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Abstract: Deepening economic interdependence in East Asia has led to lively debates on economic integration in East Asia. This paper attempts to reveal the degree of economic interdependence in the region by using the International Input-Output (IIO) approach. The IIO analysis enables us to include the indirect effects generated from interaction between different production sectors and different countries. The previous research, which uses the estimated IIO table for year 2000, shows growing but diverse economic interdependence in East Asian countries. Such results suggest that the establishment of economic and monetary union (EMU) in East Asia appears to be little premature. In the present paper, we extend the existing studies by (1) using recently published IIO table for year 2000; (2) using the tables with maximum disaggregated production sectors; (3) sub grouping the East Asian countries into ASEAN4 (Indonesia, Malaysia, the Philippines and Thailand), NIEs3 (Singapore, Taiwan and Korea), EA8 (ASEAN4, NIEs3 and China) and A9 (EA8 and Japan); and (4) introducing the size effect on the sector level analysis. We are optimistic for the economic union at both country level and production sector level. However, monetary union appears to be premature in East Asia.

JEL Classification: C67, D57, F14, F15

Keywords: economic integration, economic interdependence, intermediate inputs, IIO analysis, East Asia, Size effect

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1. Introduction

High economic growth and deepened regional interdependence in East Asia for the last few decades lead to a lively debate on possible economic and monetary union (EMU) in the region. This paper aims to examine the degree of economic integration in the region by using the International Input-Output (IIO) model.

There have so far been a large number of studies on economic and monetary integration in East Asia. For instance, Zhang and Hock (1996), Ballard and Cheong (1997), Choe (2001) and Sohn (2005) discuss the economic integration through trade and investment; Kuroda and Kawai (2003) and Kawai (2005) inquire the regional and financial integration, while Sato and Zhang (2005) investigates the evidence for a monetary union in East Asia. Most of the existing studies listed above use the microeconomic data to explore the degree of integration in East Asia, which limits these studies to the country level analyses. Furthermore, the indirect effect generated by interactions between the industrial sector as well as countries is not fully counted and the production technology of the consumption goods is not considered in the analyses.

We adopt the IIO framework in the present paper, which is (1) capable of dealing direct and indirect effects, (2) designed for sector level as well as country level analysis, and (3) equipped to involve the production technology in terms of intermediate goods. Despite strengths of the IIO method, there are very few researches on the theme of "economic integration". It may be attributed partly to the availability and the time lag of the IIO table.

Most of the existing IIO literatures[1] do not include the exogenous country effect and

[1] See, for example, Hasebe (2002), Tamamura (2002), Takagawa and Okada (2004) and Shimoda, Watanabe and Fujikawa (2005).

the economic size effect in the analysis. However, there are some papers that deal with the exogenous country effect (Hasebe, 2002; Shimoda et al., 2005) and the size effect (Shimoda et al., 2005). While introducing the economic size effect, Shimoda et al. (2005) used the value added as the economic size in their study. Their approach considers the value added as domestic inputs to produce goods, which may not be true in reality. On the basis of existing methodologies[2], Hasebe and Shrestha (2006) proposed "intermediate input method" that includes the size effect (final demand and export) and exogenous country effect to study the economic interdependence using the IIO technique[3].

Hasebe and Shrestha (2006) examined the degree of economic integration in East Asia to review the possibility of EMU in the region. Some important features of their study, as compared to previous IIO literatures, are (1) use of IIO analysis to the "integration" question, which is rarely done, (2) inclusion of the exogenous county effect, (3) reflection of economic size effect, and (4) use of trade data (UN Comtrade export data converted into industry data) to calculate the dependence structure to produce export goods. On the other hand, their analysis is based on the estimated IIO table (Takagawa and Okada, 2004) with 19 production sectors for year 2000 and sector level interdependence results do not include the sectoral size effect.

The current paper is an extension of the Hasebe and Shrestha (2006)'s work in the following ways. First, we use the IIO table recently published by Institute of Developing Economies (IDE) for year 2000. Second, our results are based on the IIO tables with maximum disaggregated production sectors. Third, we study the economic interdependence at sub-region level in East Asia. Finally, we include the size effect in

[2] See Hasebe and Shrestha (2006) for detail description of different IIO methodolodies.
[3] We discuss about the concept of economic size effect in Section 2.

the sector level analysis.

Use of the officially published IIO tables from the same source make the results comparable and has the high degree of reliability. Analyses with maximum sector level table enable us to reflect the detailed sector wise indirect interactions and it also provides detail sector wise dependence results, which is not possible with the aggregated IIO table. For example, the Transport Equipment sector in 19 sector IIO table is disaggregated into four production sectors (Motor Vehicles, Motor Cycles, Shipbuilding and Other Transport Equipment) in the 76 sector table (year 2000).

Calculation of the interdependence by grouping the East Asian countries into ASEAN4 (Indonesia, Malaysia, the Philippines and Thailand), NIEs3 (Singapore, Taiwan and Korea) EA8 (ASEAN4, China and NIEs3), A9 (EA8 and Japan), provides the information on the interdependence and extent of regional integration at the sub regional level. Such sub regional analysis enables us to answer the question of possible EMU in East Asia on the basis of comprehensive knowledge about the regional circumstances.

Inclusion of the size effect in sector level analysis provides the dependence results adjusted for the production of the consumption goods in the particular production sector. The dependence results with size effect and without size effect for the Motor Vehicle and Wearing Apparel sectors clearly shows the difference in intermediate input requirements[4] for those production sectors. Moreover, such computation enables us to identify the trade specialized sectors that has significant importance in international trade and economic integration studies.

[4] The intermediate input requirement without size effect is the intermediate goods necessary to produce a good. Whereas, the intermediate input requirement with size effect (we define it as *real* intermediate input requirement) is the intermediate goods used to produce the consumption goods irrespective of the producing countries.

We encountered a severe problem while calculating the Leontief inverse matrix for the year 2000 with maximum sector disaggregated IIO table. Calculation of the Leontief inverse matrix was impossible as one of the diagonal elements (Malaysia, Unclassified sector) of the input coefficient matrix for endogenous countries is 1. Such a problem is solved by aggregating the particular sector (Unclassified sector) with other sector.

The remainder of this paper is organized as follows. Section 2 presents the analytical framework. Section 3 describes the data used in this study. Section 4 discusses the results of analysis. And finally, section 5 concludes the paper.

2. Analytical Framework

We use the IIO approach to reveal the degree of economic integration in East Asia. The IIO method uses the IIO table as a data source that provides the information on (1) the transaction of intermediate goods and final goods categorized for each the endogenous countries and its production sectors, (2) the import of intermediate goods and final goods from the exogenous country, (3) sector-wise export to the exogenous countries, (4) the value added amounts of each sectors for the endogenous countries, and (5) the total sectoral input/output.

Insert Figure 1 here

Figure 1 is a layout of a typical IIO table with two endogenous countries (Country 1 and Country 2), an exogenous country (Country 3) and two production sectors (Sect 1 and Sect 2). The variables z, f, v, e and x represent the intermediate goods, the final goods, the value added, the export and the total input/output respectively. The lowercase *italic*, the lowercase **bold** and the uppercase **BOLD** letters respectively denote the scalar

values, the vectors and the matrices. A single letter superscript and subscript denotes the country and the production sector correspondingly. For the transaction of the intermediate goods (*z*) and the final goods (*f*), the first superscript represents the country of origin and the second superscript is the destination country. In a similar manner, first subscript is the sector that makes the goods and the second subscript denotes the sector that uses the goods. For example, z_{21}^{32} is the amount of the intermediate goods produced by sector 2 in country 3 that is exported to the country 2 to be used by sector 1; f_1^{22} represents the amount of final goods used in the country 2 that is domestically produced by sector 1.

Let us define intermediate input coefficients as $a_{ij}^{kl} = \frac{z_{ij}^{kl}}{x_j^l}$ (*k* = 1, 2 and 3; *l* = 1 and 2; *i*, *j* = 1 and 2); the input coefficient matrix for endogenous countries as $\mathbf{Ad} = \left[a_{ij}^{kl}\right]$ (*k*, *l* = 1 and 2; *i*, *j* = 1 and 2); the input coefficient matrix for exogenous country as $\mathbf{Aw} = \left[a_{ij}^{3l}\right]$ (*l* = 1 and 2; *i*, *j* = 1 and 2) and the total intermediate input coefficient matrix as $\mathbf{A} = \begin{bmatrix} \mathbf{Ad} \\ \mathbf{Aw} \end{bmatrix}$. The matrix **A** represents the direct requirement of the intermediate goods from both endogenous and exogenous countries for unit production of the goods.

The Leontief inverse matrix (**B**) is calculated as $(\mathbf{I} - \mathbf{Ad})^{-1}$, where **I** is the identity matrix of suitable size. The meaning of a column of the matrix **B** is the input structure of the intermediate goods that are supplied from each sector of the endogenous countries to produce the output that fulfills a unit final demand in the production sector corresponding to the column of the matrix **B**. The results based on the Leontief inverse matrix although includes the direct and indirect production effects, it fails to count the

exogenous country effect as the matrix **B** does not cover the exogenous country.

The exogenous country effect is introduced by defining the total intermediate input requirement matrix[5] (**D**) as the matrix multiplication of **A** and **B** (i.e., **D = AB**). The matrix **D** describes the direct and indirect requirement of intermediate goods to produce the final goods from endogenous and exogenous countries. The total intermediate input requirement matrix serves as an equivalent to the Leontief inverse matrix in the sense that the matrix **D** includes the direct and indirect effects of the production. In addition, the matrix **D** accounts the exogenous country effect.

Insert Figure 2 here

Figure 2 is a production structure of country 1 that needs the intermediate goods $\mathbf{D}^{11}$, $\mathbf{D}^{21}$ and $\mathbf{D}^{31}$ from countries 1, 2 and 3 respectively[6] to produce a unit output. The percentage share of intermediate goods from three countries constitutes the dependence on respective countries. That is, $\frac{\mathbf{D}^{11}}{\mathbf{D}^{11}+\mathbf{D}^{21}+\mathbf{D}^{31}}$ is the dependence on country 1 (self-dependence of country 1), whereas $\frac{\mathbf{D}^{21}}{\mathbf{D}^{11}+\mathbf{D}^{21}+\mathbf{D}^{31}}$ and $\frac{\mathbf{D}^{31}}{\mathbf{D}^{11}+\mathbf{D}^{21}+\mathbf{D}^{31}}$ represents the dependence on imports from country 2 and country 3 respectively.

The dependence results based on the matrix D do not reflect the economic size effect of a country in the analysis, however, exogenous country effect (absent in the Leontief inverse matrix), direct and indirect production effects are included in the results.

We count the size effect in the analysis by introducing the concept of the *real* intermediate input requirements to produce the goods that are consumed in a country.

[5] See Hasebe (2002) for detail description. Hasebe and Shrestha (2006) use the notation **R2** to represent the total intermediate input requirement matrix.

[6] $\mathbf{D}^{kl}$ (k = 1, 2 and 3; l = 1 and 2) is the $(k, l)^{\text{th}}$ block of the matrix **D** partitioned by country such that $\mathbf{D} = \begin{bmatrix} \mathbf{D}^{11} & \mathbf{D}^{12} \\ \mathbf{D}^{21} & \mathbf{D}^{22} \\ \mathbf{D}^{31} & \mathbf{D}^{32} \end{bmatrix}$.

The *real* intermediate input requirement is defined as the intermediate goods from different countries that are necessary to produce the consumption goods irrespective of the country of the production.

Insert Figure 3 here

Figure 3 represents the concept of size effect in the interdependence analysis. In this figure, country 1 consumes the goods $\mathbf{f}^{11}$ and $\mathbf{f}^{21}$ produced in country 1 and country 2 respectively[7]. The *real* intermediate input requirement to produce $\mathbf{f}^{11}$ in country 1 and $\mathbf{f}^{21}$ in country 2 are (1) $\mathbf{D}^{11}*\mathbf{f}^{11} + \mathbf{D}^{12}*\mathbf{f}^{21}$ from country 1, (2) $\mathbf{D}^{21}*\mathbf{f}^{11} + \mathbf{D}^{22}*\mathbf{f}^{21}$ from country 2, and (3) $\mathbf{D}^{31}*\mathbf{f}^{11} + \mathbf{D}^{32}*\mathbf{f}^{21}$ from country 3. The dependence results based on *real* intermediate input requirements provide the dependence measure with direct and indirect production effects, exogenous country effect and, most importantly, the economic size effect. Mathematically, the size effect is defined as the following matrix equation.

$$\mathbf{Df} = \begin{bmatrix} \mathbf{D}^{11} & \mathbf{D}^{12} \\ \mathbf{D}^{21} & \mathbf{D}^{22} \\ \mathbf{D}^{31} & \mathbf{D}^{32} \end{bmatrix} \begin{bmatrix} \mathbf{f}^{11} & \mathbf{f}^{12} \\ \mathbf{f}^{21} & \mathbf{f}^{22} \end{bmatrix} = \begin{bmatrix} \mathbf{D}^{11}\mathbf{f}^{11} + \mathbf{D}^{12}\mathbf{f}^{21} & \mathbf{D}^{11}\mathbf{f}^{12} + \mathbf{D}^{12}\mathbf{f}^{22} \\ \mathbf{D}^{21}\mathbf{f}^{11} + \mathbf{D}^{22}\mathbf{f}^{21} & \mathbf{D}^{21}\mathbf{f}^{12} + \mathbf{D}^{22}\mathbf{f}^{22} \\ \mathbf{D}^{31}\mathbf{f}^{11} + \mathbf{D}^{32}\mathbf{f}^{21} & \mathbf{D}^{31}\mathbf{f}^{12} + \mathbf{D}^{32}\mathbf{f}^{22} \end{bmatrix}$$

The first column of the matrix **Df** is the actual intermediate input requirements from different countries to produce the goods that are consumed in country 1. In a similar manner, the second column shows the structure of intermediate inputs with the size effects for country 2.

3. Data

[7] $\mathbf{f}^{kl} = \begin{bmatrix} f_1^{kl} \\ f_2^{kl} \end{bmatrix}$ (k, l = 1 and 2) is supply of the final demand from country k that is used in country l.

We use Asian IIO tables with maximum number of production[8] sectors for years 1990, 1995 and 2000 published by IDE at different years. These tables consist of 10 endogenous countries (Indonesia, I; Malaysia, M; the Philippines, P; Singapore, S; Thailand, T; China, C; Taiwan, N; Korea, K; Japan, J and USA, U) and two exogenous countries Hong Kong and Rest of the World (ROW)[9].

It is impossible to calculate the Leontief inverse matrix (based on the 2000 table) due to the problem of a unit diagonal element (Malaysia, unclassified sector) in the input coefficient matrix. Such a problem is solved by aggregating the unclassified sector with other sector. As a consequence, we use the 75 sector IIO table (instead of the 76 sector table) for year 2000.

We aggregate the 2000 IDE table into a 19 sector table to make a comparison between the dependence results calculated from the IDE table and the estimated table. Moreover, to study the degree of economic interdependence in East Asia and its sub-regions, we aggregate the endogenous countries into a number of groups (EA8, A9, ASEAN4 and NIEs3).

4. Results

As mentioned in the Section 1, this paper is an extension of the works done by Hasebe and Shrestha (2006) to use the recently published Asian IIO table for year 2000. Here, we present a comparative dependence results calculated from the IDE table and the estimated table for the year 2000. Figure 4 is the graph of the difference (the IDE

[8] Year 1990 and 1995 tables are classified into 78 production sectors, while the number of production sectors for year 2000 table is 76.
[9] Year 2000 table includes European Union (EU) as third exogenous country.

table result – the estimated table result) in the self-dependences calculated from the two tables. The self-dependence for the Philippines showed the difference of -7.6%, whereas that for the Taiwan accounted +3.1%. In general, the self-dependences are overestimated (i.e., dependence on import is underestimated) by using the estimated table[10].

Insert Figure 4 here

Figure 5 is a graph of the self-dependence of the 9 Asian endogenous countries for years 1990, 1995 and 2000. Japan and China has very high level of self-dependences, where as, Malaysia and Singapore have very high level of dependence on import to fulfill the demand of the consumption goods in these countries. Among the 8 East Asian countries Malaysia, Singapore and Thailand have significantly increased the self-dependence from 1995 to 2000[11]. On the other hand, Indonesia and Taiwan have decreased the self-dependence. Therefore, Figure 5 illustrates a clear evidence of the diverse dependence structures in the 8 individual East Asian countries.

Insert Figure 5 here

Figure 6 shows the dependence on the import from (a) East Asian countries other than the country itself (other East Asia), (b) Japan, and (c) from the ROW (including USA and EU). Although, the dependence on the other East Asian countries has increased slightly from 7.7% in 1990 to 10.9% in 2000 (9.5% in 1995) in average, the regional dependence in East Asia is still low as compared to the dependence on Japan and the ROW (including USA and EU). Such a dependence structure in East Asia implies that there is some progress in the regional integration. However, there still exists

[10] See Appendix 1 for the detailed dependence results calculated from the IDE table and the estimated table.
[11] See Appendix 2 for the detailed dependence results with size effect.

comparatively high level of dependence on the non regional partners.

Insert Figure 6 (a), (b) and (c) here

The above is the general characterization of the dependence situations and the degree of economic integration in the individual countries of East Asia. Now, we try to explain the degree of regional integration by differentiating East Asia in to four sub-regions namely (1) ASEAN4 (Indonesia, Malaysia, the Philippines and Thailand), (2) NIEs3 (Singapore, Taiwan and Korea), (3) EA8 (ASEAN4, NIEs3 and China), and (4) A9 (EA8 and Japan). Figure 7-9 are the graphical representation of intra-regional dependence, inter-regional dependences and the dependence on ROW including USA and EU respectively for different sub-regions in East Asia[12].

Insert Figure 7 here

Higher degree of the intra-regional dependence (Figure 7) can be seen in the regions EA8 and A9 as compared to the ASEAN4 and NIES. In the case of EA8, the intra-regional dependence has increased about 4% from 1995 (77.9%) to 2000 (81.8%), whereas other sub-regions do not show any significant changes. Such an increase in the intra-regional dependence indicates the progress in economic integration among the EA8 member countries.

Insert Figure 8 here

The inter-regional dependences (Figure 8) between ASEAN4, NIEs3 and China (i.e., the member countries of the EA8 region) demonstrate the increasing trend, although the degree of dependence is small, from 1995 to 2000. In addition, these three sub-regions exhibit the decrease in dependence on Japan. The dependence on ROW (including USA and EU) does not shift considerably from 1990 to 2000 (Figure 9).

[12] See Appendices 3-5 for the detailed sub-regional interdependence results.

Insert Figure 9 here

The sub-regional interdependence analysis demonstrates the increased (though the degree of dependence is low) inter-regional dependence, decreased dependence on Japan and unchanged dependence on ROW (including USA and EU). Such results imply that the economic integration in East Asia is growing. However, the dependence on Japan and ROW (including USA and EU) still exhibits higher level. As a result, East Asian countries are yet to enjoy the expected economic boost due to increase in the consumption demand.

Insert Table 1 here

Table 1 is the summary of the self-dependences and the dependences on Japan with and without size effects in the Motor Vehicle sector for the year 2000[13]. The results display significant differences in the dependence patterns. For example, Singaporean Motor Vehicle sector uses the 39.9% of domestic intermediate goods to produce the motor vehicle, whereas only 11.9% of the domestic intermediate goods are used to produce the motor vehicles running in Singapore. It is also worth noting that the dependence (with size effect) on Japan is low for China (6.8%) and Korea (7.6%). The low level of dependence on Japan may be explained by the fact that these countries mostly use domestically produced motor vehicles and the scale of "Made in Japan" motor vehicle import is small.

Insert Table 2 here

Table 2 is summarizes the self-dependences and the dependences on China with and without size effects in the Wearing Apparel sector for the year 2000[14]. The self-dependence of Japan without size effect in wearing Apparel industry is 84.9%. If

[13] See Appendix 6 for the detailed dependence structure of Motor Vehicle sector.
[14] Appendix 7 provides the dependence structure of Wearing Apparel sector.

the consumption of Wearing Apparel products in Japan is considered, only 52.5% of the Japanese intermediate goods are used. Most of the imported intermediate goods (32.4%) are delivered from China.

5. Concluding Remarks

This paper studies the degree of economic integration in East Asia by using the IIO approach. Our study shows an evidence of the diverse dependence structures in the individual East Asian countries. In general, East Asian countries have experienced some progress in economic integration by decreasing the dependence on Japan (especially from 1995 to 2000) although the degree of integration is low and the levels of dependence on Japan and the ROW (including USA and EU) are relatively high.

The sub-regional interdependence analysis also justifies the progress of economic integration in East Asia (EA8) since the last decade. Inclusion of Japan as an integrating partner, the region (A9) becomes more autonomous region (despite the diversity does not improve). As a consequence, increase in the economic activities (consumption demand and export) will boost up the regional economy.

The sector level interdependence analysis for year 2000 shows significantly different interdependence structures compared to the country level interdependence analysis. The sector level results suggest that there is possibility of economic integration at the sector level in East Asia.

To answer the question of possible EMU in East Asia, we are optimistic for the “Economic Union” at both country level and production sector level in East Asia. Such indications can be seen in the region since the last decade and is expected to continue

further in coming years. In contrast, our results suggest that “Monetary Union” in East Asia appears to be premature as diversity in economic, production and consumption structures still exist in East Asia.

The analysis of this paper can be extended in the following ways. First, we can introduce the effect of the primary inputs (i.e., effect of value added). Second, we can investigate the interdependence structure to produce the export goods (vertical specialization, as mentioned by Hummels et al., 2001). Finally, detailed analysis on more production sectors is necessary. These are left for the future research.

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Figures, Tables and Appendices

Figure 1
Layout of a typical IIO table

		Country 1		Country 2		Final Demand		Export	Total Output
		Sect 1	Sect 2	Sect 1	Sect 2	Country 1	Country 2		
Country 1	Sect 1	z_{11}^{11}	z_{12}^{11}	z_{11}^{21}	z_{12}^{21}	f_1^{11}	f_1^{12}	e_1^1	x_1^1
	Sect 2	z_{21}^{11}	z_{22}^{11}	z_{21}^{21}	z_{22}^{21}	f_2^{11}	f_2^{12}	e_2^1	x_2^1
Country 2	Sect 1	z_{11}^{21}	z_{12}^{21}	z_{11}^{22}	z_{12}^{22}	f_1^{21}	f_1^{22}	e_1^2	x_1^2
	Sect 2	z_{21}^{21}	z_{22}^{21}	z_{21}^{22}	z_{22}^{22}	f_2^{21}	f_2^{22}	e_2^2	x_2^2
Country 3	Sect 1	z_{11}^{31}	z_{12}^{31}	z_{11}^{32}	z_{12}^{32}	f_1^{31}	f_1^{32}		
	Sect 2	z_{21}^{31}	z_{22}^{31}	z_{21}^{32}	z_{22}^{32}	f_2^{31}	f_2^{32}		
Value Added		v_1^1	v_2^1	v_1^2	v_2^2				
Total Input		x_1^1	x_2^1	x_1^2	x_2^2				

Figure 2
Production structure of Country 1 (intermediate input requirements)

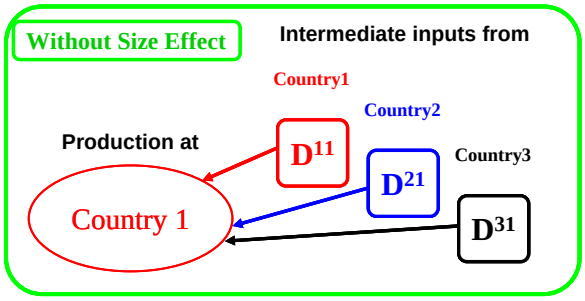


Figure 3
Concept of size effect (*real* intermediate input requirements)

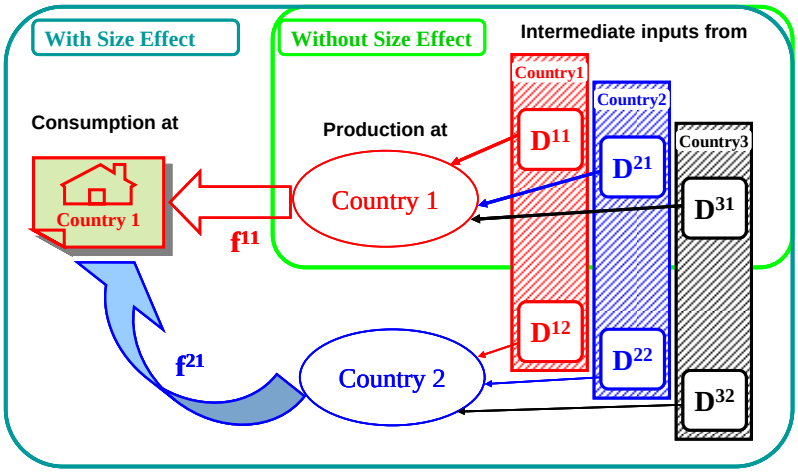


Figure 4
Difference in self-dependence calculated from the IDE and the estimated tables

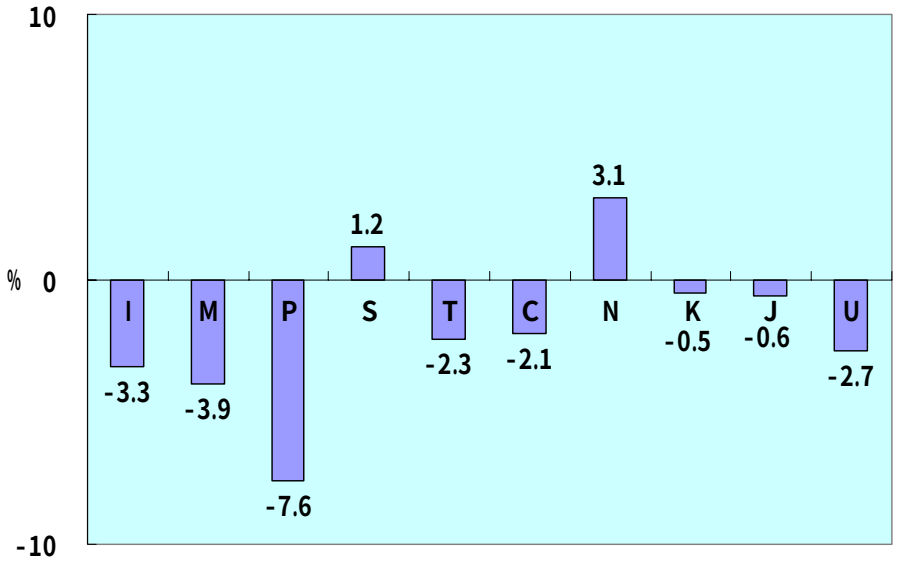


Figure 5
Self-dependence of the 9 Asian endogenous countries

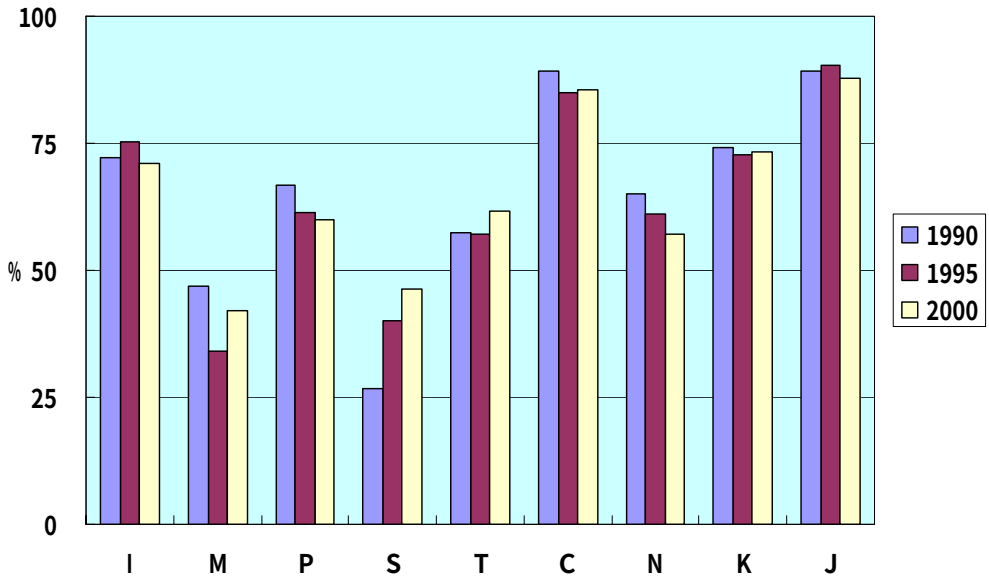


Figure 6 (a)
Dependence on other East Asian countries

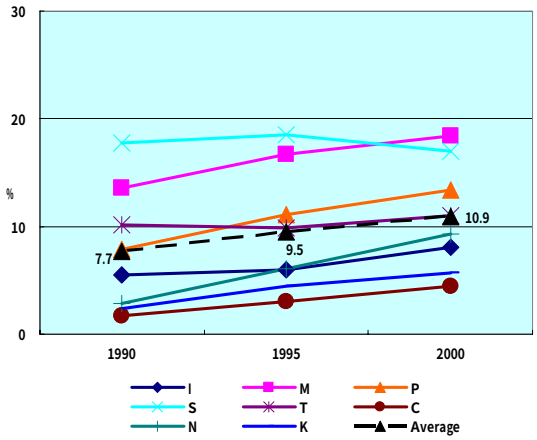


Figure 6 (b)
Dependence on Japan

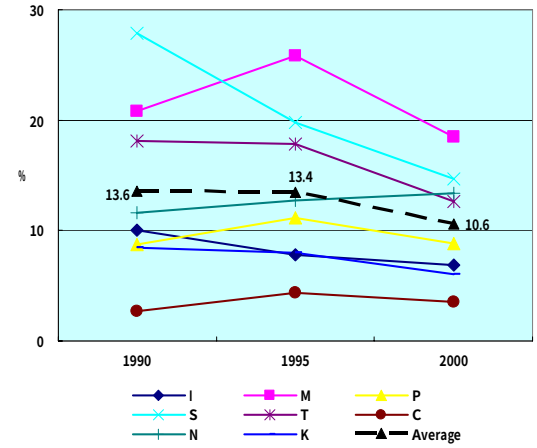


Figure 6 (c)
Dependence on the ROW (including USA and EU)

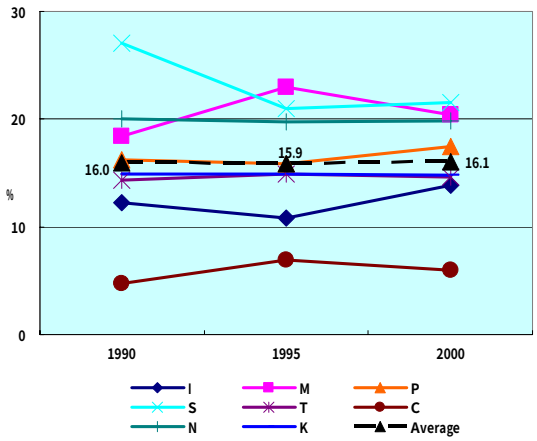


Figure 7
Intra-regional dependence

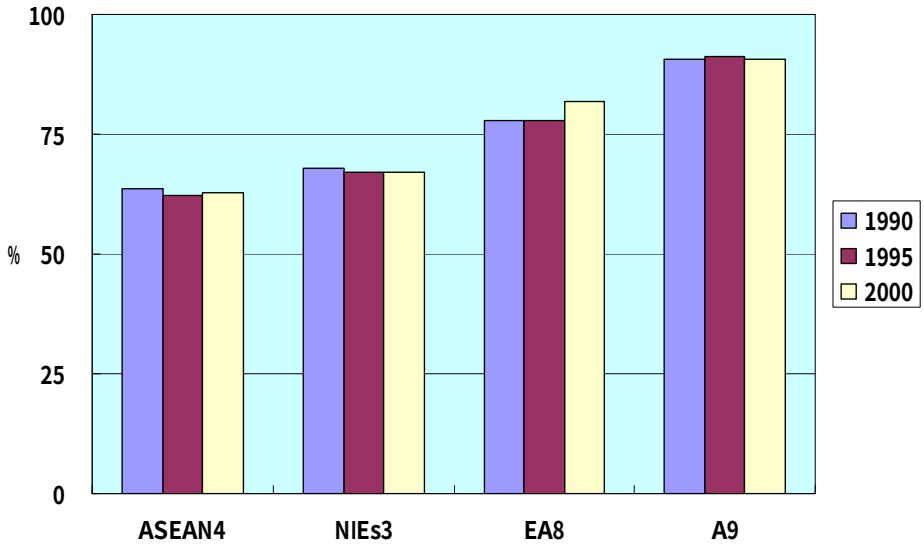
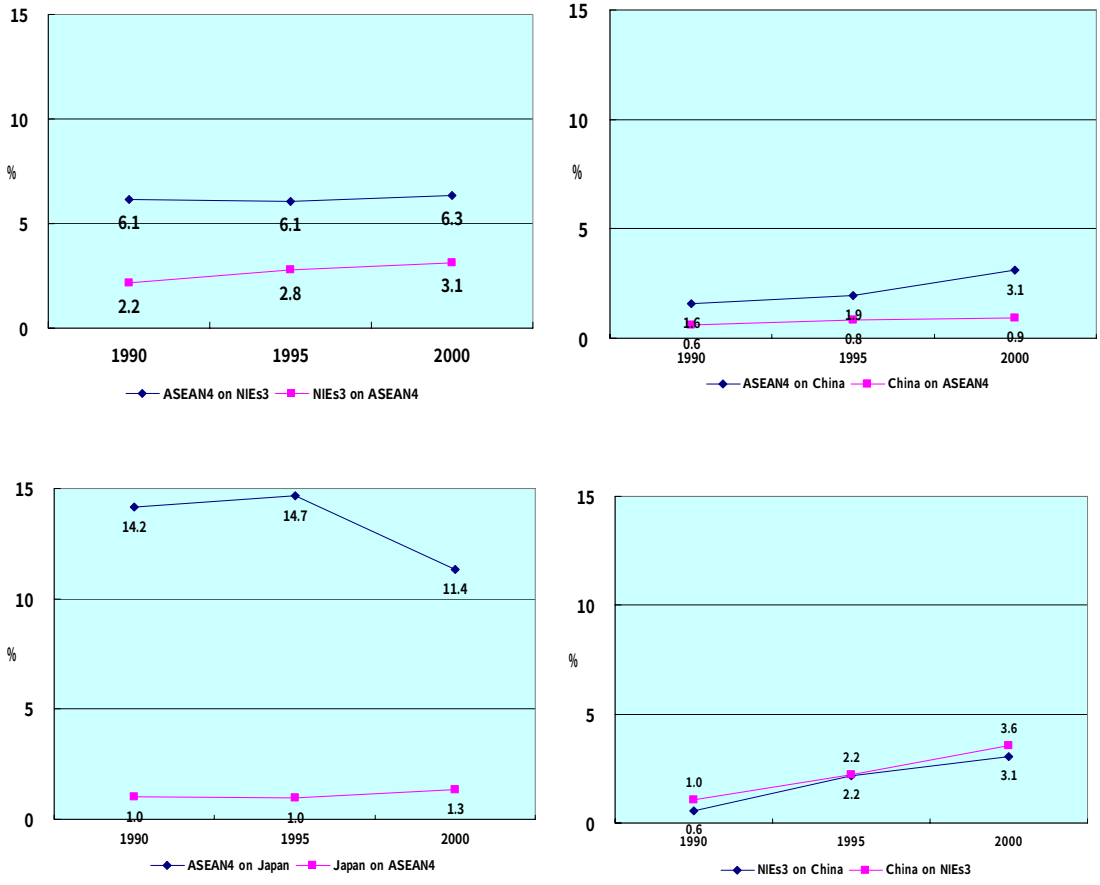


Figure 8
Inter-regional dependence



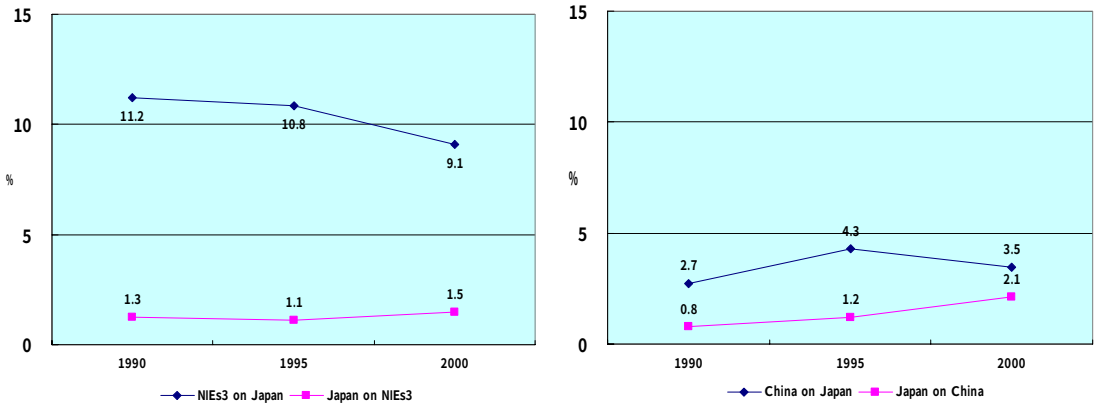


Figure 9
Dependence on ROW (including USA and EU)

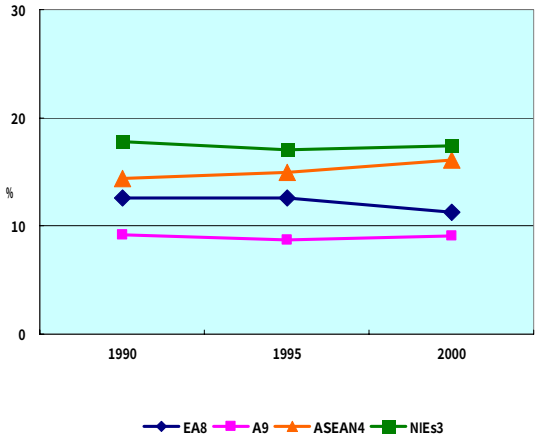


Table 1
Summary of Sector level Dependence results (%) for Motor Vehicle sector (2000)

Countries	Self-dependence		Dependence on Japan	
	Without Size Effect	With Size Effect	Without Size Effect	With Size Effect
Indonesia	63.8	34.3	17.7	47.3
Malaysia	35.7	22.3	33.1	53.0
Philippines	45.4	17.8	16.0	47.7
Singapore	39.5	12.0	19.1	55.4
Thailand	37.0	33.5	37.7	42.0
China	85.1	83.3	5.3	6.8
Taiwan	58.9	56.9	20.0	21.3
Korea	78.8	78.4	7.3	7.6
Japan	93.1	92.3	-	-

Table 2
Summary of Sector level Dependence results (%) for Wearing Apparel sector (2000)

Countries	Self-dependence		Dependence on China	
	Without Size Effect	With Size Effect	Without Size Effect	With Size Effect
Indonesia	64.9	63.9	3.9	4.3
Malaysia	37.5	35.1	6.1	9.5
Philippines	30.0	16.7	7.3	12.4
Singapore	42.6	40.4	8.2	9.5
Thailand	70.2	66.2	4.9	7.7
China	85.5	85.0	-	-
Taiwan	66.2	61.8	2.5	3.8
Korea	71.6	62.8	8.9	18.1
Japan	84.9	52.5	4.3	32.4

Appendix 1
Dependence results (%) calculated from the IDE table and the estimated table

		I	M	P	S	T	C	N	K	J	U
Indonesia	IDE	69.4	1.9	2.2	1.2	1.3	0.4	1.7	1.4	0.9	0.2
(I)	Estimated	72.6	1.2	1.1	2.3	0.5	0.6	2.2	1.5	1.0	0.1
Malaysia	IDE	1.4	49.8	2.6	6.1	2.1	0.4	1.5	0.8	0.6	0.3
(M)	Estimated	1.0	53.7	1.7	6.7	2.9	0.4	2.2	1.3	0.7	0.3
Philippines	IDE	0.1	0.4	46.4	0.2	0.3	0.1	0.3	0.1	0.1	0.1
(P)	Estimated	0.1	0.2	54.0	0.4	0.4	0.0	0.2	0.1	0.1	0.2
Singapore	IDE	1.0	5.1	2.9	47.4	1.7	0.3	0.9	0.4	0.1	0.2
(S)	Estimated	1.4	4.2	1.8	46.2	2.1	0.4	1.0	0.3	0.2	0.2
Thailand	IDE	0.9	2.3	1.6	1.8	57.8	0.2	0.7	0.3	0.3	0.2
(T)	Estimated	0.4	1.2	0.7	2.5	60.0	0.2	0.6	0.3	0.5	0.1
China	IDE	2.4	3.0	3.1	3.9	3.1	85.2	2.6	3.2	1.4	1.0
(C)	Estimated	2.0	2.8	2.6	4.1	2.7	87.3	3.5	3.0	1.3	0.6
Taiwan	IDE	1.0	2.9	3.4	1.5	1.9	1.6	58.9	0.6	0.4	0.6
(N)	Estimated	0.9	1.8	2.5	1.9	1.3	0.4	55.8	0.4	0.3	0.3
Korea	IDE	2.2	2.6	4.5	1.8	1.8	1.9	2.4	69.2	0.7	0.6
(K)	Estimated	2.1	2.4	3.4	2.9	2.1	1.3	2.0	69.7	0.7	0.5
Japan	IDE	5.0	12.1	9.8	10.1	11.2	3.0	9.7	5.6	86.3	1.8
(J)	Estimated	6.0	12.3	9.3	11.5	9.7	2.1	9.8	4.8	86.9	1.6
USA	IDE	3.2	6.4	6.9	7.2	4.7	1.5	6.4	5.0	2.3	85.7
(U)	Estimated	3.4	5.9	6.4	8.4	4.8	1.3	8.8	5.1	2.5	88.3
ROW	IDE	13.5	13.5	16.9	18.7	14.3	5.4	14.9	13.3	6.8	9.5
	Estimated	10.1	14.3	16.4	13.1	13.6	6.1	13.7	13.4	5.8	7.8

Appendix 2
Dependence results (%) with size effect for individual countries

		I	M	P	S	T	C	N	K	J	U
Indonesia	1990	72.0	0.7	0.6	1.3	0.3	0.2	0.5	0.6	0.5	0.1
(I)	1995	75.3	1.0	1.1	2.0	0.5	0.3	0.9	0.7	0.4	0.2
	2000	71.1	1.7	1.3	1.4	0.9	0.3	0.9	0.8	0.5	0.2
Malaysia	1990	0.4	46.8	0.9	5.1	1.6	0.3	0.5	0.6	0.3	0.2
(M)	1995	0.5	34.0	1.4	4.6	1.6	0.3	0.8	0.6	0.3	0.3
	2000	1.0	42.0	1.9	5.0	1.5	0.4	1.0	0.6	0.4	0.3
Philippines	1990	0.1	0.2	66.6	0.2	0.1	0.0	0.1	0.1	0.1	0.1
(P)	1995	0.1	0.4	61.4	0.3	0.2	0.0	0.1	0.1	0.1	0.1
	2000	0.1	0.4	59.8	0.3	0.3	0.1	0.3	0.2	0.1	0.2
Singapore	1990	1.0	4.4	1.0	26.8	1.9	0.2	0.6	0.2	0.1	0.2
(S)	1995	1.1	4.8	1.4	40.2	1.7	0.3	0.7	0.3	0.2	0.3
	2000	0.9	4.3	2.3	46.2	1.4	0.3	1.0	0.4	0.2	0.3
Thailand	1990	0.2	1.1	0.4	1.4	57.3	0.1	0.2	0.2	0.2	0.1
(T)	1995	0.4	1.6	0.7	2.2	57.2	0.2	0.5	0.2	0.3	0.2
	2000	0.8	2.0	1.0	1.9	61.5	0.2	0.7	0.3	0.3	0.2
China	1990	1.2	1.9	0.8	3.8	2.5	89.3	0.1	0.1	0.8	0.3
(C)	1995	1.3	2.6	2.0	3.7	2.2	84.9	1.8	2.1	1.2	0.7
	2000	2.4	4.3	2.2	4.3	3.5	85.5	3.1	2.8	2.1	1.7
Taiwan	1990	1.4	3.5	2.5	3.5	2.1	0.6	65.1	0.6	0.5	0.7
(N)	1995	1.1	3.1	2.6	2.6	1.8	0.7	61.2	0.5	0.4	0.5
	2000	1.0	3.0	1.8	1.8	1.8	1.5	57.1	0.6	0.6	0.6
Korea	1990	1.2	1.9	1.7	2.4	1.5	0.2	0.8	74.2	0.6	0.6
(K)	1995	1.5	3.3	1.9	3.2	1.9	1.2	1.4	72.6	0.5	0.5
	2000	1.8	2.7	2.8	2.3	1.6	1.7	2.3	73.2	0.7	0.7
Japan	1990	10.0	20.8	8.7	27.9	18.1	2.7	11.6	8.5	89.3	3.6
(J)	1995	7.8	25.8	11.2	19.8	17.8	4.3	12.8	8.0	90.3	3.6
	2000	6.9	18.5	8.8	14.7	12.6	3.5	13.4	6.1	87.9	3.1
USA	1990	3.2	10.1	7.4	14.3	4.5	2.1	9.2	7.2	3.0	89.1
(U)	1995	3.3	12.8	7.2	10.9	5.7	2.3	8.0	6.7	2.5	88.2
	2000	3.3	8.0	5.4	8.7	4.7	1.8	9.1	5.0	2.6	86.1
Hong Kong	1990	0.1	0.3	0.5	0.5	0.2	1.6	0.3	0.1	0.1	0.1
	1995	0.1	0.5	0.6	0.6	0.2	0.9	0.2	0.1	0.1	0.1
	2000	0.1	0.7	0.5	0.6	0.3	0.5	0.3	0.2	0.1	0.2
EU	1990	-	-	-	-	-	-	-	-	-	-
	1995	-	-	-	-	-	-	-	-	-	-
	2000	1.5	2.6	1.7	3.0	2.5	1.1	2.0	1.3	0.6	1.2
ROW	1990	9.1	8.4	8.8	12.7	9.8	2.6	10.9	7.7	4.7	4.9
	1995	7.5	10.2	8.7	10.1	9.2	4.6	11.7	8.3	3.8	5.3
	2000	9.0	9.7	10.4	9.8	7.4	3.0	8.8	8.4	4.0	5.3

Appendix 3
Dependence results (%) with size effect for sub-region EA8

		EA8	Japan	USA
EA8	1990	77.8	3.2	2.4
	1995	77.9	3.4	3.0
	2000	81.8	5.1	4.3
Japan	1990	8.9	89.2	3.6
	1995	9.1	90.2	3.5
	2000	6.5	87.7	3.0
USA	1990	5.5	2.9	89.1
	1995	5.2	2.5	88.1
	2000	3.9	2.5	86.0
Hong Kong	1990	0.7	0.1	0.1
	1995	0.5	0.1	0.1
	2000	0.4	0.1	0.2
EU	1990	-	-	-
	1995	-	-	-
	2000	1.5	0.6	1.2
ROW	1990	7.1	4.6	4.9
	1995	7.4	3.8	5.2
	2000	5.9	3.9	5.3

Appendix 4
Dependence results (%) with size effect for sub-region A9

		A9	USA
A9	1990	90.5	5.8
	1995	91.1	6.5
	2000	90.6	7.2
USA	1990	3.8	89.2
	1995	3.5	88.2
	2000	3.2	86.2
Hong Kong	1990	0.3	0.1
	1995	0.2	0.1
	2000	0.3	0.1
EU	1990	-	-
	1995	-	-
	2000	1.0	1.2
ROW	1990	5.4	4.9
	1995	5.2	5.2
	2000	4.9	5.3

Appendix 5
Dependence results (%) with size effect for sub-regions ASEAN4 and NIEs3

		ASEAN4	China	NIEs3	Japan	USA
ASEAN4	1990	63.5	0.6	2.2	1.0	0.4
	1995	62.1	0.8	2.8	1.0	0.8
	2000	62.8	0.9	3.1	1.3	0.9
China	1990	1.6	89.3	0.6	0.8	0.3
	1995	1.9	84.9	2.2	1.2	0.7
	2000	3.1	85.5	3.1	2.1	1.7
NIEs3	1990	6.1	1.0	68.0	1.3	1.5
	1995	6.1	2.2	67.0	1.1	1.4
	2000	6.3	3.6	67.0	1.5	1.6
Japan	1990	14.2	2.7	11.2	89.3	3.6
	1995	14.7	4.3	10.8	90.3	3.6
	2000	11.4	3.5	9.1	87.9	3.1
USA	1990	5.3	2.1	8.4	3.0	89.1
	1995	6.2	2.3	7.5	2.5	88.2
	2000	5.1	1.8	6.6	2.6	86.1
Hong Kong	1990	0.3	1.6	0.2	0.1	0.1
	1995	0.3	0.9	0.2	0.1	0.1
	2000	0.4	0.5	0.3	0.1	0.2
EU	1990	-	-	-	-	-
	1995	-	-	-	-	-
	2000	2.1	1.1	1.7	0.6	1.2
ROW	1990	9.1	2.6	9.4	4.7	4.9
	1995	8.7	4.6	9.4	3.8	5.3
	2000	8.9	3.0	9.2	4.0	5.3

Appendix 6
Sector level Dependence results (%) with size effect for Motor Vehicle sector (2000)

Without Size Effect	I	M	P	S	T	C	N	K	J	U
Indonesia (I)	63.8	1.4	3.2	1.6	0.9	0.2	0.6	0.5	0.3	0.1
Malaysia (M)	0.7	35.7	2.2	4.5	1.3	0.2	0.5	0.3	0.2	0.3
Philippines (P)	0.2	0.3	45.4	0.2	1.2	0.0	0.2	0.1	0.1	0.2
Singapore (S)	0.6	3.8	2.2	39.5	0.9	0.2	0.4	0.2	0.1	0.2
Thailand (T)	0.9	1.6	1.5	1.1	37.0	0.1	0.4	0.2	0.5	0.2
China (C)	1.8	3.1	3.8	4.5	2.7	85.1	2.3	1.9	0.8	1.4
Taiwan (N)	1.0	2.6	3.2	1.2	1.7	1.2	58.9	0.4	0.3	0.8
Korea (K)	1.5	2.8	5.2	2.2	2.0	1.5	2.0	78.8	0.4	0.8
Japan (J)	**17.7**	**33.1**	**16.0**	**19.1**	**37.7**	5.3	**20.0**	7.3	93.1	5.5
USA (U)	2.8	5.4	4.3	7.6	4.4	1.3	4.3	3.6	1.6	80.1
Hong Kong	0.1	0.5	0.7	1.1	0.2	0.3	0.2	0.2	0.1	0.1
EU	1.8	4.5	1.9	5.2	4.9	1.9	4.2	1.7	0.5	1.9
ROW	7.1	5.2	10.3	12.2	5.1	2.7	5.9	4.9	2.0	8.2

With Size Effect	I	M	P	S	T	C	N	K	J	U
Indonesia (I)	34.3	1.2	2.0	1.7	0.9	0.2	0.6	0.5	0.3	0.1
Malaysia (M)	0.7	22.3	1.3	1.8	1.3	0.2	0.5	0.3	0.2	0.3
Philippines (P)	0.3	0.3	17.8	0.2	1.3	0.0	0.2	0.1	0.1	0.2
Singapore (S)	0.4	2.4	1.0	12.0	0.8	0.2	0.4	0.2	0.1	0.2
Thailand (T)	1.3	1.5	2.1	1.2	33.5	0.2	0.4	0.2	0.5	0.3
China (C)	1.9	2.5	3.2	2.4	2.6	83.3	2.2	1.9	0.9	1.5
Taiwan (N)	1.2	1.9	3.9	1.3	1.6	1.3	56.9	0.4	0.3	0.7
Korea (K)	1.1	2.8	6.7	7.8	2.0	1.6	3.0	78.4	0.4	1.9
Japan (J)	**47.3**	**53.0**	**47.7**	**55.4**	**42.0**	6.8	**21.3**	7.6	92.3	14.0
USA (U)	4.9	4.5	6.5	7.8	4.4	1.5	4.3	3.7	2.1	71.3
Hong Kong	0.1	0.3	0.3	0.4	0.2	0.3	0.2	0.2	0.1	0.1
EU	1.4	3.1	1.5	2.3	4.5	1.9	4.1	1.7	0.5	1.8
ROW	5.1	4.1	6.0	5.8	4.8	2.7	5.8	4.9	2.0	7.5

Appendix 7
Sector level Dependence results (%) with size effect for Wearing Apparel sector (2000)

Without Size Effect	I	M	P	S	T	C	N	K	J	U
Indonesia (I)	64.9	3.4	2.9	0.7	1.1	0.3	1.7	1.1	1.0	1.4
Malaysia (M)	0.9	37.5	1.1	6.9	0.7	0.2	0.8	0.3	0.4	0.6
Philippines (P)	0.1	0.3	30.0	0.4	0.1	0.0	0.2	0.0	0.1	0.3
Singapore (S)	0.5	6.3	1.1	42.6	1.9	0.2	0.4	0.2	0.1	0.2
Thailand (T)	0.7	2.3	3.0	2.6	70.2	0.2	0.9	0.4	0.5	1.2
China (C)	3.9	6.1	7.3	8.2	4.9	85.5	2.5	**8.9**	**4.3**	3.1
Taiwan (N)	4.9	9.4	18.0	2.6	3.6	2.5	66.2	1.6	0.6	3.0
Korea (K)	5.9	2.9	9.3	3.9	2.8	2.6	3.9	71.6	1.4	1.5
Japan (J)	4.5	12.8	7.5	4.7	4.9	3.7	8.5	4.4	84.9	1.6
USA (U)	3.1	6.2	5.8	4.3	2.6	1.1	4.7	3.0	1.6	78.5
Hong Kong	1.0	2.5	4.9	3.4	0.4	0.6	0.3	0.1	0.2	0.6
EU	1.8	2.8	2.1	3.9	1.7	0.8	2.4	1.6	1.7	1.5
ROW	7.8	7.6	7.1	15.9	5.2	2.5	7.4	6.6	3.3	6.2

With Size Effect	I	M	P	S	T	C	N	K	J	U
Indonesia (I)	63.9	3.7	2.6	0.8	1.2	0.3	1.8	1.0	1.1	3.0
Malaysia (M)	1.1	35.1	1.3	7.0	0.8	0.2	0.9	0.3	0.4	1.2
Philippines (P)	0.1	0.3	16.7	0.4	0.2	0.0	0.3	0.0	0.1	1.1
Singapore (S)	0.7	6.1	1.1	40.4	2.0	0.2	0.5	0.2	0.1	0.7
Thailand (T)	0.8	2.5	2.8	3.0	66.2	0.2	1.2	0.4	0.7	3.1
China (C)	4.3	9.5	12.4	9.5	7.7	85.0	3.8	**18.1**	**32.4**	10.9
Taiwan (N)	5.0	9.1	19.4	2.7	3.6	2.4	61.8	1.7	1.5	4.4
Korea (K)	6.0	2.9	14.8	4.5	2.9	2.9	4.6	62.8	4.4	5.7
Japan (J)	4.6	12.3	11.1	4.8	5.4	3.7	10.5	4.7	52.5	2.6
USA (U)	3.2	6.1	6.5	4.6	3.0	1.1	4.7	2.8	2.0	58.8
Hong Kong	1.0	2.4	2.9	3.3	0.4	0.6	0.3	0.2	0.3	0.8
EU	1.8	2.7	2.0	3.8	1.7	0.8	2.3	1.5	1.4	1.5
ROW	7.8	7.4	6.5	15.3	5.1	2.5	7.2	6.1	3.2	6.0