.44**
TRD	0.12	0.06	7.62	0.11	0.55	0.35	1.09	**9.90**
SRV	0.00	0.07	0.32	0.02	0.02	0.08	0.24	**0.75**
sum	**0.94**	**0.59**	**78.62**	**2.00**	**4.90**	**3.12**	**9.83**	**100.00**

Table 3 shows the ratio of total trade value that intersectoral trade accounts for. Industry codes are abbreviated as AGR for agriculture, forestry and fisheries, MIN for mining, MNF for manufacturing, ELE for energy, CON for construction, TRD for commerce and transportation, and SRV for services. In input-output tables, as output of the construction sector, in definition, is recorded in the country where it is produced, the construction sector does not appear in vertical rows of Table 3. Also, as there is little intercountry trade by the energy sector in the AIO table, the energy sector does not appear in vertical rows of Table 3, either.

First, the sums of industry-by-industry shares in vertical rows do not indicate any significant change for each survey year, and even where there is change of note, there appears to be no unique pattern for that change. This indicates relative stability in import shares by industry in the AIO table. However, the internal structure is not necessarily stable. In particular, vertical rows for the manufacturing sector show continuous declines in imports from agriculture and mining but substantial increases in imports from manufacturing. Next, the sums of industry-by-industry shares in horizontal rows show significant changes. While continuous declines in export shares can be observed for agriculture and mining, the export share of products of the manufacturing sector substantially increased from 68.71% in 1985 to 83.44% in 2000. These facts indicate the progress of industrialization in East Asia as well as the rising concentration of interindustry trade in the manufacturing sector. Also noteworthy is the overwhelming share of the manufacturing sector in interindustry trade, which expanded dramatically from 52.87% in 1985 to 66.67% in 2000. This appears to demonstrate the progress in globalization and increased demand for diverse goods as well as the deepening and intensification of international division of labor, processing trade, and roundabout production.

(Bo Meng)

5 Backward Linkages of Asian Countries

In this section, we attempt to measure the backward linkage effect to examine the structure of interindustry relationships for countries covered in the 2000 AIO table. We conduct an analysis with particular heed given to changes seen in the spatial interdependence (integration), as referred to in the "Introduction" section.

According to Hirschman, the backward linkage effect means that "every nonprimary economic activity, will induce attempts to supply through domestic production the inputs needed in that activity"(Hirschman, 1958, p.100). Or, according to Torii, the backward linkage effect is defined as "the effect of the emergence of one industry in making the emergence of a materials supplier industry possible by inducing demand for raw materials from other industries" (Torii, 1979, p. 242). In an actual interindustry analysis, however, it is more common to measure the quantity of output that is induced for the entire industry by an increase in demand in an existing industrial sector or to measure the extent to which an amount of production is induced for the whole industry when a unit of demand is created in an industrial sector in a given country. There are several indicators to show the backward linkage effect. In this section, we attempt to make an analysis using two indicators. First, we make an analysis using the so-called Rasmussen index (index of power of dispersion), which represents deviation from the mean of column totals of the Leontief inverse matrix. Then, we attempt to analyze the backward linkage effect by directly using column totals of the Leontief inverse matrix as an index.

5.1 An Analysis with Use of the Index of Power of Dispersion

Table 4 shows the index of power of dispersion for 1985, 1990, 1995, and 2000. This index represents the relative value of each column total of the Leontief inverse matrix against the mean of all column totals. A sector with an index value of more than 1 has power of dispersion greater than the all-industry average, while a sector with an index value of less than 1 has power of dispersion smaller than the all-industry average. In intertemporal comparison, changes in the index value can be interpreted as relative changes in the magnitude of effects between different points of time.

As Table 4 indicates, first, the index value has increased almost unalterably since 1985 for all industries in China. Second, the effects of China's light industry, heavy and chemical industry, and other sectors of secondary industry were outstandingly large in the 1990, 1995, and 2000 tables. Third, the index value has been declining consistently for all industries in Japan. Fourth, on an all-industry basis, the index values have remained relatively small for both Indonesia and the Philippines since 1985. All in all, these changes suggest that in the region under review, the presence and influence of China's industries have been growing relatively and that the supply source of intermediate goods is increasingly shifting from Japan to China.

Next, we make an analysis by directly using column totals as an index to delve deeper into these characteristics.

Table 4: Changes of the Backward Linkages Effects （1985～2000）

Countries/Regions	Sectors	1985	1990	1995	2000
Indonesia	Primary Industry	0.635541	0.667714	0.674594	0.671173
	Light Industry	1.036102	1.021596	1.015229	0.993249
	Heavy (Chemical) Industry	0.951086	0.940402	0.962191	0.946778
	Other Secondary Industry	1.081554	1.066621	1.030253	0.992301
	Tertiary Industry	0.728860	0.766483	0.782761	0.804648
	Total	0.886628	0.892563	0.893006	0.881630
Malaysia	Primary Industry	0.697621	0.729477	0.704438	0.767473
	Light Industry	1.100075	1.174524	1.079336	1.172032
	Heavy (Chemical) Industry	1.010837	1.086856	1.047452	1.181444
	Other Secondary Industry	1.103471	1.129565	1.103990	1.049027
	Tertiary Industry	0.761172	0.851204	0.867421	0.805164
	Total	0.934635	0.994325	0.960528	0.995028
Philippines	Primary Industry	0.756274	0.785118	0.757412	0.732591
	Light Industry	1.050915	1.051585	1.015612	0.993909
	Heavy (Chemical) Industry	0.944756	0.954385	0.930815	1.020284
	Other Secondary Industry	0.995708	0.969293	0.916548	0.948814
	Tertiary Industry	0.795643	0.818115	0.798717	0.789134
	Total	0.908659	0.915699	0.883821	0.896946
Singapore	Primary Industry	0.978788	0.957522	1.065369	1.103476
	Light Industry	1.093336	1.107892	1.133391	1.091926
	Heavy (Chemical) Industry	1.058997	1.093068	1.229997	1.110587
	Other Secondary Industry	1.067303	0.923431	1.017082	1.085381
	Tertiary Industry	0.883818	0.796821	0.935191	0.911747
	Total	1.016448	0.975747	1.076206	1.060623
Tailand	Primary Industry	0.847977	0.801057	0.787072	0.827902
	Light Industry	1.080727	1.069937	1.057697	1.088781
	Heavy (Chemical) Industry	0.958895	1.026334	1.050080	1.040049
	Other Secondary Industry	1.151105	1.029424	1.012031	1.024842
	Tertiary Industry	0.813102	0.819347	0.810014	0.869133
	Total	0.970361	0.949220	0.943379	0.970142
China	Primary Industry	0.804527	0.926156	0.993184	0.996380
	Light Industry	1.196593	1.264318	1.271645	1.313909
	Heavy (Chemical) Industry	1.198513	1.346753	1.328865	1.387845
	Other Secondary Industry	1.249778	1.328558	1.330457	1.353341
	Tertiary Industry	0.952802	1.038213	1.046218	1.106225
	Total	1.080442	1.180800	1.194074	1.231540
Taiwan	Primary Industry	1.052527	0.995637	1.003343	0.989410
	Light Industry	1.255527	1.238201	1.203165	1.182837
	Heavy (Chemical) Industry	1.183960	1.181076	1.149784	1.157927
	Other Secondary Industry	1.138248	1.132396	1.096027	1.034928
	Tertiary Industry	0.791719	0.783778	0.755870	0.710465
	Total	1.084396	1.066218	1.041638	1.015113
Korea	Primary Industry	0.866061	0.848065	0.829760	0.865746
	Light Industry	1.234698	1.220179	1.128610	1.175437
	Heavy (Chemical) Industry	1.169701	1.180867	1.126202	1.140030
	Other Secondary Industry	1.096043	1.051454	1.067612	1.014062
	Tertiary Industry	0.819688	0.827597	0.798883	0.813374
	Total	1.037238	1.025632	0.990214	1.001730
Japan	Primary Industry	0.986843	0.937587	0.931606	0.923320
	Light Industry	1.186249	1.144061	1.104278	1.067286
	Heavy (Chemical) Industry	1.244727	1.185579	1.157702	1.129237
	Other Secondary Industry	1.099321	1.041224	1.025896	0.987630
	Tertiary Industry	0.828955	0.815704	0.796570	0.785449
	Total	1.069219	1.024831	1.003211	0.978585
U.S.A.	Primary Industry	0.942446	0.955508	1.008000	0.976378
	Light Industry	1.129895	1.069502	1.101745	1.043308
	Heavy (Chemical) Industry	1.125725	1.026110	1.090663	1.031532
	Other Secondary Industry	1.059289	0.996304	1.019803	0.986956
	Tertiary Industry	0.802507	0.827401	0.849420	0.805141
	Total	1.011972	0.974965	1.013926	0.968663

5.2 International Comparison of Backward Linkage Effects

First, the backward linkage effects in the 2000 AIO table are compared at the international level by focusing on the all-industry average. Figures shown in the bottom columns of Table 5 are indexes that show multiples of production in terms of the average initial demand for the whole of the 10 countries under review that are induced by an increase of demand by one unit from a certain industrial sector of a given country. A country with a high value of the all-industry average is generally seen to have relatively strong linkages with industries of other countries in the region. The country with the highest value (2.462) is China, followed by Singapore (2.120), Taiwan (2.029), and Korea (2.003), with all of them witnessing more than doubling of production induced. Countries with relatively low values include the Philippines (1.793) and Indonesia (1.763).

Next, we examine the backward linkage effects on domestic industries (domestic backward linkages), still using Table 5. The country with the highest value (2.318) is again China, followed by Japan (1.894), the United States (1.888), and Korea (1.810). The country with the lowest value (1.470) is the Philippines, then Malaysia (1.517) and Indonesia (1.626). Singapore (1.643) and Taiwan (1.729), which ranked relatively higher for the all-industry average of the backward linkage effects, are found to have relatively low index values compared with China, the United States, Japan, and Korea in terms of the backward linkage effects on domestic industries. In sum, China, Singapore, and Taiwan have strong linkages between domestic industries and industries of other countries, while such linkages are weak for the Philippines and Indonesia. In terms of the domestic backward linkages, Japan and the United States have high values in following China, but Singapore and Taiwan take backseats. Since these features are also observable in the 1995 AIO table, there appears to have been little change in these characteristics between 1995 and 2000.

The contribution from domestic industries to the backward linkage effects as a whole, or the contribution from the increase in output induced by the one unit of the increase in demand for a given industrial sector that can be satisfied by domestic industries, can also be derived from Table 5. In other words, if these contributions are down from 1995, it means that the interdependence between countries concerned has been deepened. While the contribution for 2000 stands above 90% for the United States (97.5%), Japan (96.8%), China (94.1%), Indonesia (92.2%), and Korea (90.4%), around 20% of demand generated for domestic industries is leaking out abroad for Malaysia (76.3%), Singapore (77.5%), and the Philippines (82.0%). Similar features were observed in the 1995 table. Meanwhile, the contribution fell from 1995 for all countries under review other than Singapore, indicating that links between industries of countries concerned tend to grow stronger as a whole.

We now more closely examine the production inducement effects that leak out overseas, using the above-mentioned contributions derived from Table 5. First, for all countries under review, such effects are the largest on Japanese industries. For Malaysia, which has the largest leakage rate, 4.9% of the newly generated demand was diverted to Japan, with Singapore and the Philippines also showing relatively high figures of 4.9% and 3.9%, respectively. Second, the United States was the second largest recipient of such leaked demand, except for the case of China. These developments are indicative of the importance of Japan and the United States concerning newly created demand in other countries

Table 5: Backward Linkages Effects for 2000

I. Average Backward Linkages Effects by 5-Sector Classification (2000)

	Indonesia		Malaysia		Philippines		Singapore		Thailand		China		Taiwan		Korea		Japan		U.S.A.	
	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio
Indonesia	1.6257	92.2%	0.0179	0.9%	0.0118	0.7%	0.0169	0.8%	0.0110	0.6%	0.0045	0.2%	0.0112	0.5%	0.0103	0.5%	0.0053	0.3%	0.0015	0.1%
Malaysia	0.0096	0.5%	1.5172	76.3%	0.0187	1.0%	0.0838	4.0%	0.0208	1.1%	0.0055	0.2%	0.0148	0.7%	0.0081	0.4%	0.0040	0.2%	0.0027	0.1%
Philippines	0.0007	0.0%	0.0082	0.4%	1.4703	82.0%	0.0033	0.2%	0.0036	0.2%	0.0014	0.1%	0.0058	0.3%	0.0022	0.1%	0.0013	0.1%	0.0014	0.1%
Singapore	0.0079	0.4%	0.0689	3.5%	0.0286	1.6%	1.6428	77.5%	0.0182	0.9%	0.0049	0.2%	0.0128	0.6%	0.0051	0.3%	0.0014	0.1%	0.0020	0.1%
Thailand	0.0058	0.3%	0.0262	1.3%	0.0119	0.7%	0.0240	1.1%	1.6438	84.8%	0.0036	0.1%	0.0083	0.4%	0.0036	0.2%	0.0026	0.1%	0.0017	0.1%
China	0.0189	1.1%	0.0370	1.9%	0.0199	1.1%	0.0497	2.3%	0.0352	1.8%	2.3180	94.1%	0.0263	1.3%	0.0322	1.6%	0.0118	0.6%	0.0095	0.5%
Taiwan	0.0085	0.5%	0.0377	1.9%	0.0234	1.3%	0.0221	1.0%	0.0200	1.0%	0.0248	1.0%	1.7293	85.2%	0.0094	0.5%	0.0051	0.3%	0.0054	0.3%
Korea	0.0159	0.9%	0.0316	1.6%	0.0374	2.1%	0.0259	1.2%	0.0208	1.1%	0.0281	1.1%	0.0311	1.5%	1.8102	90.4%	0.0070	0.4%	0.0057	0.3%
Japan	0.0443	2.5%	0.1476	7.4%	0.1013	5.7%	0.1478	7.0%	0.1143	5.9%	0.0474	1.9%	0.1182	5.8%	0.0642	3.2%	1.8943	96.8%	0.0190	1.0%
U.S.A.	0.0254	1.4%	0.0971	4.9%	0.0698	3.9%	0.1041	4.9%	0.0518	2.7%	0.0240	1.0%	0.0717	3.5%	0.0574	2.9%	0.0237	1.2%	1.8877	97.5%
Total	1.7626	100.0%	1.9893	100.0%	1.7932	100.0%	2.1204	100.0%	1.9395	100.0%	2.4621	100.0%	2.0294	100.0%	2.0027	100.0%	1.9564	100.0%	1.9366	100.0%

II. Backward Linkages Effects of Light Industry (2000)

	Indonesia		Malaysia		Philippines		Singapore		Thailand		China		Taiwan		Korea		Japan		U.S.A.	
	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio
Indonesia	1.8372	92.5%	0.0347	1.5%	0.0113	0.6%	0.0239	1.1%	0.0159	0.7%	0.0076	0.3%	0.0177	0.7%	0.0143	0.6%	0.0058	0.3%	0.0024	0.1%
Malaysia	0.0099	0.5%	1.8218	77.8%	0.0121	0.6%	0.0960	4.4%	0.0190	0.9%	0.0055	0.2%	0.0166	0.7%	0.0083	0.4%	0.0049	0.2%	0.0027	0.1%
Philippines	0.0007	0.0%	0.0060	0.3%	1.7522	88.2%	0.0040	0.2%	0.0030	0.1%	0.0012	0.0%	0.0051	0.2%	0.0024	0.1%	0.0014	0.1%	0.0015	0.1%
Singapore	0.0071	0.4%	0.0781	3.3%	0.0164	0.8%	1.5896	72.8%	0.0199	0.9%	0.0039	0.1%	0.0105	0.4%	0.0043	0.2%	0.0014	0.1%	0.0016	0.1%
Thailand	0.0081	0.4%	0.0343	1.5%	0.0116	0.6%	0.0257	1.2%	1.8628	85.6%	0.0040	0.2%	0.0131	0.6%	0.0062	0.3%	0.0039	0.2%	0.0025	0.1%
China	0.0206	1.0%	0.0582	2.5%	0.0249	1.3%	0.0629	2.9%	0.0443	2.0%	2.4567	93.5%	0.0302	1.3%	0.0642	2.7%	0.0175	0.8%	0.0099	0.5%
Taiwan	0.0105	0.5%	0.0472	2.0%	0.0308	1.6%	0.0257	1.2%	0.0291	1.3%	0.0329	1.3%	2.0025	84.7%	0.0118	0.5%	0.0053	0.2%	0.0059	0.3%
Korea	0.0205	1.0%	0.0330	1.4%	0.0294	1.5%	0.0302	1.4%	0.0243	1.1%	0.0384	1.5%	0.0336	1.4%	2.0955	89.2%	0.0076	0.4%	0.0060	0.3%
Japan	0.0317	1.6%	0.1384	5.9%	0.0475	2.4%	0.1708	7.8%	0.0997	4.6%	0.0495	1.9%	0.1219	5.2%	0.0643	2.7%	2.0440	95.8%	0.0164	0.8%
U.S.A.	0.0396	2.0%	0.0914	3.9%	0.0509	2.6%	0.1541	7.1%	0.0587	2.7%	0.0272	1.0%	0.1136	4.8%	0.0788	3.4%	0.0419	2.0%	2.0369	97.7%
Total	1.9857	100.0%	2.3432	100.0%	1.9870	100.0%	2.1830	100.0%	2.1767	100.0%	2.6268	100.0%	2.3648	100.0%	2.3500	100.0%	2.1337	100.0%	2.0858	100.0%

III. Backward Linkages Effects of Heavy (Chemical) Industry (2000)

	Indonesia		Malaysia		Philippines		Singapore		Thailand		China		Taiwan		Korea		Japan		U.S.A.	
	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio
Indonesia	1.6434	86.8%	0.0235	1.0%	0.0179	0.9%	0.0236	1.1%	0.0182	0.9%	0.0057	0.2%	0.0167	0.7%	0.0176	0.8%	0.0068	0.3%	0.0017	0.1%
Malaysia	0.0199	1.0%	1.4263	60.4%	0.0352	1.7%	0.1142	5.1%	0.0458	2.2%	0.0089	0.3%	0.0319	1.4%	0.0182	0.8%	0.0062	0.3%	0.0062	0.3%
Philippines	0.0012	0.1%	0.0222	0.9%	1.2761	62.6%	0.0051	0.2%	0.0085	0.4%	0.0025	0.1%	0.0152	0.7%	0.0053	0.2%	0.0028	0.1%	0.0032	0.2%
Singapore	0.0134	0.7%	0.1409	6.0%	0.0535	2.6%	1.4637	65.9%	0.0407	2.0%	0.0078	0.3%	0.0283	1.2%	0.0125	0.6%	0.0033	0.1%	0.0053	0.3%
Thailand	0.0107	0.6%	0.0490	2.1%	0.0247	1.2%	0.0329	1.5%	1.4571	70.1%	0.0052	0.2%	0.0147	0.6%	0.0058	0.3%	0.0044	0.2%	0.0031	0.2%
China	0.0363	1.9%	0.0618	2.6%	0.0343	1.7%	0.0763	3.4%	0.0684	3.3%	2.5611	92.3%	0.0520	2.2%	0.0445	2.0%	0.0190	0.8%	0.0154	0.7%
Taiwan	0.0145	0.8%	0.0717	3.0%	0.0470	2.3%	0.0373	1.7%	0.0359	1.7%	0.0372	1.3%	1.6974	73.3%	0.0209	0.9%	0.0119	0.5%	0.0118	0.6%
Korea	0.0244	1.3%	0.0658	2.8%	0.0831	4.1%	0.0480	2.2%	0.0429	2.1%	0.0403	1.5%	0.0684	3.0%	1.8922	83.0%	0.0143	0.6%	0.0130	0.6%
Japan	0.0904	4.8%	0.2879	12.2%	0.2836	13.9%	0.2609	11.8%	0.2542	12.2%	0.0717	2.6%	0.2632	11.4%	0.1498	6.6%	2.1537	95.4%	0.0446	2.2%
U.S.A.	0.0388	2.0%	0.2131	9.0%	0.1844	9.0%	0.1581	7.1%	0.1076	5.2%	0.0342	1.2%	0.1272	5.5%	0.1122	4.9%	0.0353	1.6%	1.9579	94.9%
Total	1.8928	100.0%	2.3620	100.0%	2.0398	100.0%	2.2203	100.0%	2.0793	100.0%	2.7746	100.0%	2.3150	100.0%	2.2792	100.0%	2.2576	100.0%	2.0623	100.0%

Table 6: Backward Linkages Effects for 1995

I. Average Backward Linkages Effects (1995 by Five-Sector Classification)

	Indonesia		Malaysia		Philippines		Singapore		Thailand		China		Taiwan		Korea		Japan		U.S.A.	
	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio
Indonesia	1.6331	92.9%	0.0098	0.5%	0.0103	0.6%	0.0242	1.1%	0.0046	0.2%	0.0036	0.2%	0.0109	0.5%	0.0081	0.4%	0.0042	0.2%	0.0011	0.1%
Malaysia	0.0043	0.2%	1.5087	79.8%	0.0105	0.6%	0.0609	2.9%	0.0179	1.0%	0.0038	0.2%	0.0118	0.6%	0.0064	0.3%	0.0026	0.1%	0.0026	0.1%
Philippines	0.0004	0.0%	0.0025	0.1%	1.4918	85.8%	0.0048	0.2%	0.0034	0.2%	0.0005	0.0%	0.0020	0.1%	0.0011	0.1%	0.0008	0.0%	0.0011	0.1%
Singapore	0.0085	0.5%	0.0413	2.2%	0.0130	0.7%	1.5696	74.1%	0.0201	1.1%	0.0039	0.2%	0.0099	0.5%	0.0034	0.2%	0.0013	0.1%	0.0022	0.1%
Thailand	0.0021	0.1%	0.0120	0.6%	0.0039	0.2%	0.0310	1.5%	1.5755	84.9%	0.0024	0.1%	0.0050	0.2%	0.0023	0.1%	0.0021	0.1%	0.0015	0.1%
China	0.0103	0.6%	0.0203	1.1%	0.0181	1.0%	0.0357	1.7%	0.0176	0.9%	2.2364	95.2%	0.0197	1.0%	0.0229	1.2%	0.0077	0.4%	0.0046	0.2%
Taiwan	0.0078	0.4%	0.0249	1.3%	0.0232	1.3%	0.0299	1.4%	0.0179	1.0%	0.0080	0.3%	1.7607	85.9%	0.0065	0.3%	0.0033	0.2%	0.0042	0.2%
Korea	0.0119	0.7%	0.0247	1.3%	0.0230	1.3%	0.0391	1.8%	0.0183	1.0%	0.0171	0.7%	0.0185	0.9%	1.7668	90.7%	0.0052	0.3%	0.0044	0.2%
Japan	0.0540	3.1%	0.1693	9.0%	0.0815	4.7%	0.2052	9.7%	0.1263	6.8%	0.0490	2.1%	0.1271	6.2%	0.0699	3.6%	1.9242	97.5%	0.0215	1.1%
U.S.A.	0.0247	1.4%	0.0766	4.1%	0.0639	3.7%	0.1172	5.5%	0.0548	3.0%	0.0249	1.1%	0.0841	4.1%	0.0613	3.1%	0.0229	1.2%	1.9519	97.8%
Total	1.7573	100.0%	1.8901	100.0%	1.7392	100.0%	2.1178	100.0%	1.8564	100.0%	2.3497	100.0%	2.0497	100.0%	1.9485	100.0%	1.9741	100.0%	1.9952	100.0%

II. Backward Linkages Effects of Light Industry (1995)

	Indonesia		Malaysia		Philippines		Singapore		Thailand		China		Taiwan		Korea		Japan		U.S.A.	
	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio
Indonesia	1.8861	94.4%	0.0192	0.9%	0.0133	0.7%	0.0365	1.6%	0.0077	0.4%	0.0052	0.2%	0.0197	0.8%	0.0117	0.5%	0.0053	0.2%	0.0015	0.1%
Malaysia	0.0039	0.2%	1.6772	79.0%	0.0169	0.8%	0.0828	3.7%	0.0144	0.7%	0.0054	0.2%	0.0183	0.8%	0.0108	0.5%	0.0039	0.2%	0.0020	0.1%
Philippines	0.0004	0.0%	0.0033	0.2%	1.7268	86.4%	0.0042	0.2%	0.0021	0.1%	0.0004	0.0%	0.0019	0.1%	0.0015	0.1%	0.0008	0.0%	0.0018	0.1%
Singapore	0.0064	0.3%	0.0444	2.1%	0.0113	0.6%	1.6509	74.0%	0.0156	0.7%	0.0033	0.1%	0.0085	0.4%	0.0029	0.1%	0.0013	0.1%	0.0015	0.1%
Thailand	0.0028	0.1%	0.0164	0.8%	0.0046	0.2%	0.0236	1.1%	1.8120	87.1%	0.0043	0.2%	0.0086	0.4%	0.0049	0.2%	0.0034	0.2%	0.0023	0.1%
China	0.0071	0.4%	0.0355	1.7%	0.0155	0.8%	0.0495	2.2%	0.0221	1.1%	2.3593	94.3%	0.0252	1.1%	0.0450	2.0%	0.0108	0.5%	0.0050	0.2%
Taiwan	0.0088	0.4%	0.0352	1.7%	0.0531	2.7%	0.0387	1.7%	0.0251	1.2%	0.0089	0.4%	1.9953	84.3%	0.0119	0.5%	0.0052	0.2%	0.0039	0.2%
Korea	0.0153	0.8%	0.0271	1.3%	0.0293	1.5%	0.0340	1.5%	0.0205	1.0%	0.0289	1.2%	0.0229	1.0%	1.9626	88.4%	0.0062	0.3%	0.0042	0.2%
Japan	0.0339	1.7%	0.1704	8.0%	0.0516	2.6%	0.1798	8.1%	0.1000	4.8%	0.0492	2.0%	0.1294	5.5%	0.0678	3.1%	2.0944	96.4%	0.0162	0.7%
U.S.A.	0.0332	1.7%	0.0952	4.5%	0.0763	3.8%	0.1303	5.8%	0.0620	3.0%	0.0375	1.5%	0.1378	5.8%	0.1017	4.6%	0.0419	1.9%	2.1297	98.2%
Total	1.9978	100.0%	2.1239	100.0%	1.9985	100.0%	2.2303	100.0%	2.0813	100.0%	2.5023	100.0%	2.3676	100.0%	2.2209	100.0%	2.1730	100.0%	2.1680	100.0%

III. Backward Linkages Effects of Heavy (Chemical) Industry (1995)

	Indonesia		Malaysia		Philippines		Singapore		Thailand		China		Taiwan		Korea		Japan		U.S.A.	
	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio	Value	Ratio
Indonesia	1.6038	84.7%	0.0106	0.5%	0.0160	0.9%	0.0264	1.1%	0.0073	0.4%	0.0048	0.2%	0.0122	0.5%	0.0081	0.4%	0.0054	0.2%	0.0015	0.1%
Malaysia	0.0101	0.5%	1.4479	70.2%	0.0174	1.0%	0.0936	3.9%	0.0385	1.9%	0.0055	0.2%	0.0195	0.9%	0.0101	0.5%	0.0038	0.2%	0.0060	0.3%
Philippines	0.0008	0.0%	0.0041	0.2%	1.3824	75.5%	0.0119	0.5%	0.0091	0.4%	0.0010	0.0%	0.0049	0.2%	0.0025	0.1%	0.0015	0.1%	0.0019	0.1%
Singapore	0.0168	0.9%	0.0726	3.5%	0.0259	1.4%	1.5167	62.7%	0.0426	2.1%	0.0057	0.2%	0.0194	0.9%	0.0084	0.4%	0.0032	0.1%	0.0055	0.3%
Thailand	0.0038	0.2%	0.0168	0.8%	0.0068	0.4%	0.0602	2.5%	1.4682	71.1%	0.0027	0.1%	0.0072	0.3%	0.0034	0.2%	0.0033	0.1%	0.0024	0.1%
China	0.0247	1.3%	0.0223	1.1%	0.0292	1.6%	0.0378	1.6%	0.0307	1.5%	2.4374	93.2%	0.0352	1.6%	0.0355	1.6%	0.0132	0.6%	0.0077	0.4%
Taiwan	0.0169	0.9%	0.0361	1.8%	0.0262	1.4%	0.0405	1.7%	0.0334	1.6%	0.0132	0.5%	1.7164	75.9%	0.0110	0.5%	0.0057	0.3%	0.0086	0.4%
Korea	0.0234	1.2%	0.0381	1.8%	0.0394	2.2%	0.0798	3.3%	0.0298	1.4%	0.0243	0.9%	0.0383	1.7%	1.8702	84.4%	0.0108	0.5%	0.0100	0.5%
Japan	0.1433	7.6%	0.2865	13.9%	0.1684	9.2%	0.3679	15.2%	0.2932	14.2%	0.0878	3.4%	0.2700	11.9%	0.1620	7.3%	2.1964	96.4%	0.0493	2.3%
U.S.A.	0.0497	2.6%	0.1261	6.1%	0.1199	6.5%	0.1856	7.7%	0.1136	5.5%	0.0326	1.2%	0.1395	6.2%	0.1051	4.7%	0.0348	1.5%	2.0532	95.7%
Total	1.8934	100.0%	2.0612	100.0%	1.8317	100.0%	2.4204	100.0%	2.0663	100.0%	2.6149	100.0%	2.2625	100.0%	2.2161	100.0%	2.2781	100.0%	2.1462	100.0%

as part of the backward linkage effects. As for production induced in other countries to satisfy demand leaked out of China, Korea had the second largest share of such demand and the United States the fourth largest, after Taiwan.

The structure characterized by the large presence of Japan and the United States can also be observed in the 1995 table. However, the share of the production inducement effects on Japanese industries declined in 2000 from the 1995 table for all countries under review. The losses in the Japanese shares appear to have been picked up mainly by China and Korea, whose shares have risen between 1995 and 2000, though there is no categorical confirmation of this. China's and Korea's industries are believed to be gaining in importance by strengthening linkages with industries of other countries covered in the AIO table.

5.3 Industry-by-Industry Comparison

Next, we examine the backward linkage effects by industry. We focus on the manufacturing sector and consider light industry and heavy and chemical industry for comparison, using Tables 5-II, III and 6-II, III.

First, we look at the percentage of the increase in output induced by the one unit of the increase in demand that can be satisfied by domestic industries. As pointed out earlier, if the percentage is lower than that of 1995, it is interpreted that interdependence in a given area has increased in intensity. It can be observed easily that the backward linkage effect on domestic industries is greater for light industry than for heavy and chemical industry. In light industry, only Singapore (72.8%) and Malaysia (77.8%) have contributions lower than 80%. In heavy and chemical industry, however, five countries have contributions lower than 80%: Malaysia (60.4%), the Philippines (62.6%), Singapore (65.9%), Thailand (70.1%), and Taiwan (73.3%). These patterns are the same as in 1995. The big difference from the 1995 table is the fact that in heavy and chemical industry, the contributions are down by as much as 9.8 percentage points for Malaysia and 12.9 points for the Philippines (Table 5-III, 6-III). There is little structural change from the 1995 table for light industry (Table 5-II, 6-II).

Next, we examine differences, if any, in the inducement effects to other countries between light and heavy and chemical industries. In this respect, the inducement effects are the largest on Japan for all countries under review other than Japan in heavy and chemical industry, with the United States coming in second. However, as seen in the all-industry average, the share of the effects on Japan declined from the 1995 table in heavy and chemical industry, with the shares of Korea and China rising (Table 5-III, 6-III). In light industry, many countries also had their largest inducement effects on Japan, but Indonesia, the Philippines, and Korea had their largest effects on the United States. The share of the effects on Japan also was lower than in the 1995 table, as was expected, while the share of the effects on China rose from 1995 for all countries under review (Table 5-II, 6-II).

5.4 Key Findings

Above, we examined the interindustry structure in the region under review by looking at the backward linkage effects of the 2000 AIO table. The main findings are as follows:

First, the index of power of dispersion was by far the largest for China in the 2000 table, and the index value for China showed a clear uptrend when compared with the 1985, 1990, and 1995 tables, indicating the trend that the center of influence in the region under review is shifting from Japan to China.

Second, the all-industry average of the backward linkage effects was the largest for China, followed by Singapore and Taiwan. This indicates that on average, industries in these countries have strong linkages with domestic industries as well as industries of other countries. Indonesia and the Philippines have low index values. These features are not much different from the 1995 table.

Third, narrowly focusing on the backward linkage effects on domestic industries on an all-industry average basis, China, Japan, and the United States have high index values, indicating that these countries' domestic industrial bases have relatively strong structures to respond to newly generated demand. These features are not much different from those seen in the 1995 table, either.

Fourth, as for the inducement effects leaking out overseas on an all-industry basis, the effects on Japan and the United States stand out, meaning that these countries are responding to demand from Asian countries while at the same time satisfying domestic demand. These characteristics are not much different from those seen in the 1995 table. However, while the shares of the backward linkage effects on China and Korea rose from 1995 for all countries under review, the share of the effects on Japan declined. Furthermore, the shares of domestic industries in the overall backward linkage effects dropped for all countries other than Singapore, suggesting deepening interdependence in the region under review.

Fifth, in the manufacturing sector, the backward linkage effects on domestic industries were relatively high in light industry in all countries in comparison with heavy and chemical industry, as in the 1995 table. However, the share of the effects on domestic industries in the overall backward linkage effects declined noticeably from 1995 in heavy and chemical industry in the Philippines and Malaysia.

Sixth, as for the inducement effects to other countries in the manufacturing sector, the effects on Japan and the United States remain importantly large. The remarkable feature of the 2000 table, in comparison with the 1995 table, is the dwindling tendency of the share of the effects on Japan in both light and heavy and chemical industries. In turn, the effects on China and Korea increased in heavy and chemical industry. In light industry, the shares of the effects on China rose from the 1995 levels for all countries under review.

In summary, while the presence of Japan and the United States remains huge in the region under review, the comparison with the 1995 table indicates that, first, the interdependence in the region is intensifying and, second, the importance of China and Korea, and particularly of China, appear to be rising in the region. While this paper is based on the five-sector interindustry table, further studies with the use of the 24-sector table and the 76-sector table should lead to more interesting facts.

(Hajime Sato)

6 Final Demand Interdependence of Asian Countries

In this section, using the newly completed 2000 AIO table and the 1995 AIO table, we measure the degree of dependence of production induced on final demand in countries under review for the purpose of making international comparisons in terms of the degree of dependence and ascertaining changes in industrial structures between the two different points of time. The degree of dependence of production induced on final demand is an indicator of to what extent production of a particular product in a given country is influenced by final demand in other countries. Conversely, it is also possible to observe the impact of final demand at home on production in other countries.

6.1 Comparison on an All-Industry Basis

Table 7-I shows the value of production induced and the degree of dependence on final demand on an all-industry basis in 1995 and 2000 in the countries under review.

First, based on the degree of dependence on domestic final demand shown on the diagonal line in the tables, the countries under review can be classified roughly into three groups: Malaysia and Singapore (with dependence of 40% or lower), Japan and the United States (with dependence of around 90%), and the remainder (with dependence ranging from 60% to less than 80%). This indicates that Malaysia and Singapore are the countries that have industrial structures with the highest dependence on overseas demand, with no discernable big change in this respect between 1995 and 2000. In other words, it is assumed that the domestic economies of these two countries are very vulnerable to increases/decreases in exports, but these structures have not changed much between 1995 and 2000. Japan and the United States have industrial structures quite the opposite of those of Malaysia and Singapore, with dependence on domestic final demand standing out at 90% and 91.5%, respectively, in 2000, an indication that their industrial structures have tilted toward domestic demand a little further. Next, it is observed that countries in between the above two groups have undergone relatively significant change between 1995 and 2000.

Indonesia's dependence on domestic final demand was 80.6% in 1995. But its domestic demand-led "full-set economy" rapidly became external demand-dependent by 2000, with the dependence on domestic final demand falling 15.2 points to 65.4%, almost matching Taiwan (64.6% in 2000). The devaluation of the rupiah in the wake of the 1997 currency crisis led to a rapid expansion of exports, which apparently transformed the Indonesian economy into an export-dependent structure. Thus, this change primarily stemmed from the decline of the rupiah and does not warrant a definitive conclusion that Indonesia's industrial structure has changed. During the same period, the dependence on domestic final demand also fell 9.5 points to 63% for the Philippines and 7.3 points to 60.7% for Thailand, showing increased dependence on external demand, presumably owing to the impact of the currency crisis, as in the case of Indonesia. The percentage for China was about 79% in 2000, with only a tiny change of 0.6 point from 1995, with the slow pace of change apparently stemming from the sheer size of its economy. Despite the substantial devaluation of the won in the currency crisis, Korea's changed little, from 74.7% to 74.0%, indicating a rapid recovery in its domestic demand-led industrial structure.

Next, looking into individual countries' dependence on other countries, the significant dependence on Japan and the United States is immediately obvious. The dependence on the United States was larger than that on Japan for all countries, except for Indonesia and China, in 1995. The apparent tendency is toward an even greater dependence on the United Stats.

While the interdependence between Singapore and Malaysia stands out, Singapore's dependence on Malaysia declined somewhat in 2000. Also noteworthy is the growing dependence on China. Other than Japan and the United States, China is one of the two countries on which all countries have the highest dependence. In particular, Taiwan's dependence on China increased from 1.5% in 1995 to 3.6% in 2000, exceeding its 3.1% dependence on Japan. Similarly, Korea's dependence on China grew to 2.1% in 2000, close to its dependence of 2.3% on China.

6.2 Comparison by Industry

Next, we examine the dependence on final demand by industry, in reference to Table 7-II (Final Demand Dependence of Light Industry) and Table 7-III (Final Demand Dependence of Heavy and Chemical Industry).

In terms of the value of production induced by light and heavy industries, heavy industry induced more production than light industry in 2000 in all countries other than Indonesia, indicating an expansion of exports of heavy-industry products. Countries with big gaps in dependence between light and heavy industries in 2000 are the Philippines (78.1% vs. 22.9%), Singapore (43.8% vs. 13.8%). and Taiwan (45.1% vs. 28.5%).

As for the dependence on domestic final demand of light industry in 2000, Malaysia's very low dependence of 29.0% indicates its heavy dependence on external demand. Other than Japan and the United States, countries with high dependence on domestic final demand include Indonesia (61.5%), the Philippines (78.1%), China (66.1%), and Korea (64.3%). The presence of Japan and the United States is overwhelming as countries Asian countries depend on for export demand. As with an all-industry basis, Malaysia and Singapore have a high degree of interdependence of light industry as well. Asian countries also show relatively high dependence on Taiwan and Korea. Dependence on China has also been rapidly rising: 3.2% for Malaysia, 5.6% for Taiwan, and 3.8% for Korea in 2000. While the absolute value is still small, Japan's dependence on China stands at 0.8%, the largest among Asian countries. Taiwan's dependence on China accelerated from 1.5% in 1995 to 5.6% in 2000, indicating a rapid pace of increase in dependence during this period. Within ASEAN, aside from the deep interdependence of Singapore and Malaysia, Indonesia largely depends on Malaysia, Malaysia on Thailand, Singapore also on Thailand, and Thailand on Malaysia. The Philippines has lessened its dependence on all ASEAN countries, an indication of a sort of polarization.

In heavy industry, Malaysia and Singapore depend heavily on overseas markets, with their dependence on domestic markets remaining very low, at 13.7% and 13.9%, respectively, in 2000. The Philippines' dependence on the domestic market declined significantly from 53.5% in 1995 to 22.9% in 2000. Except for Singapore, all countries increased their dependence on overseas markets during the same period. The dependence on domestic markets declined from 76.4% in 1995 to 53.7% in 2000 for Indonesia, from 55.5% to 34.4%

Table 7: Contribution Ratios of Final Demand on Output

I. One Sector per Economy	Year	Impact (Billion $)	Contribution Ratios (%)											
			Indonesia	malaysia	Pilippines	Singapore	Thailand	China	Taiwan	Korea	Japan	U.S.A.	Others	Total
Indonesia	1995	442	80.6	0.3	0.2	0.5	0.2	0.6	0.4	0.8	4.2	2.9	9.3	100
	2000	321	65.4	0.6	0.3	0.6	0.5	1.7	0.8	1.6	7.3	5.4	15.8	100
malaysia	1995	205	0.6	40.3	0.6	2.3	1.6	1.6	1.3	1.4	6.8	13.7	29.8	100
	2000	237	0.7	38.8	0.6	2.8	1.1	2.6	1.4	1.7	8.4	13.0	28.9	100
Pilippines	1995	142	0.1	0.4	72.5	0.2	0.4	0.3	0.5	0.5	3.2	8.1	13.8	100
	2000	152	0.1	0.5	63.0	0.2	0.4	1.1	0.8	0.8	4.5	10.6	18.0	100
Singapore	1995	223	1.2	3.6	0.5	34.5	1.7	1.6	1.2	1.1	4.5	12.2	37.9	100
	2000	257	0.4	1.7	0.8	38.7	0.9	1.9	1.1	1.0	2.7	8.0	42.8	100
Thailand	1995	356	0.3	0.7	0.2	0.9	68.0	0.7	0.5	0.3	4.1	5.3	19.0	100
	2000	300	0.4	0.7	0.3	0.7	60.7	1.4	0.7	0.5	4.6	7.2	22.8	100
China	1995	1875	0.2	0.1	0.1	0.2	0.2	79.2	0.2	0.6	3.7	3.2	12.3	100
	2000	3161	0.1	0.1	0.1	0.1	0.2	78.6	0.3	0.5	3.1	5.2	11.7	100
Taiwan	1995	566	0.5	0.8	0.4	0.4	0.8	1.5	61.3	0.6	3.8	7.5	22.4	100
	2000	662	0.2	0.4	0.2	0.2	0.4	3.6	64.6	0.6	3.1	7.2	19.5	100
Korea	1995	1058	0.4	0.4	0.2	0.3	0.4	1.4	0.5	74.7	2.8	4.3	14.6	100
	2000	1206	0.2	0.2	0.2	0.2	0.2	2.1	0.6	74.0	2.3	4.7	15.3	100
Japan	1995	9746	0.2	0.3	0.1	0.2	0.3	0.5	0.4	0.5	89.8	2.6	5.1	100
	2000	8676	0.1	0.2	0.1	0.1	0.2	0.6	0.4	0.4	90.0	2.6	5.3	100
U.S.A.	1995	13456	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	1.0	89.4	8.4	100
	2000	17936	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.6	91.5	7.3	100

II. Light Industry	Year	Impact (Billion $)	Contribution Ratios (%)											
			Indonesia	malaysia	Pilippines	Singapore	Thailand	China	Taiwan	Korea	Japan	U.S.A.	Others	Total
Indonesia	1995	98	79.2	0.3	0.3	0.5	0.2	0.7	0.6	0.8	4.4	3.5	9.5	100
	2000	73	61.5	0.5	0.2	0.2	0.4	1.8	0.8	1.0	5.5	7.5	20.6	100
malaysia	1995	39	0.5	33.6	0.7	2.8	1.7	3.2	1.3	1.5	7.5	8.7	38.5	100
	2000	33	0.7	29.0	0.9	3.7	1.3	3.2	1.7	1.4	9.2	12.2	36.9	100
Pilippines	1995	32	0.1	0.1	70.9	0.1	0.1	0.1	0.4	0.3	1.8	12.3	13.8	100
	2000	29	0.1	0.2	78.1	0.1	0.2	0.3	0.3	0.3	2.3	10.7	7.4	100
Singapore	1995	11	1.5	4.4	1.3	36.4	2.2	1.5	1.4	0.9	6.6	11.7	32.1	100
	2000	11	0.7	2.7	1.0	43.8	2.3	1.7	1.5	1.0	4.3	9.3	31.7	100
Thailand	1995	83	0.6	0.6	0.4	0.6	51.8	1.2	0.6	0.4	6.6	7.5	29.7	100
	2000	65	0.5	0.7	0.3	0.5	51.1	1.0	0.9	0.6	6.8	11.4	26.3	100
China	1995	405	0.1	0.1	0.1	0.2	0.2	72.2	0.2	0.7	5.7	4.3	16.2	100
	2000	543	0.1	0.1	0.1	0.1	0.2	66.1	0.2	0.8	6.4	7.6	18.3	100
Taiwan	1995	80	0.7	0.6	1.2	0.4	0.8	1.5	52.9	0.8	6.4	7.7	27.0	100
	2000	78	0.6	0.6	0.6	0.2	0.8	5.6	45.1	0.7	4.4	9.9	31.7	100
Korea	1995	147	0.6	0.2	0.2	0.2	0.3	2.3	0.4	68.4	4.8	4.6	18.0	100
	2000	139	0.4	0.2	0.3	0.1	0.3	3.8	0.6	64.3	4.2	6.5	19.4	100
Japan	1995	1017	0.1	0.2	0.1	0.1	0.2	0.6	0.3	0.4	93.3	1.6	3.1	100
	2000	821	0.1	0.2	0.1	0.1	0.2	0.8	0.4	0.4	91.3	2.3	4.3	100
U.S.A.	1995	1310	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.4	1.8	87.3	9.8	100
	2000	1461	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	1.3	88.3	9.5	100

III. Heavey Industry	Year	Impact (Billion $)	Contribution Ratios (%)											
			Indonesia	malaysia	Pilippines	Singapore	Thailand	China	Taiwan	Korea	Japan	U.S.A.	Others	Total
Indonesia	1995	59	76.4	0.7	0.5	1.2	0.6	0.8	0.5	0.8	5.1	4.5	8.9	100
	2000	53	53.7	1.5	0.7	2.1	1.1	2.0	1.3	1.7	7.1	8.1	20.8	100
malaysia	1995	75	0.8	20.2	0.8	3.0	2.0	1.6	1.8	1.7	7.6	23.0	37.5	100
	2000	98	0.8	13.7	0.9	3.8	1.6	4.3	2.3	2.2	10.1	23.6	36.8	100
Pilippines	1995	20	0.3	1.4	53.5	0.7	1.4	1.0	1.3	1.4	6.4	12.0	20.6	100
	2000	36	0.3	1.3	22.9	0.5	0.8	2.9	2.0	1.9	8.7	22.9	35.9	100
Singapore	1995	92	2.2	6.3	0.8	11.9	3.0	3.0	2.2	2.0	7.7	22.0	38.9	100
	2000	105	0.8	3.8	1.6	13.9	1.8	4.5	2.6	2.4	6.0	18.9	43.8	100
Thailand	1995	77	0.5	1.5	0.3	2.0	55.5	0.9	0.9	0.6	6.5	9.8	21.5	100
	2000	82	0.7	1.4	0.7	1.7	34.4	3.2	1.3	1.1	8.9	14.0	32.5	100
China	1995	600	0.3	0.2	0.1	0.2	0.4	76.4	0.3	0.8	3.6	4.1	13.6	100
	2000	1105	0.2	0.2	0.1	0.2	0.3	71.1	0.4	0.7	3.2	7.4	16.3	100
Taiwan	1995	184	0.9	1.5	0.6	0.7	1.5	2.6	37.3	1.1	6.1	14.2	33.5	100
	2000	242	0.4	0.8	0.4	0.5	0.7	8.0	28.5	1.4	6.8	16.1	36.4	100
Korea	1995	375	0.6	0.9	0.3	0.6	0.7	2.4	0.9	59.5	4.3	8.1	21.7	100
	2000	435	0.5	0.5	0.4	0.4	0.4	5.1	1.4	47.7	5.0	11.9	26.8	100
Japan	1995	2442	0.5	0.8	0.2	0.5	1.0	1.4	1.1	1.4	73.6	7.4	12.1	100
	2000	2119	0.3	0.5	0.3	0.5	0.6	2.0	1.4	1.3	68.5	9.2	15.5	100
U.S.A.	1995	2400	0.2	0.4	0.1	0.2	0.3	0.6	0.5	0.9	2.3	76.5	18.0	100
	2000	3078	0.1	0.2	0.1	0.2	0.2	0.7	0.6	0.6	1.7	76.3	19.5	100

for Thailand, from 59.5% to 47.7% for Korea, indicating a rapid deepening of interdependence within the region under review. It is assumed that the currency crisis that hit these countries in 1997 and the subsequent sharp devaluation of their currencies lead to rapid expansion of exports.

As with light industry, excluding Japan and the United States, Asian countries tended to increase their dependence on China. Between 1995 and 2000, dependence on China increased rapidly, from 1.6% to 4.3% for Malaysia, from 3.0% to 4.5% for Singapore, from 0.9% to 3.2% for Thailand, from 2.6% to 8.0% for Taiwan, from 2.4% to 5.1% for Korea, and from 1.4% to 2.0% even for Japan. China is increasingly coming to play the role of absorber in the region. The United States offers a significantly larger market than does Japan. While Asian countries' dependence on Japan is mostly in single-digit percentage points, their dependence on the United States is overwhelmingly larger, at 23.6% for Malaysia, 22.9% for the Philippines, 18.9% for Singapore, 16.1% for Taiwan, and 11.9% for Korea. Their deepening dependence on the United States is observed, and the United States is playing a conspicuous role as a market for Asian countries.

6.3 Key Findings

The results of examining the tables can be summarized as follows:
(1) On an all-industry basis, Asian countries tend to increase their dependence on overseas markets, with Indonesia, Thailand, and Taiwan standing out in this respect.
(2) Japan and the United States still maintain overwhelming presence among Asian countries.
(3) Light industry in the region depends on the United States and Japan to a similar extent, but heavy industry depends on the United States far more heavily than on Japan, and the dependence on the United States appears to be expanding further.
(4) China's influence is rapidly expanding in all countries under review, with its influence particularly pronounced in heavy industry.
(5) Interdependence within the ASEAN region is relatively small, except between Malaysia and Singapore. But Thailand and Malaysia are deepening their interdependence.

(Jun Nakamura)

7 Conclusions

Until the first half of the 1990s the Asian region was an important region for the global economy, with its sustained economic development. In Asia during this period, the maturing of NIES economies, the catch-up by ASEAN countries, and the rise of China were observed successively. The Asian financial crisis of 1997 affected these countries to varying degrees according to the degree of maturation of their economies. Some ASEAN countries, including Indonesia, Thailand, and Malaysia, were forced to devalue their currencies substantially, while Korea was compelled to carry out massive restructuring at home. However, China felt little impact of the currency crisis, though Hong Kong was affected very much. After all these developments, the Chinese economy has boosted its presence in the Asian region. In fact, the analysis in this paper produced very significant findings.

(1) Industrial structures undergo changes in tandem with economic growth. While the share of the service sector is increasingly expanding in Japan, the United States, and other advanced industrialized nations, Asian countries are mostly in the middle of shifting the focus to secondary industry. The cluster analysis confirmed the existence of four different groups of countries in the Asian region under review: (1) Japan and the United States, (2) Korea and Taiwan, (3) the Philippines, Thailand, and Malaysia, and (4) China and Indonesia. China has achieved rapid economic growth and joined the group of ASEAN countries, reshaping the flying-geese pattern of economic development, where China was previously placed behind ASEAN. Since China built the full-set model of industries during the era of planned economy, it has a higher leveling rate of industrial structure than ASEAN countries. In other words, China, as "an old industrial nation," has risen as "a new industrial nation" with the aggressive introduction of foreign direct investment and reform of state-owned enterprises.

(2) The Chinese economy is enlarging its presence in terms of trade structure as well. While the export and import shares of Japan and the United States in the region have been steadily declining and the shares of ASEAN countries increased only modestly, China has been rapidly expanding its shares. The overall regional trade structure is also shifting from a structure revolving around Japan and the United States to a three-pillared structure led by Japan, the United States, and China. While both Japan and the United States trade heavily with each of the Asian countries, China depends heavily on Japan and the United States and is only recently expanding trade with Korea and Taiwan. In this sense, China's presence in the ASEAN region is not yet as large as that of Japan or the United States.

(3) Diversification of regional trade is helping intensify interdependence among countries in Asia, and the Asian economies are certainly moving toward integration. In fact, in recent years, countries in the region have been actively negotiating, and in some cases concluded, free-trade agreements (FTAs) and economic-partnership agreements (EPAs), boosting the prospects for regional integration. Momentum toward integration will intensify as the center of regional growth shifts from Japan and the United States to China and other Asian countries. In terms of the backward linkage effects, China has by far the largest value for the index of power of dispersion. In other words, China is replacing Japan and the United States as the center of regional growth, and China's growth is driving the

growth of other countries in the region. Industries in ASEAN countries used to depend on Japan and the United States, and Japan in particular, for the supply of intermediate goods. But this dependence is now dwindling, with China looming large in this respect as well.
(4) Japan and the United States both have markets that can grow mainly on domestic demand, and the U.S. market is of particular importance as an export market. Asian countries have achieved economic growth by increasing their dependence on the U.S. market. Meanwhile, China's rapid economic growth has enabled it to offer an export market for Asian countries. Korea and Taiwan have steadily strengthened their dependence on the Chinese market. ASEAN countries are becoming increasingly driven by the Chinese market. Consequently, the intra-ASEAN market appears to have stopped growing.

As a major research subject going forward, the growth of the Chinese economy and its growing impact on other countries should be examined at the levels of individual industrial sectors.

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