Far Eastern Studies Vol.7 May 2008
Center for Far Eastern Studies, University of Toyama

Changes of dependency structure in East Asia from 1990 to 2000: Analysis by intermediate input according to sector

Dan Jin[1]*and Yantian Chen**

Abstract

This paper attempts to interpret the situation surrounding the development of regional economy integration in East Asia by examining the degree of self-dependency and dependency on foreign countries in this region by using the International Input-Output (IIO) approach. We show that the economic interdependency in East Asia grew stronger from 1990 to 2000, with a strong upturn of the interdependency on China and Korea, and a downturn of dependency on Japan in this region. Moreover, our analysis suggests that dependency on foreign countries is increasing and self-dependency is decreasing. ASEAN4 was largely dependent on Japan, China and Korea, whereas Japan, China and Korea were largely dependent on other countries. From the fall of self-dependency in the heavy industries sectors and the decrease of dependency in sectors like the iron and steel, we can know that the economic effect of ASEAN4, China, Korea and Japan is seeping into other regions. Therefore, strong efforts should be made to strengthen the economic cooperation in this region in the future.

Keywords*: self-dependency and dependency structure, International Input-Output Model*

1. Introduction

In the world economy of the 1990s, world trade led to more and more prosperity, and the meaning and effects of regionalism and globalism were often debated by economists. In East Asia, Association of South-East Asian Nations (ASEAN) had been the sole regional cooperation system since its establishment in 1967. In addition, Northeast Asia which includes Japan, China and South Korea experienced a high economic growth for the few decades before the 1990s and regional trade had expanded substantially. However, the regional economic integration in East Asia takes fell behind that occurring in the EU and NAFTA.

As the greatest trade zone, precincts trade in the EU and NAFTA accounted for one-third of world trade. The EU aimed at expanding the local market by increasing member nations. Moreover, led by the United States, the economic integration between South and North America had been developed. The ratio of the regional commerce traded in the two areas was over 40% of world trade. However the same ratio of ASEAN4, China, Japan and Korea was 5.4%.[2]

[1] * Center for Far Eastern Studies, University of Toyama, 3190 Gofuku, Toyama 930-8555, Japan
E-mail: jindan904@hotmail.com
** Yokohama National University, 79-3, Tokiwadai, Hodogaya-ku, Yokohama, 240-8501, Japan
E-mail: chenyantian@hotmail.com

[2] See NIRA (2003).

As this situation, it will be indispensable to reinforce economic assistance and deepen cooperation in East Asia.

Many economic studies have examined the interdependency relations in East Asian areas. For instance, Aoki (2005), in a study of seven sectors from 1990-1995, concluded that economic integration in East Asia had progressed and that the international division of labor, especially the regional division of labor, had been reorganized constantly by much more intensification of growth-of-industrial-structure competition, and that the regional horizontal division of labor had appeared to progress. Examining 78 sectors from 1990 to 1995, Fujita (2006) extended the VS (vertical specialization share) model, and stated that the international division of labor in East Asia had certainly progressed. On the other hand, in a study of 3 sectors from 1985 to 2000, Fujikawa, Shimoda and Watanabe (2006) insisted that most East Asian countries showed decreasing trends in home production rates, and that a large amount of their value-added had not remained within the East Asian region, concluding that it would still be premature to regard the East Asian region as an independent economic community. Hasebe and Shrestha (2006), using 19 sectors from 1985 to 2000 [where the year 2000 is an extended table estimated by Takagawa and Okada (2004)], studied the degree of economic integration in East Asia, taking into account the direct and indirect effects, the exogenous country effect and the size effect of the economy. They also insisted that the average self-dependence in the region had declined, but that the average dependence on other regional partners had increased and the regional interdependence had deepened although the extent of dependence was small.

However, no studies have examined the extent of the economic relations and the level of interdependency among ASEAN4, China, Japan and Korea both at a more detailed sector level with more recent data. To fill this gap, this paper attempts to interpret the situation surrounding the development of regional economic integration in East Asia, especially among ASEAN4, China, Japan and Korea from 1990 to 2000, by using the International Input-Output (IIO) approach to examine the degree of self-dependency and dependency on foreign countries in the region.

Newly Industrializing Economies (NIEs) and ASEAN have been recording rapid economic growth since the 1970s and 1980s. With the appreciation of the yen in 1985, Japanese enterprises' overseas local production, especially manufacturing's, progressed and which contributed to the development of the East Asian nation's economy by the form of direct equity investment. With the collapse of the Japan's economic bubble in the early 1990s, Japan fell into a prolonged recession. In contrast, substantial high growth of the Chinese economy started after the middle of 1980s, and with the real entry of China into world trade, the expension of Chinese international commerce has continued since 1990s. The East Asian nations pulled the world economic growth, and became an important region to the world economy. However, the Asian monetary crisis in 1997 influenced the economy of each country in this region through the connection such as the intraregional trade and the Foreign Direct Investment (FDI). Since then, Asian nations have worked on the deregulation of trade and the regional economic integration, aiming at recovering from the crisis and avoiding its

reappearance.[3]

In the next couple of paragraphs, we use the world trade matrix published by JETRO on the Web to examine the interdependency of trade relations between each country.

Table 1 The trade matrix of the East Asian countries from export aspect (1990-2000)

1990 ($1,000,000)

to \ from	ASEAN4	China	Korea	Japan	World
ASEAN4	3,612	1,784	3,346	21,020	86,361
China	1,830	−	433	9,210	62,760
Korea	3,256		−	12,638	67,812
Japan	22,241	6,145	17,500	−	287,678

1995 ($1,000,000)

to \ from	ASEAN4	China	Korea	Japan	World
ASEAN4	10,787	5,482	6,176	33,703	193,723
China	5,501	−	6,688	28,466	148,955
Korea	9,829	9,144	−	17,048	131,312
Japan	53,590	21,934	31,292	−	443,047

2000 ($1,000,000)

to \ from	ASEAN4	China	Korea	Japan	World
ASEAN4	18,803	9,265	9,990	42,968	267,420
China	9,335	−	11,293	41,654	249,195
Korea	12,395	18,455	−	20,466	171,826
Japan	45,381	30,356	30,703	−	478,179

The ratio of expansion (1990-2000) (times)

to \ from	ASEAN4	China	Korea	Japan	World
ASEAN4	5.2	5.2	3.0	2.0	3.1
China	5.1	−	26.1	4.5	4.0
Korea	3.8		−	1.6	2.5
Japan	2.0	4.9	1.8	−	1.7

(1990-1995) (times)

to \ from	ASEAN4	China	Korea	Japan	World
ASEAN4	3.0	3.1	1.8	1.6	2.2
China	3.0	−	15.4	3.1	2.4
Korea	3.0		−	1.3	1.9
Japan	2.4	3.6	1.8	−	1.5

(1995-2000) (times)

to \ from	ASEAN4	China	Korea	Japan	World
ASEAN4	1.7	1.7	1.6	1.3	1.4
China	1.7	−	1.7	1.5	1.7
Korea	1.3	2.0	−	1.2	1.3
Japan	0.8	1.4	1.0	−	1.1

Source: JETRO (Japan), World Trade Matrix.

Table 1 shows the trade matrix from 1990 to 2000, where the highlighted (shaded) values indicate an expansion of more than five times. The expansion on the trade between China and

[3] See Okamoto, Inomata and others (2006).

Japan, and that between China and ASEAN4 was remarkable. Compared with the beginning of the 1990s, the ratio of expansion in the late 1990s tended to decline. It may be said it would still be unwise to regard East Asian economy as an 'independent' or 'self-circulating' economy at the present time.

Table 2 shows the change with the same trade matrix by using magnifying power. We can read the following things.

- Japan, China and Korea: The share of exports to ASEAN4 showed an upward trend.
- ASEAN4: The share of exports to Japan and Korea declined, but the share of exports to China rose.
- China: The share of exports to ASEAN4 and Korea showed few change. The share of exports to Japan deteriorated in comparison with 1995.
- Korea: The share of exports to Japan deteriorated, but the share of exports to ASEAN4 and China showed an upward trend.
- Japan: The share of exports to ASEAN4, China and Korea showed an upward trend.

Table 2 The change of the export of East Asian countries (%)

from \ to		ASEAN4	China	Korea	Japan
ASEAN4	1990	4.2	2.1	3.9	24.3
	1995	5.6	2.8	3.2	17.4
	2000	7.0	3.5	3.7	16.1
China	1990	2.9		0.7	14.7
	1995	3.7	－	4.5	19.1
	2000	3.7		4.5	16.7
Korea	1990	4.8	－		18.6
	1995	7.5	7.0	－	13.0
	2000	7.2	10.7		11.9
Japan	1990	7.7	2.1	6.1	
	1995	12.1	5.0	7.1	－
	2000	9.5	6.3	6.4	

In general, the degree of each country's export dependency on Japan still occupied an absolute ratio, but the degree got weakened. Contrastively, the presence of China became larger.

In addition, owing to the expansion of final demand and the supplies of the intermediate goods, such as raw materials, motor parts and electronic parts, inports flourished in East Asia. Therefore, it is necessary to examine the various kinds of trade structures that emerged in East Asia in each industry according to sectors, taking into consideration not only direct transaction effect but also indirect transaction effect. So we examine the structure through the IIO approach which can show both direct transaction effect and indirect transaction effect at a more detailed sector level with more recent data.

2. Methods and Data

We adopted the IIO model for the analysis of interdependency in East Asia as it is designed to reflect direct and indirect interaction effects between production sectors as well as between countries. In addition, it is a popular methodology for studying the economic interdependency at the production sector levels. Despite its strength and popularity, however, there is not much research that has used the IIO framework, which may be partly because of the time lag and the availability of the IIO table[4].

The International Input-Output table, which is the basis of the International Input-Output framework, provides information about the transaction of intermediate goods and final goods across each production sector and each endogenous country. Further it provides information about the import of intermediate input goods from the exogenous country to each production sector of each endogenous country.

The most popular approach in the IIO analysis is the Leontief method, which uses the requirement matrix B[5]. By multiplying the requirement matrix B with final demand F (which is constituted by private consumption, government consumption, gross fixed capital formation and changes in stocks), we can calculate the interdependency on the size effect.

On the other hand, the International Input-Output study includes the direct and indirect effects of the production sector from the endogenous countries only, it completely ignores the effect of the import of intermediate input goods from the exogenous countries. Hasebe (2002) studied the international dependency in East Asian countries for 1985, 1990 and 1995 by using Total Intermediate Input method. Fujikawa, Shimoda and Watanabe (2006) studied the structure of international division of labor in the Asia Pacific region, with the division of labor measure based on value added. The main difference of the two studies lies in the definition of the dependency measure, as we use the international dependency measure based on Total Intermediate Input Method.

The total intermediate input requirement matrix (***D***)[6] is derived as follows.

According to the definition of total intermediate input coefficient matrix ***A***, intermediate input goods required to produce unit output in each sector of endogenous countries is simply given by the matrix ***A*** as

$$\begin{bmatrix} Ad \\ Aw \end{bmatrix} = A$$

where ***Ad*** represents the intermediate input coefficient matrix for endogenous countries and ***Aw*** represents that for exogenous countries. By multiplying the Leontief inverse matrix (B) with the total intermediate input coefficient matrix ***A***, we can get the total intermediate inputs

[4] See Hasebe and Shrestha (2006).
[5] This is the Leontief inverse matrix of the intermediate input coefficient matrix A.
[6] See Hasebe (2002) for a detailed description of the model.

that is necessary to produce one unit output of final demand in endogenous countries at each sector, and which concludes both direct and indirect interaction effects, and does not ignore the imports from exogenous countries.

$$\begin{bmatrix} Ad \\ Aw \end{bmatrix} \bullet B = D$$

Considering the input structure of a particular production sector and country (i.e., the column for corresponding sector and country) from matrix ***D*** and calculating the share of inputs from each country, we can obtain the dependency structure (i.e., the international division of labor) for that particular production sector. And the ratio that own country accounts for is called self-dependency or local contents.

And to measure the dependency structure using the IIO model, not only the intermediate input but also the final demand should be analyzed. So in the same time, we also study the dependency structure in the final demand with direct and indirect effects by multiplying the Leontief inverse matrix (B) with the finaldemand matrix of each country. This will show us how much each country's production is dependent on the final demand of its own country or that of a foreign country.

We used the Asian IIO tables for years 1990, 1995 and 2000 published by the Institute of Developing Economies (IDE). These tables comprise data for 10 endogenous countries (Indonesia, Malaysia, the Philippines, Singapore, Thailand, China, Taiwan, Korea, Japan and USA)[7], and tow exogenous countries (Hong Kong and Rest of the World). We also integrated the three tables into 63 production sectors for analysis.[8] Incidentally, the statistical data for year 2000 which is collected by a survey in most of countries is reliable enough.

3. Results

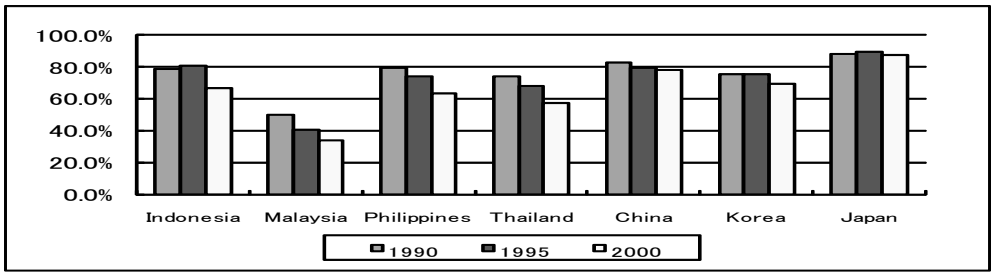
Figure 1 shows how much of each country's production was dependent on its own final demand in 1990-2000. It can be summarized as following:

Note that the Japan's ratios were quite high. Take 2000 as an example, the Japan's ratio was 87.1%, while China and Indonesia also showed relatively high ratios of self-dependency of 78.3% and 66.8%, respectively. From 1990 to 1995, the ratios for Indonesia, Korea and Japan increased slightly, by 1.7%, 0.3% and 1.6%, respectively. Overall, the ratios of self-dependency based on final demand reduced and the ratios of dependency on foreign countries based on final demand tended to rise.

[7] Singapore re-exports most of its imports, and, for political reasons, there is no export data from China to Taiwan in the AIIO table of 1990, so we aim our analysis at ASEAN4, China, Korea and Japan.

[8] See Appendix 1for details of production sectors and Appendix 2 for details of integrated sectors.

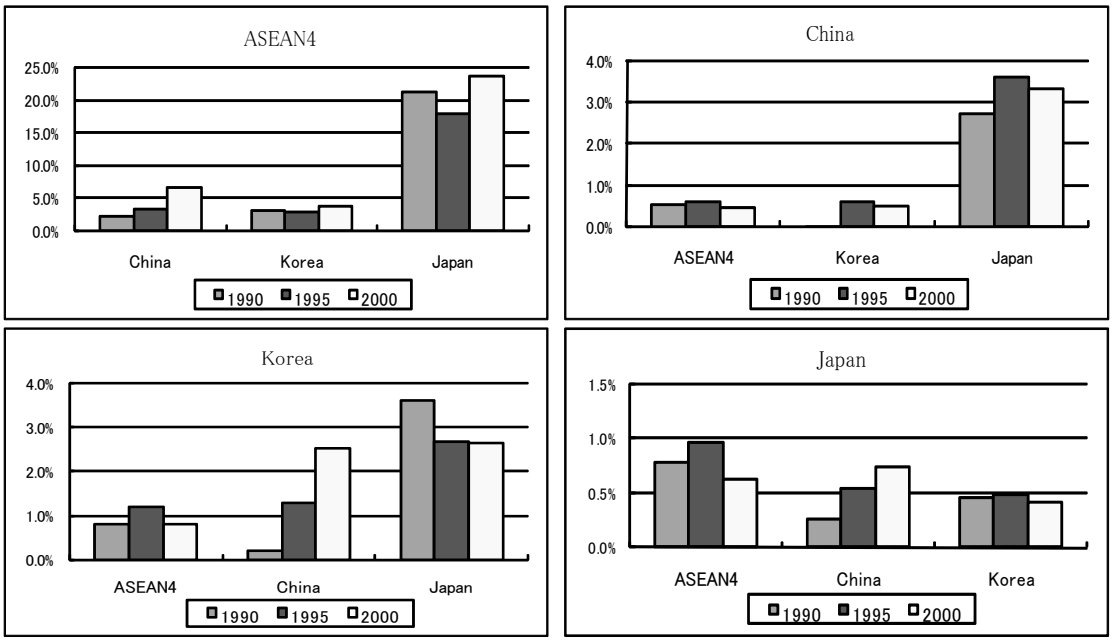
Figure 1 Self dependency based on the final demand



From the data in Fig.2, we know that ASEAN4 raised its dependency on China, Korea and Japan, while Korea and Japan raised its dependency on China. On the other hand, China reduced its dependency on ASEAN4, Korea and Japan.[9]

In general, from 1990 to 1995, the dependency on foreign countries based on the final demand of the four (ASEAN4, China, Korea and Japan) showed a strong tendency to rise. In addition, ASEAN4 depended on China, Korea and Japan greatly, but China, Korea and Japan depended on areas other than ASEAN4.[10]

Figure 2 Dependency based on final demand



Next, let's look at self-dependency based on the total intermediate input method by each country (figure 3 shows the transition for each country).[11]

---

[9] Okamoto, Inomata and others (2006) also drew almost the same conclusion. They used AIIO tables from 1995-2000, whereas we focus on ASEAN4, China, Korea and Japan using AIIO tables from 1990 to 2000.

[10] See Appendix 3 for details of dependency structures based on final demand. For brevity, we unify into a column vector the final demand matrix, which is constituted by private consumption, government consumption, gross fixed capital formation and changes in stocks.

[11] See figure 3 for the transition of the ratio of self-dependency of each country and Appendix 1 for the list of production sectors.

1）Indonesia

From 1990 to 2000, the ratios of self-dependency on the sectors of non-food crops, spinning, basic industrial chemicals, chemical fertilizers and pesticides, non-ferrous metal, electronics and electronic products, motor vehicles, and other transport equipment tended to increase. Noteworthy is that the ratios for the sectors of spinning, chemical fertilizers and pesticides, electronics and electronic products, and other transport equipment increased largely in comparison with 1990, by 28.5%, 23.4%, 23.9% and 25.4% respectively.

Compared with the peak, in 2000, the ratios of self-dependency on forestry and fishery sectors showed remarkable decreases, by 7.4% and 17.1%, respectively. In industrial sectors, the ratios of pulp and paper, refined petroleum and its products, tires and tubes, other rubber products, boilers, engines and turbines, and shipbuilding sectors decreased sharply.

2）Malaysia

The ratios of self-dependency on the sectors of other grain, fishery, iron ore, spinning, leather and leather products, synthetic resins and fiber, refined petroleum and its products, boilers, engines and turbines, heavy electric machinery, and motor vehicles reached the top in 2000. It is particularly noteworthy that the ratios for the sectors of fishery, iron ore, boilers, engines and turbines, and heavy electric machinery increased largely, by 34.6%, 57.6%, 30.6% and 21.2%, respectively. Whereas, compared with the peak, the ratios of tobacco, tires and tubes, non-ferrous metal, and ordinary and specialized machinery sectors reduced greatly, by 40.7%, 39.7%, 31.4% and 27.4% respectively.

3）The Philippines

The ratios of almost all sectors showed a tendency to fall from 1990 to 2000, in which the ratio of most sectors fell once in 1995, and rose again in 2000. In a few sectors (tobacco, synthetic resins and fiber, chemical fertilizers and pesticides, and motor vehicles), the ratios peaked in 2000. In agriculture sectors, though the ratio of the fishery sector rose a little, others reduced at an average of 20% from 80% or so. In industrial sectors, the ratios of non-ferrous metal, metal products, electronics and electronic products, and precision machines sectors also reduced largely, by 21.4%, 15.4%, 18.1% and 28.7% respectively.

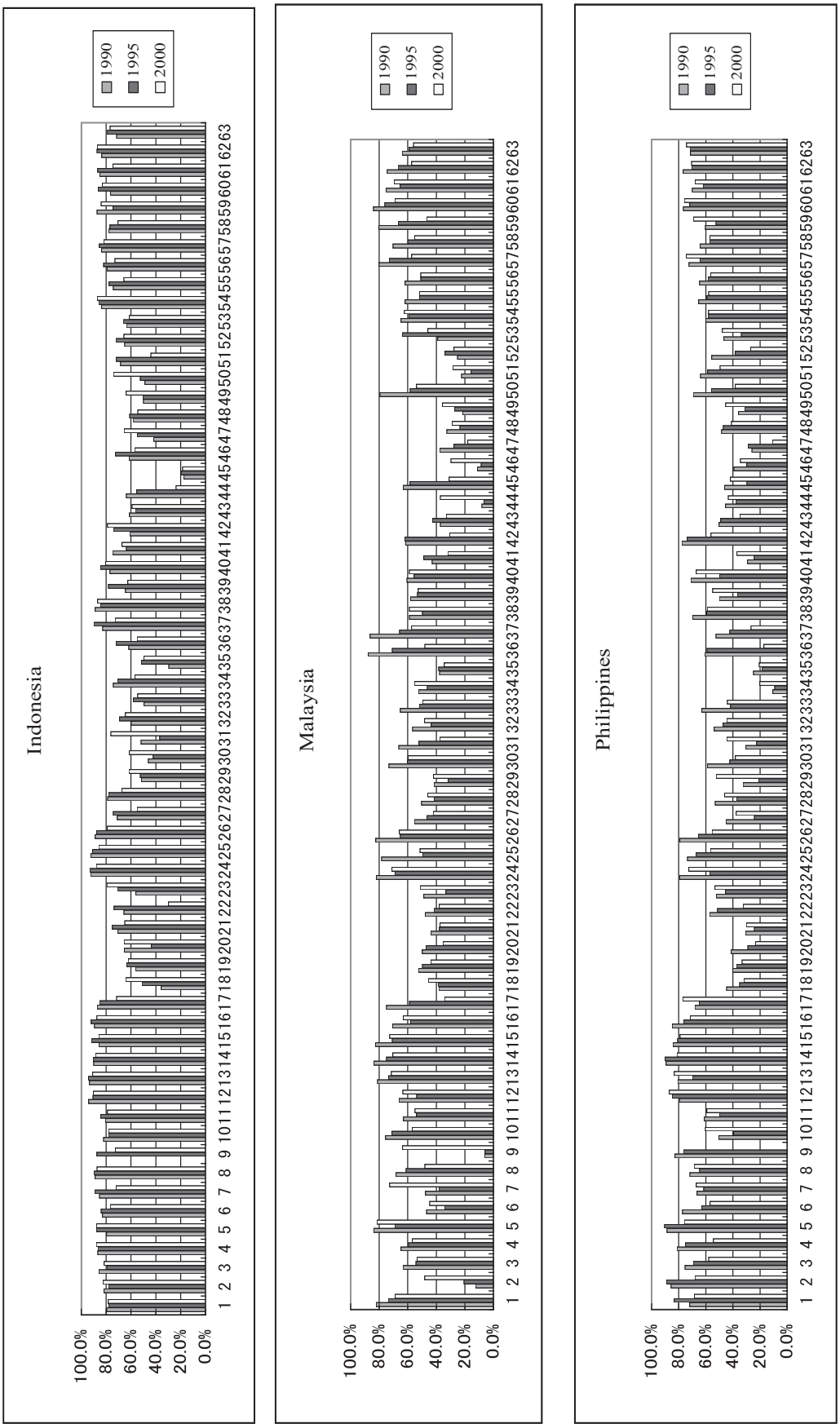
4）Thailand

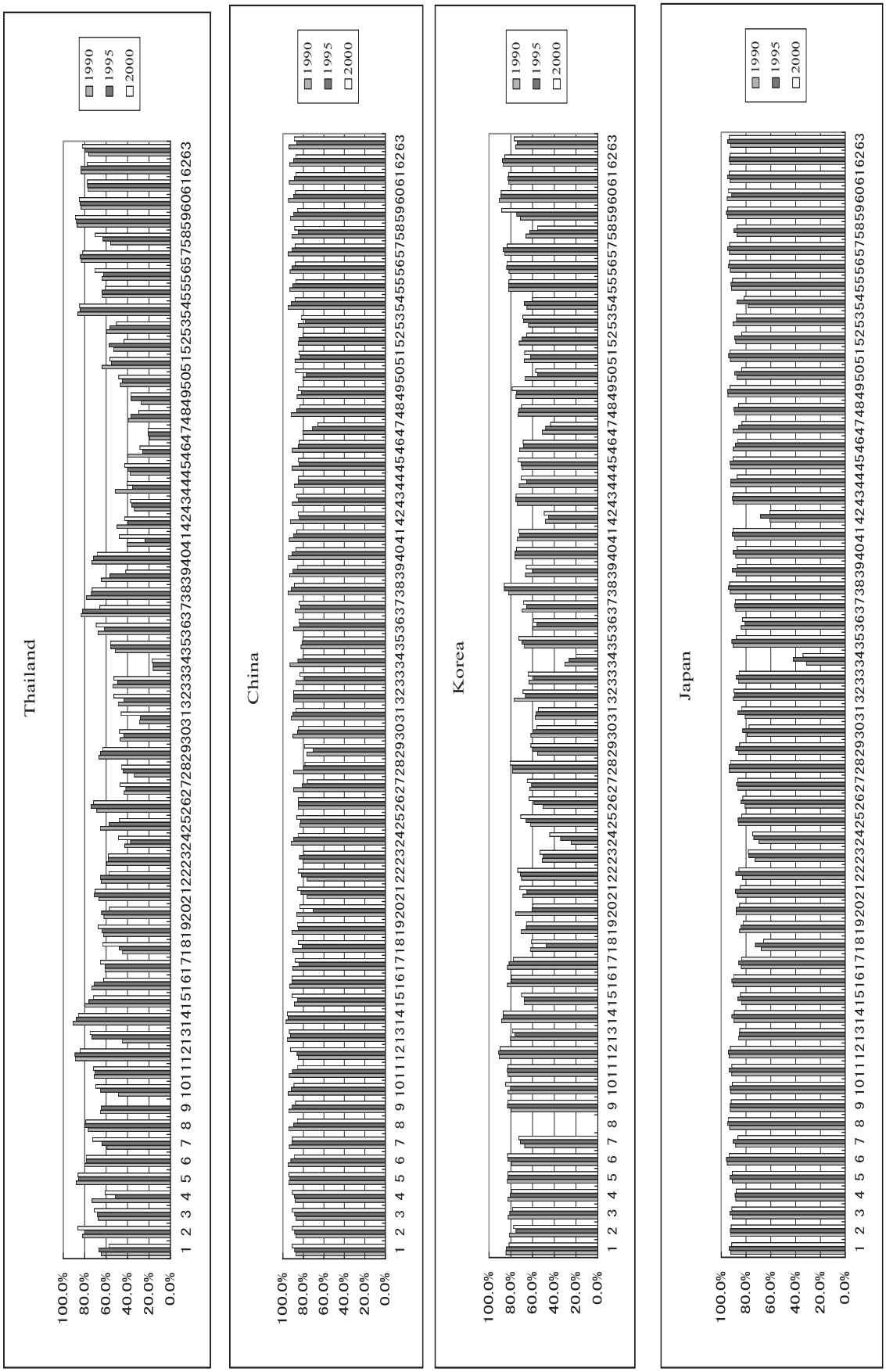
From 1990 to 2000, the ratios of self-dependency on fishery, fish products, tobacco, spinning, weaving and dyeing, chemical fertilizers and pesticides, iron and steel, and ordinary and specialized machinery sectors showed an increase tendency. Whereas, the ratios of wooden furniture, other rubber products, glass and glass products, boilers, engines and turbines, and heavy electric machinery sectors decreased by 18.0%, 17.3%, 22.7%, 10.9% and 11.4% respectively.

5）China

The ratios of most sectors showed a tendency to fall but still remained at a high level of 80% or so. The ratios of agriculture sectors increased consistently except forestry and fishery

Figure 3 The transition of the ratio of self-dependency




Thailand
China
Korea
Japan
1990
1995
2000
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63

sectors. In the heavy industrial sectors, the ratios of most of sectors decreased at an average of 5%, especially refined petroleum and its products sector fell 12.9%.

6）Korea

The ratios of many sectors increased in 2000, especially the timber sector, which increased by 19.7% in comparison with 1990. In contrast, the ratio of refined petroleum and its products sector reduced 9.9% in comparison with 1990.

7）Japan

With the peak in 1995, the ratios of almost all sectors except leather and leather products, and timber, showed a tendency to decrease from 1990 to 2000. However, the ratios of most sectors except spinning, refined petroleum and its products, and non-ferrous metal stayed at a high level.

In comparison with the peak, in agricultural sectors, the ratios of most sectors showed a tendency to fall in 2000, especially the ratios of non-food crops, and fishery sectors decreased greatly. In industrial sectors, a fall in ratio at an average of 2% was observed, whereas, the ratios for boilers, engines and turbines, other transport equipment, and precision machines sectors reduced greatly by 5.1%, 5.8% and 5.9%, respectively.

To summarize, from the self-dependency results obtained by using the total intermediate input method, we can conclude that in East Asia, the ratios of self-dependency in most sectors showed a tendency to decrease at after the peak of 1995.

In agricultural sectors, the ratios for most East Asian countries showed a reduction tendency, expect the fishery sector in Malaysia, the Philippines, Thailand and Korea.

In industrial sectors, there was a decrease of the ratio in the sectors of refined petroleum and its products, tires and tubes, other rubber products, non-ferrous metal, metal products, ordinary and specialized machinery, heavy electric machinery, and precision machines.[12]

As we see in the above, it may be said that business related to intermediate goods increased between each country, especially in the heavy industries sectors, up till 2000.

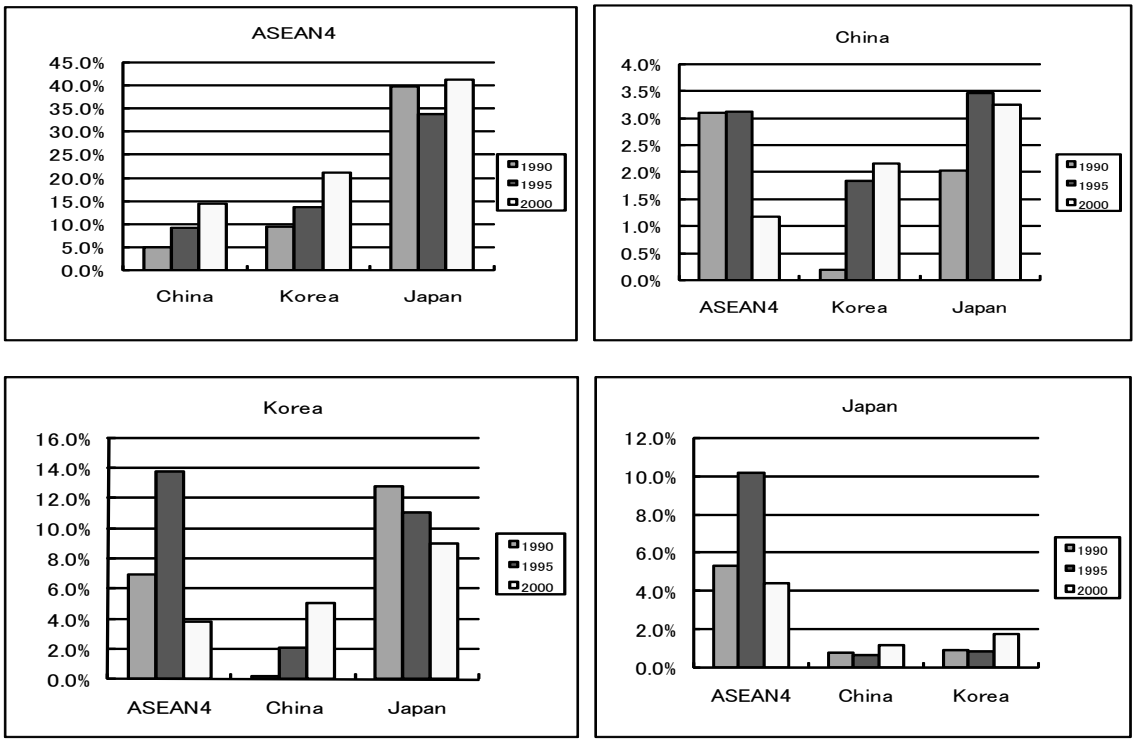
Next, we look at seven sectors where there was an obvious decrease of the ratio to clarify the interdependency relations of intermediate goods in East Asia. Those sectors are tires and tubes, iron and steel, ordinary and specialized machinery, heavy electric machinery, electronics and electronic products, motor vehicles, and precision machines.

● Tires and tubes: The ratios of ASEAN4's dependency on Japan, China and Korea increased, especially, the dependency on China which increased about three fold, from 4.9% to 14.5%, and the dependency on Korea, which increased over two fold, from 9.5% to 21.1% from 1990 to 2000. China and Korea increased their ratios of dependency on each other.

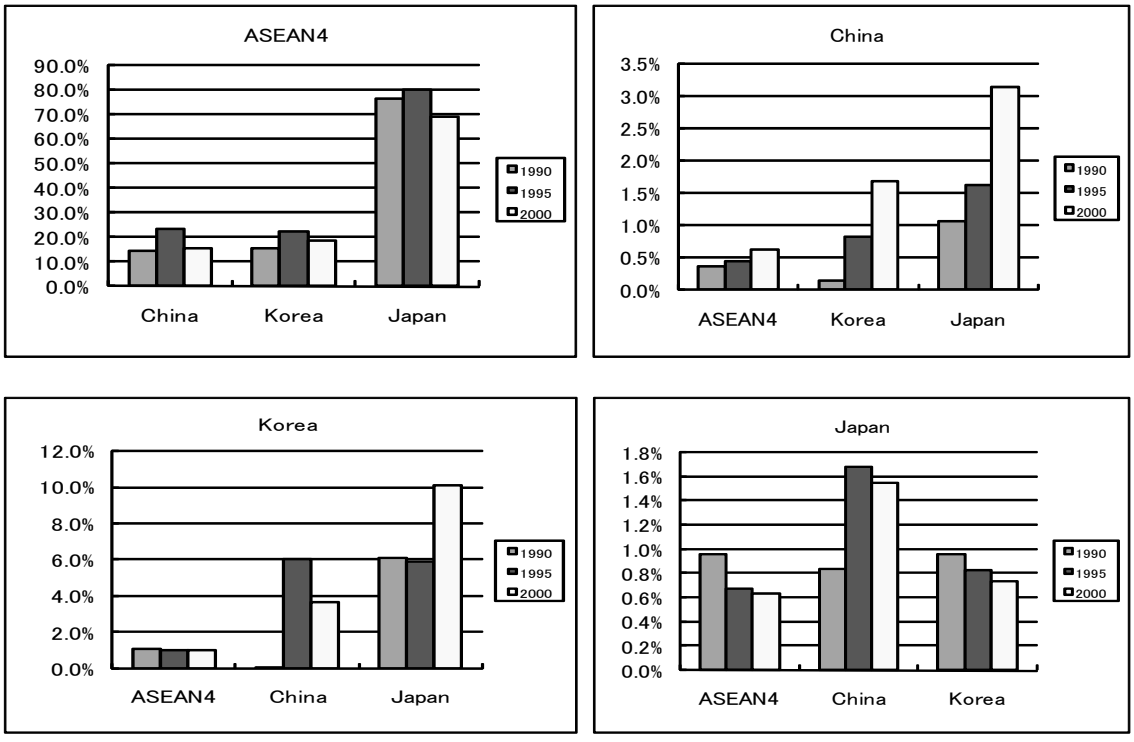
[12] There is a reduction tendency, in refined petroleum and its products, and heavy electric machinery sectors (not include Malaysia); and in electronics and electronic products sector (except for Indonesia) and in ordinary and specialized machinery sector (not including Thailand and Korea).

Figure 4　The transition of the ratio of dependency on foreign countries in seven sectors

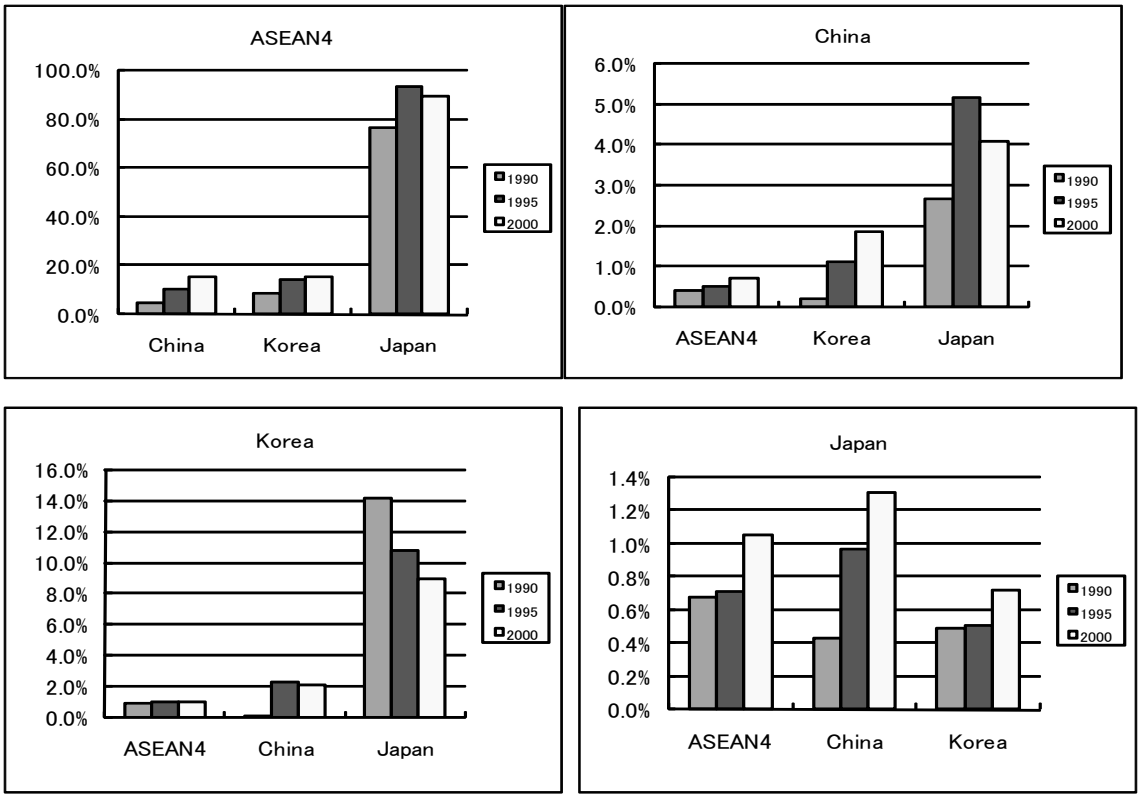
Tires and tubes：



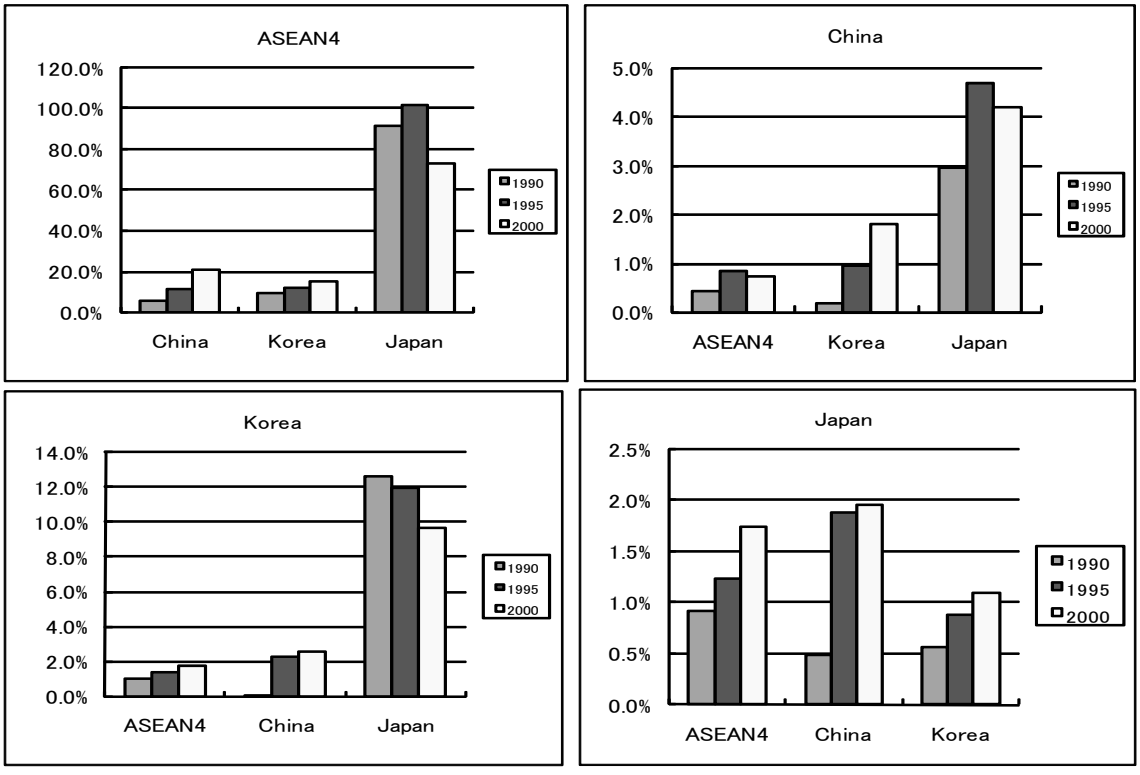
Iron and steel：



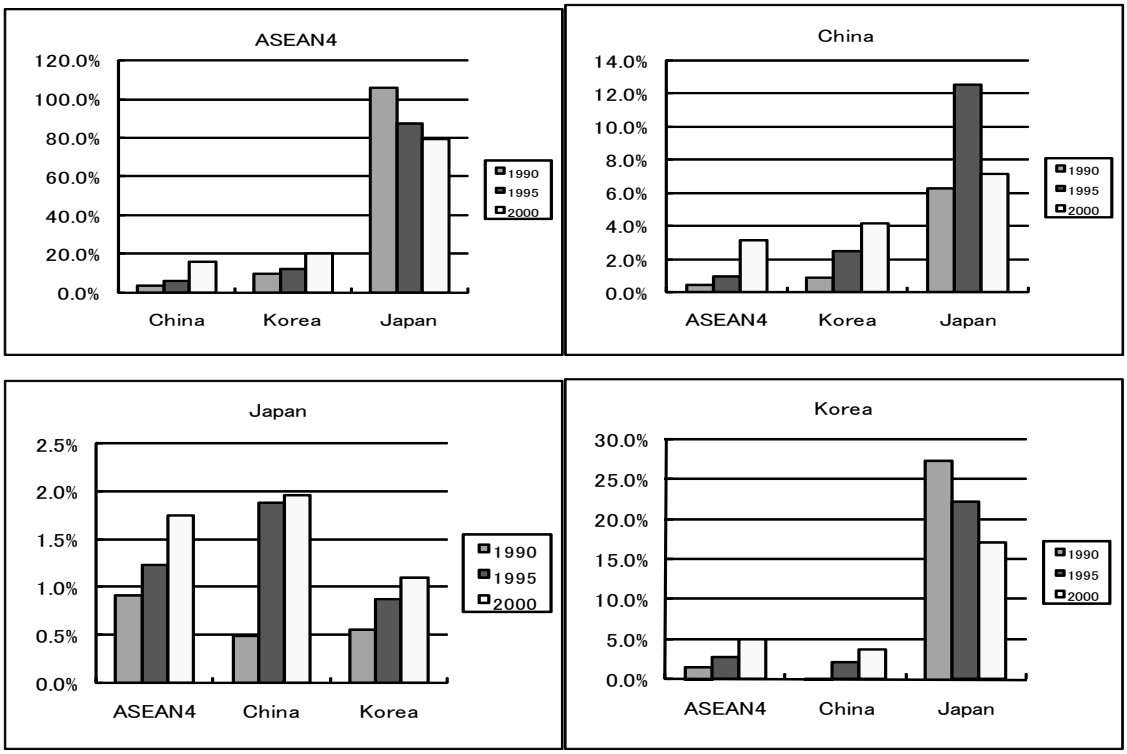
Ordinary and specialized machinery：



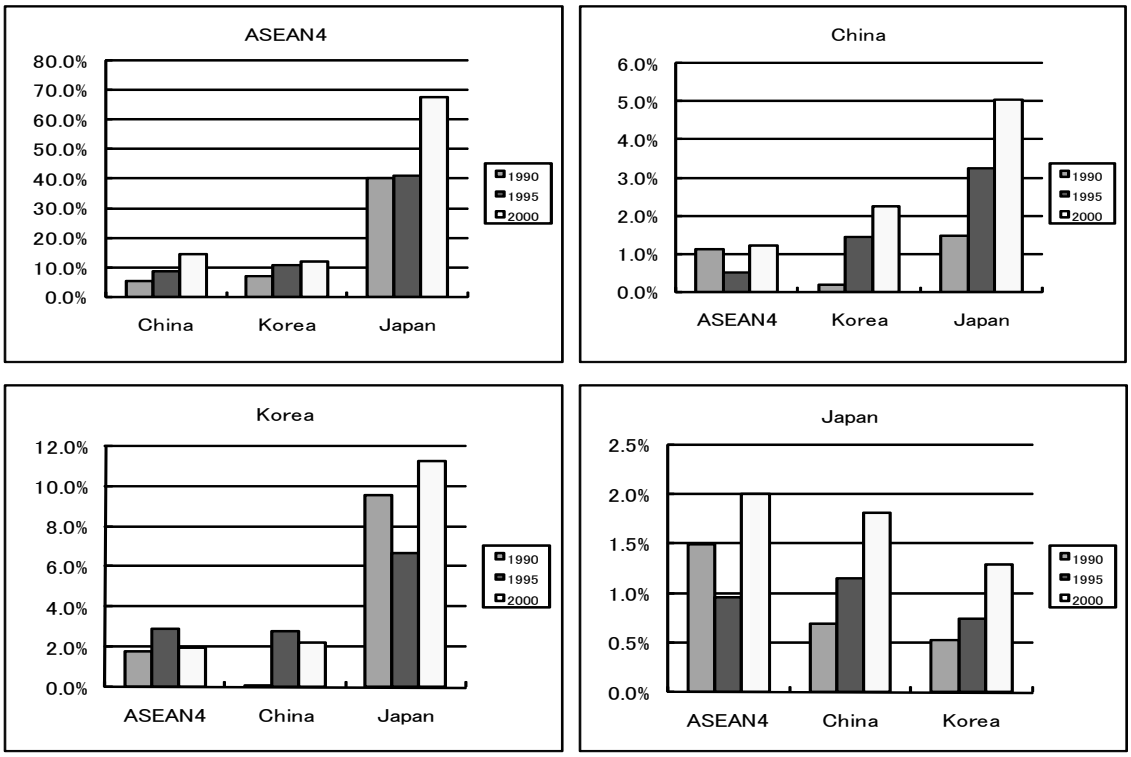
Heavy electric machinery：



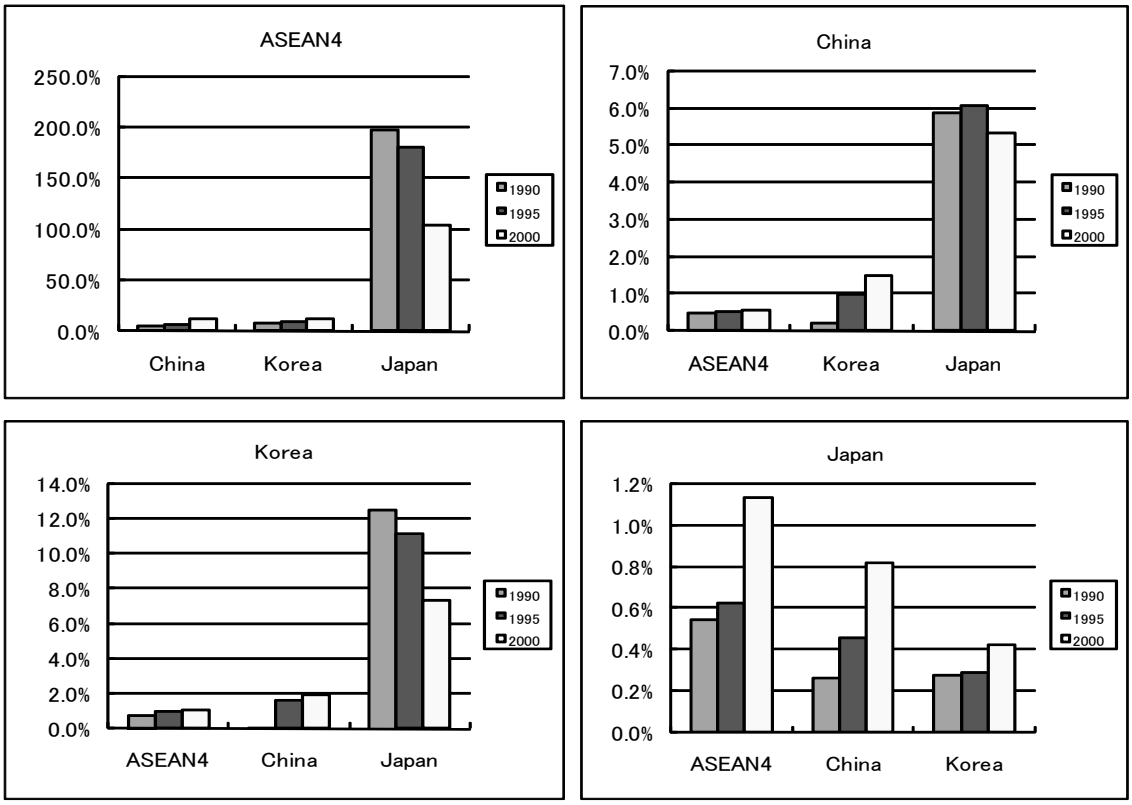
Electronics and electronic products：



Precision machines：



Motor vehicles：



● Iron and steel: The ratios of China's dependency on ASEAN4, Korea and Japan increased, particularly the increase of its dependency on Japan was remarkable. This is thought to be due to the increased demand for iron and steel because of the Chinese construction rush. On the other hand, except for China, the ratios of dependency on other countries in the region decreased.

● Ordinary and specialized machinery: The ratio of Korea's dependency on China decreased. ASEAN4, Korea and China decreased their dependency on Japan. However, the ratios of Japan's dependency on the three increased.

● Heavy electric machinery, and electronics and electronic products: Japan raised its dependency on the three countries, whereas ASEAN4, China and Korea decreased their dependency on Japan. It can be considered that technical knowledge of heavy electric machinery improved in ASEAN4, China and Korea.

● Precision machines: ASEAN4, China and Korea increased their dependency on Japan, which showed the comparative advantage of Japan in the high-tech technical product sector.

● Motor vehicles: Differ from other sectors, the increase of Japan's dependency on ASEAN4 was more remarkable than that of China and Korea. This pointed to the growth of the manufacturing industry led by the electronics and electronic products sector of ASEAN4.

To summarize, we can conclude the following:

1. ASEAN4's, China's and Korea's ratios of dependency on Japan was still large but declining. And trade among ASEAN4, China and Korea flourished.
2. Trade to China and Korea from ASEAN4 increased and the dependency on China rose.
3. The dependency of Japan on China, Korea and ASEAN4 increased.
4. From the fall of self-dependency in the heavy industries sectors based on the total intermediate input method and the decrease of the rate of the dependency on the region in the iron and steel sector, we can know that the economic effect of ASEAN4 China, Korea and Japan leaked outside the area.

4. Conclusions

We studied the degree of self-dependency and dependency on foreign countries in East Asia using the IIO model. Our conclusions are as follows: (1) There was a growth of ASEAN4's and Japan's dependency on China based on final demand and a particular increase of dependency on China based on the total intermediate input method. We can know that both the presence of China as the "world's factory" and the presence of China as the "world's market" rose. (2) ASEAN4 was largely dependent on Japan, China and Korea based on final demand, whereas Japan, China and Korea were largely dependent on other countries. The growth of dependency on foreign countries based on final demand can be observed. (3) The reduction of self-dependency based on the total intermediate input method can be observed. On the other hand, the dependency on Japan based on the total intermediate input method decreased. (4) The interdependency deepened in East Asia owing to increasing intermediate input, especially in the heavy industries sectors. From the growth of the dependency on ASEAN4, China and Korea in heavy electric machinery, electronics and electronic products, and motor vehicles sectors, we can conclude that the technical knowledge improved in ASEAN4, China and Korea. On the other hand, the economic effect of ASEAN4, China, Korea and Japan seeped into other regions, especially in the iron and steel sector. (5) Although the interdependency in East Asia increased, it will be indispensable to strengthen economic cooperation in this region in the future.

Appendix 1

Details of production sectors

Details of 63 sectors					
Code	Description	Code	Description	Code	Description
1	Paddy	22	Other made-up textile products	43	Metal products
2	Other grain	23	Leather and leather products	44	Boilers, Engines and turbines
3	Food crops	24	Timber	45	Ordinary and specialized machinery
4	Non-food crops	25	Wooden furniture	46	Heavy electric machinery
5	Livestock and poultry	26	Other wooden products	47	Electronics and electronic products
6	Forestry	27	Pulp and paper	48	Other electric machinery and appliance
7	Fishery	28	Printing and publishing	49	Motor vehicles
8	Crude petroleum and natural gas	29	Synthetic resins and fiber	50	Other transport equipment
9	Iron ore	30	Basic industrial chemicals	51	Shipbuilding
10	Other metallic ore	31	Chemical fertilizers and pesticides	52	Precision machines
11	Non-metallic ore and quarrying	32	Drugs and medicine	53	Other manufacturing products
12	Milled grain and flour	33	Other chemical products	54	Electricity, gas and water supply
13	Fish products	34	Refined petroleum and its products	55	Building construction
14	Slaughtering, meat products and dairy products	35	Plastic products	56	Other construction
15	Other food products	36	Tires and tubes	57	Wholesale and retail trade
16	Beverage	37	Other rubber products	58	Transportation
17	Tobacco	38	Cement and cement products	59	Telephone and telecommunication
18	Spinning	39	Glass and glass products	60	Finance and insurance
19	Weaving and dyeing	40	Other non-metallic mineral products	61	Education and research
20	Knitting	41	Iron and steel	62	Other services
21	Wearing apparel	42	Non-ferrous metal	63	Public administration and Unclassified

Appendix 2

Details of integrated sectors

Ditails of integrated sectors

76 Sector Classification (2000)		63 Sector Classification	
Code	Description	Code	Description
045	General machinery	045	Ordinary and specialized machinery
046	Metal working machinery		
047	Specialaized machinery		
049	Television sets, radios,audios and communication equipment	047	Electronics and electronic products
050	Electronic computing equipment		
051	Semiconductors and integrated circuits		
052	Other electronics and electronic products		
053	Household electrical equipment	048	Other electric machinery and appliance
054	Lighting fixtures, batteries, wiring and others		
056	Motor cycles	050	Other transport equipment
058	Other transport equipment		
061	Electricity and gas	054	Electricity, gas and water supply
062	Water supply		
069	Real estate	062	Other services
071	Medical and health service		
072	Restraunts		
073	Hotel		
074	Other services		
075	Public administration	063	Public administration and Unclassified
076	Unclassified		

78 Sector Classification (1990.1995)		63 Sector Classification	
Code	Description	Code	Description
002	Cassava	003	Food crops
004	Sugar cane and beet		
005	Oil parm and coconuts		
008	Other Food crops		
003	Natural rubber	004	Non-food crops
006	Fiber crops		
009	Other commercial crops		
014	Copper ore	010	Other metallic ore
015	Tin ore		
017	Other metallic ore		
021	Other milled grain and flour	012	Milled grain and flour
020	Milled Rice		
019	Oil and fats	015	Other food products
022	Sugar		
025	Other food products		
053	Agricultural machinery and equipment	045	Ordinary and specialized machinery
054	Specialized industrial machinery		
055	Ordinary industrial machinery		
061	Motor cycles and bicycles	050	Other transport equipment
062	Aircrafts		
064	Other transport equipment		
077	Public administration	063	Public administration and Unclassified
078	Unclassified		

Appendix 3

Dependency structure based on final demand from 1990 to 2000

Dependence Structure based on Final Demand (1990-2000)							
1990	Indonesia	Malaysia	Philippines	Thailand	China	Korea	Japan
Indonesia	78.8%	0.2%	0.1%	0.1%	0.5%	0.8%	7.4%
Malaysia	0.5%	50.0%	0.4%	1.6%	1.3%	1.6%	7.7%
Philippines	0.1%	0.2%	79.5%	0.1%	0.2%	0.3%	3.0%
Thailand	0.1%	0.4%	0.1%	73.7%	0.3%	0.3%	3.3%
China	0.1%	0.1%	0.0%	0.3%	82.6%	0.0%	2.7%
Korea	0.2%	0.2%	0.1%	0.3%	0.2%	75.0%	3.6%
Japan	0.2%	0.2%	0.1%	0.3%	0.3%	0.4%	87.7%
1995	Indonesia	Malaysia	Philippines	Thailand	China	Korea	Japan
Indonesia	80.5%	0.3%	0.2%	0.2%	0.6%	0.8%	4.2%
Malaysia	0.6%	40.4%	0.6%	1.5%	1.8%	1.4%	6.8%
Philippines	0.1%	0.4%	74.2%	0.2%	0.3%	0.5%	2.9%
Thailand	0.3%	0.6%	0.2%	67.9%	0.7%	0.3%	4.0%
China	0.2%	0.1%	0.1%	0.2%	79.4%	0.6%	3.6%
Korea	0.3%	0.4%	0.1%	0.3%	1.3%	75.3%	2.7%
Japan	0.2%	0.3%	0.1%	0.4%	0.5%	0.5%	89.3%
2000	Indonesia	Malaysia	Philippines	Thailand	China	Korea	Japan
Indonesia	66.8%	0.6%	0.3%	0.4%	1.6%	1.3%	6.2%
Malaysia	0.6%	34.3%	0.6%	0.9%	2.8%	1.4%	8.0%
Philippines	0.1%	0.3%	63.2%	0.3%	1.0%	0.6%	4.3%
Thailand	0.4%	0.7%	0.3%	57.4%	1.3%	0.5%	5.1%
China	0.1%	0.1%	0.0%	0.2%	78.3%	0.5%	3.3%
Korea	0.2%	0.2%	0.2%	0.2%	2.5%	69.3%	2.6%
Japan	0.1%	0.2%	0.1%	0.2%	0.7%	0.4%	87.1%

References

Aoki, K. (2005), "*The changing of the growth in triangle in Asia-Pacific region*" Nihon Hyoronsha (in Japanese)

Eguchi, S. (2006), "Globalization and reorganization of the northeast Asian region order" *A general policy selection of treatises Vol.11* The University of Shimane *(in Japanese).*

Fujikawa, K. Shimoda, M. and Watanabe, T. (2006), "The change of the international division of labor structure of the Asia and the Pacific Area" *Economic Management Vol.42* Osaka Sangyo University *(in Japanese).*

Fujikawa, T. and Watanabe, T. (2003), "The Economic effect of FTA of China, Korea and Japan" *Business journal of PAPAIOS, Vol.11 No.1 (in Japanese).*

Fujita, W. (2006),"An extending on virtical specialization share using International Input-Output Tables" *Journal of Management and Economy*, Vol.85, No.3.4, (in Japanese)

Hasebe, Y. (2002), "Trade and Economic Growth in Eastern Asia: An Analysis for Economic interdependency Using 1985-90-95 Asian International Input-Output Tables," *Yokohama Journal of Social Sciences*, Vol. 7, No. 3, (in Japanese).

Hasebe, Y. and Shrestha, N. (2006), "Economic Integration in East Asia : An International Input-Output Analysis" *The World Economy* Vol.29, Issue 12

Honda, K. (2006) "A study about the international division of labor and industrial accumulation in East Asia" B*ulletin of the Research Institute of Economic science Vol.36* Research Institute of Economic Science College of Economics Nihon University *(in Japanese).*

Kimura, F. Maruya, H. and Ishikawa, K. (2002) "*The international division of labor in East Asia and China*" JETRO *(in Japanese).*

Meng, B. Sato, H. Nakamura, J. Okamoto, N. Kuwamori, H. and Inomata, S. (2006), "Interindustrial Structure in the Asia-Pacific Region : Growth and Integration, by Using 2000 AIO Table" *DISCUSSION PAPER No.50, INSTITUTE OF DEVELOPING ECONOMIES*

NIRA (2003), "The feasible economic effect of Free Trade Area of China, Korea and Japan" *NIRA policy study Vol.16, No.12 (in Japanese).*

Okamoto, N, Inomata, T. and others (2006),"International Input-Output Theory: Input-Output Analysis on East Asia V" *Asian International Input-Output Analysis Series No.66, (in Japanese).*

Shimizu, K. (2004). "For regional economy cooperation of Asean, China, Korea and Japan" *Korea economic study Vol.4* Kyushu University *(in Japanese).*

Takagawa, I. and Okada, T. (2004), "Estimation of Input Coefficient of Extended International IO table and Analysis of Interdependency in Asia-Pacific Economy," *Bank of*

Japan Working Paper Series No. 04-J-6, (in Japanese).

Tamamura, S. Uchida, Y. and Okamoto, N. (2003) "Production, demand structure and the trade liberalization of Asian countries" *Journal of Asian Economies XLIV-5・6 (in Japanese).*

Kim, X. (2006) "The relations among China, Korea and Japan and Northeastern Asian regional cooperation" *A general policy selection of treatises Vol.11* The University of Shimane *(in Japanese).*

Data Source for the Asian IIO tables

Institute of Developing Economies (1998), "Asian International Input-Output Table 1990," IDE Statistical Data Series, No. 81

Institute of Developing Economies (2001), "Asian International Input-Output Table 1995," IDE Statistical Data Series No. 82

Institute of Developing Economies (2006), "Asian International Input-Output Table 2000," IDE Statistical Data Series No. 90

Received 3 October 2007; accepted 14 April 2008