Foreign Direct Investment, Intra-Regional Trade and Production Sharing in East Asia

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1. Introduction

Free Trade Agreements (FTAs) have gained increasing global popularity. Although East Asia lagged behind other regions in concluding free trade agreements, the 1990s saw a marked change in considering formal regional cooperation treaties in East Asia.[1] One of the leading factors that led to the emergence of such heightened interest is the rapid growth of intra-regional trade. In turn, the important new development that contributed to the expansion of intra-East Asian trade is the international exchange of *intermediate goods*, which includes *parts and components* rather than final goods. This phenomenon results from the emergence of a new form of global production--international fragmentation of production where a production process of the final product is split up into two or more steps and each production step is undertaken in different locations across national boundaries. Many alternative names have been coined for such a phenomenon, including "slicing the value chain" (Krugman, 1995), "vertical specialization" (Hummels et al. 1998), "international production sharing" (Ng and Yeats 2001), and "outsourcing" (Hanson et al 2001).

There has been growing evidence of the phenomenal increase in international fragmentation of production around the globe in a variety of sectors, including textiles and apparel, machinery and transport equipment, consumer electronics, toys and furniture. Recent improvements in service links in terms of lower costs of transportation and communication also enhance this trend. Moreover, the dispersed production networks created by such fragmentation seem to be more extensive in East Asia than in other parts of the world (Athukorala (2006), Ng and Yeats (2001, 2003)).

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[1] For a comparative study of regional trade agreements in East Asia and Latin America, see Aminian, Fung and Ng (2007).

While there is growing evidence that trade associated with production fragmentation has been the driving force behind increased trade integration in East Asia, it is less certain as to the exact determinants of trade in components and parts in East Asia. In particular, we know that trade in components and parts in general can be tied to *foreign* investment in the host countries or due to foreign outsourcing to *local* producers. In the former case, foreign direct investment (FDI) plays an important role in the formation of the production network, while in the latter case, local firms rather than FDI are important in fostering trade in components and parts.

It is possible that the global operations of multinational enterprises (MNEs) and consequent foreign direct investment (FDI) have been instrumental in the prevalence of production fragmentation in East Asia. The international fragmentation of production occurs if such fragmentation leads to sufficient reduction in production cost. A part of cost reduction arises from the standard theory of comparative advantage. The theory predicts that the firms locate relatively labor-intensive segment of the production in the country where labor is abundant and locate relatively capital-intensive segment of the production in the country where capital is abundant. In other words, fragmentation of production is encouraged by factor-endowment dissimilarities. Unlike intra-industry trade of similar goods that favors exchanges of final goods among developed economies, this opens the door for many developing countries to be a part of the production network and engage in trade.

It is widely recognized that a significant amount of trade in the global economy is carried out in the form of intra-firm trade, which is symptomatic of the prevalence of FDI-based production networks. But, the dispersed production networks can include both intra-firm and arm's-length transactions. Initially, the development of international

production networks may expand the volume of exports from FDI source country to the host country as the reallocation of production site increases exports of intermediate goods as well as capital goods required to engage in production. It may also increase imports of FDI source country as host country increase exports of finished products back to the source country. This trade-creating effect of FDI may change over time if foreign affiliates start sourcing intermediate goods locally or from third-country.

This paper first examines the extent and patterns of trade activities among the East Asian nations. We then attempt to analyze the impact of inward FDI on four types of trade flow, namely semi-finished goods, parts and components, capital goods and consumption goods. In a standard gravity equation, the volume of trade between two countries is a positive function of their gross domestic products and a negative function of the geographical distance between them. Starting with the specification, this analysis incorporates host country's FDI inflow to examine the influence of FDI on trade in Asia.

The remainder of the paper is organized as follows: Section 2 describes some characteristics of international trade in East Asia, and is divided into three parts. The first part discusses the increased importance of East Asia in world trade. The second section illustrates the geographic destinations of East Asian trade. These are followed by the analysis of trade by stages of production for each country. Section 3 discusses the general trend of inward FDI in East Asia. Section 4 presents the statistical analysis to investigate the effects of the FDI on the volume of trade for various East Asian countries. The section begins with the description of the variables used in the regression analysis, followed by the estimation methodology. The results for all regressions are reported and are analyzed in Section 4.2. Section 5 concludes.

2. Patterns of trade in East Asia

2.1 The relative importance of East Asia in world trade over time

Table 1a and 1b present global share of exports and imports of all products and the average annual growth rates for East Asian countries during 1980 to 2003, respectively. The tables also report similar figures for the European Union (EU 15), North America and global trade for comparison.

Regarding the import share, two key points emerge from the table. Firstly, the share of ex-Japan East Asia[2] in total world imports increased far faster than other two groups during the period. Ex-Japan East Asia's share more than doubled from 7.0% in 1980 to 17.7% in 2003, whereas the share of North America only increased from 16.8% to 21.0%. In contrast, the importance of the EU15 in the world imports steadily declined during the same period. In terms of the annual growth rate of import values, East Asian imports grew by 12.1% on average between 1980 and 2003, which was almost twice as fast as the growth the EU 15 experienced during the period.

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[2] East Asia ex-Japan includes China, the NIEs 4 and ASEAN 4.

Table 1a: The Share of Imports in World Imports, 1980-2003

	1980	1985	1990	1995	2000	2001	2002	2003
Japan	7.6%	7.0%	7.0%	6.8%	6.0%	5.7%	5.4%	5.2%
Rep.Korea	1.2%	1.7%	2.1%	2.7%	2.5%	2.3%	2.4%	2.4%
Taiwan	1.1%	1.1%	1.7%	2.1%	2.2%	1.7%	1.8%	1.7%
HongKong	1.2%	1.6%	2.5%	4.0%	3.4%	3.3%	3.3%	3.2%
Singapore	1.3%	1.4%	1.8%	2.6%	2.1%	1.9%	1.9%	1.7%
China	0.0%	2.2%	1.6%	2.7%	3.6%	4.0%	4.7%	5.6%
Thailand	0.5%	0.5%	1.0%	1.4%	1.0%	1.0%	1.0%	1.0%
Malaysia	0.6%	0.7%	0.8%	1.5%	1.3%	1.2%	1.2%	1.1%
Philippines	0.5%	0.3%	0.4%	0.6%	0.5%	0.5%	0.6%	0.5%
Indonesia	0.6%	0.6%	0.7%	0.8%	0.5%	0.5%	0.5%	0.4%
N. America	16.8%	23.9%	19.1%	19.2%	23.6%	22.8%	22.8%	21.0%
EU15	46.1%	40.5%	46.9%	38.9%	34.8%	35.7%	36.1%	37.3%
E Asia	7.0%	10.1%	12.6%	18.5%	17.0%	16.3%	16.4%	17.7%
Growth rate								
Japan	27.0%	-5.0%	11.5%	22.2%	22.6%	-7.9%	-3.5%	13.7%
Rep.Korea	9.5%	1.7%	13.4%	30.3%	35.9%	-11.9%	7.8%	17.0%
Taiwan	33.7%	-8.3%	4.7%	21.3%	26.5%	-23.4%	4.9%	13.1%
HongKong	28.5%	3.5%	14.3%	19.1%	18.5%	-5.5%	3.3%	11.7%
Singapore	36.1%	-8.4%	22.3%	21.3%	21.2%	-13.9%	0.4%	9.8%
China	0.0%	52.0%	-9.8%	14.2%	35.8%	8.2%	21.2%	39.8%
Thailand	32.5%	-12.2%	29.1%	30.1%	21.8%	0.6%	-100.0%	
Malaysia	37.0%	-10.3%	28.9%	30.6%	25.5%	-10.2%	8.0%	4.8%
Philippines	25.4%	-15.3%	16.7%	25.3%	3.8%	-7.2%	12.9%	11.6%
Indonesia	50.8%	-26.0%	33.5%	27.0%	39.6%	-7.6%	1.1%	4.0%
N. America	14.1%	5.6%	4.6%	11.7%	17.6%	-6.4%	1.6%	8.4%
EU15	20.4%	6.6%	19.7%	19.3%	4.9%	-0.7%	2.7%	21.9%
E Asia	29.1%	2.0%	12.8%	22.7%	26.4%	-7.1%	2.4%	27.1%
World	22.6%	2.2%	13.2%	19.6%	13.1%	-3.2%	1.7%	17.8%

Source: IDE

Table 1b: The Share of Exports in World Exports, 1980-2003

	1980	1985	1990	1995	2000	2001	2002	2003
Japan	7.4%	10.2%	9.0%	9.2%	7.8%	6.8%	6.8%	6.7%
Rep.Korea	1.0%	1.8%	2.0%	2.5%	2.8%	2.5%	2.7%	2.7%
Taiwan	1.1%	1.8%	2.1%	2.3%	2.4%	2.1%	2.2%	2.0%
HongKong	1.1%	1.8%	2.6%	3.6%	3.3%	3.2%	3.3%	3.2%
Singapore	1.1%	1.3%	1.6%	2.5%	2.2%	2.0%	2.1%	2.0%
China	0.0%	1.5%	1.9%	3.1%	4.0%	4.5%	5.4%	6.2%
Thailand	0.4%	0.4%	0.7%	1.2%	1.1%	1.1%	1.1%	1.1%
Malaysia	0.7%	0.9%	0.9%	1.5%	1.6%	1.5%	1.5%	1.5%
Philippines	0.3%	0.3%	0.3%	0.4%	0.6%	0.5%	0.6%	0.5%
Indonesia	1.2%	1.1%	0.8%	0.9%	1.0%	0.9%	0.9%	0.9%
N. America	15.9%	17.3%	16.1%	15.9%	17.1%	16.6%	15.5%	14.0%
EU15	42.6%	42.0%	46.8%	41.4%	35.5%	37.4%	38.5%	39.8%
E Asia	7.0%	10.8%	13.0%	18.0%	19.1%	18.3%	18.6%	20.1%
Growth rate								
Japan	25.8%	3.4%	4.3%	12.0%	14.8%	-15.8%	3.3%	13.2%
Rep.Korea	16.2%	3.5%	4.1%	28.5%	21.3%	-12.5%	8.1%	18.8%
Taiwan	23.0%	0.9%	1.4%	20.0%	22.0%	-17.2%	6.3%	10.4%
HongKong	30.0%	6.1%	12.3%	14.8%	16.1%	-5.9%	5.4%	11.8%
Singapore	36.1%	-5.2%	18.0%	22.1%	20.3%	-11.8%	2.9%	15.2%
China	0.0%	3.1%	18.2%	23.0%	27.8%	6.8%	22.4%	34.6%
Thailand	22.8%	-3.9%	15.2%	24.7%	18.1%	-5.3%	-100.0%	
Malaysia	16.8%	-5.2%	17.6%	25.4%	16.2%	-10.4%	6.9%	11.3%
Philippines	25.8%	-14.1%	4.7%	30.0%	8.8%	-15.4%	9.5%	2.8%
Indonesia	40.5%	-15.1%	17.4%	13.7%	27.8%	-9.5%	1.7%	6.9%
N. America	20.7%	-1.2%	8.3%	14.4%	13.5%	-6.1%	-4.6%	5.1%
EU15	15.0%	8.2%	19.2%	21.0%	2.3%	1.7%	5.2%	20.5%
E Asia	27.2%	-1.4%	11.2%	21.4%	20.9%	-7.1%	3.5%	26.1%
World	21.4%	2.9%	14.1%	19.3%	12.6%	-3.3%	2.1%	16.5%

Source: IDE

For North America and the World as a whole, the corresponding figures were 7.8% and 7.1%, respectively.

Secondly, within the East Asian countries, the largest contributor to the rapid expansion of imports is China followed by Hong Kong. The global share of China increased from 0% in 1980 to 5.6% in 2003, whereas the corresponding increase for Hong Kong is 2% during the period. In terms of average annual growth rates, although figures for all East Asian nations are higher than that of the World, China leads the trend by achieving the highest average growth rate of 13.1%. Table1.b acknowledges Asia's growing importance in exporting to the world. It portrays an even more impressive picture than the import side. The export share of developing East Asia almost tripled from 7.0% in 1980 to 20.1% in 2003 surpassing the global share of the U.S. and Canada since 1993. The key players in the expansion of global share of East Asia are again China and Hong Kong. China's share increased to 6.2% in 2003, which is only 0.5% smaller than that of Japan during the same year. East Asian exports grew at an annual rate of 12.4% between 1980 and 2003, which was about 5.3% higher than the growth rate of the world exports. Both the U.S. and Canada and EU15 registered the slower annual growth rates for exports than the world average at 6.5% and 6.7%, respectively.

2.2 The geographic destinations of East Asian trade

Table 2a and 2b examine the changes in the share of geographic direction of individual East Asian imports and exports, respectively for 1985, 1995 and 2003. Tables 2a and 2b also include the figures for North America, EU15 and the World for comparison.

East Asia in general appears to have gone through significant changes in the direction of their imports. The share of East Asia's imports from other East Asian countries increased from 23.0% in 1985 to 40.9% in 2003 indicating increased dependency on regional trade. The increase is largely attributed to the NIEs and China. China's share more than doubled from 5.9% to 12.5%, whereas the share of the NIEs increased from 10.7% to 18.4%. On the other hand, the table reports relatively small gain in the share of the ASEAN by 3.6%. In contrast, a sizeable decline occurred in the share of Japan by almost 8% from 1985 to 2003. Despite the setback, however, Japan still remains as the single largest import sourcing country for East Asia. The share of the U.S. and Canada as well as EU15 in the East Asian imports also declined, however by lower intensity relative to the Japanese experience.

Increased dependency on regional trade can be seen for all East Asian countries, although sizeable differences regarding the extent of the dependency exist among those countries. For example, the share of East Asia in Philippines' imports increased by 6.2%, whereas the corresponding figures for Indonesia and China are both 22.1%. At the same time, the dependency on North America as an import source declined for all East Asian countries, and that on EU15 declined for all except Singapore during the period.

The increased importance of China as an import source country can be seen in all East Asian countries except Philippines where China lost some marginal share and Singapore where China only gained 0.1% increase in share. China has also become an increasingly important factor for non-regional markets. The increase in the share of China in the imports of North America between 1985 and 2003 was 10.4%. In spite of the fact that intra-regional imports dominate in EU15 accounting for 57.6% in 2003,

Table 2.a The Geographic Destinations of East Asian Imports: 1985, 1995, 2003

		East Asia	Japan	China	NIEs	ASEAN4	N. America	EU15
East Asia	1985	23.0%	25.7%	5.9%	10.7%	6.4%	17.1%	13.6%
	1995	33.6%	22.8%	10.0%	16.0%	7.5%	15.8%	13.9%
	2003	40.9%	17.7%	12.5%	18.4%	10.0%	11.3%	11.1%
Japan	1985	25.9%		5.1%	7.7%	13.1%	24.0%	7.6%
	1995	34.7%		10.8%	12.3%	11.5%	25.9%	14.5%
	2003	42.4%		19.7%	10.2%	12.5%	17.6%	12.8%
Korea	1985	10.6%	24.2%	0.0%	3.5%	7.1%	22.8%	11.0%
	1995	15.4%	24.6%	5.6%	4.2%	5.6%	24.7%	13.4%
	2003	26.4%	20.6%	12.4%	6.4%	7.6%	15.2%	10.7%
Taiwan	1985	9.6%	27.6%	0.0%	3.8%	5.7%	25.5%	11.1%
	1995	18.8%	29.2%	3.0%	8.8%	7.0%	21.6%	14.4%
	2003	30.1%	25.6%	8.6%	11.2%	10.3%	14.1%	10.3%
Hong Kong	1985	45.8%	23.1%	25.5%	17.5%	2.8%	9.8%	12.3%
	1995	59.6%	14.8%	36.2%	18.8%	4.6%	8.4%	10.8%
	2003	66.9%	11.9%	43.5%	16.8%	6.6%	6.0%	8.4%
Singapore	1985	32.6%	17.0%	8.6%	6.8%	17.2%	15.5%	12.2%
	1995	36.5%	21.1%	3.3%	11.8%	21.5%	15.5%	13.4%
	2003	43.5%	11.9%	8.7%	11.4%	23.4%	14.5%	12.5%
China	1985	14.0%	35.8%		11.9%	2.1%	14.6%	16.5%
	1995	32.6%	22.0%		28.1%	4.5%	14.2%	16.1%
	2003	36.1%	18.0%		27.6%	8.4%	9.3%	12.8%
Thailand	1985	23.4%	26.5%	2.4%	13.7%	7.2%	12.6%	16.1%
	1995	24.7%	30.7%	3.0%	15.3%	6.4%	12.7%	15.9%
	2003	32.0%	24.3%	8.1%	13.8%	10.1%	10.1%	10.1%
Malaysia	1985	31.0%	23.2%	2.1%	22.4%	6.6%	16.4%	16.1%
	1995	31.0%	28.1%	2.3%	23.7%	5.0%	17.1%	15.6%
	2003	46.1%	17.2%	8.9%	25.1%	12.1%	16.2%	11.9%
Philippines	1985	30.6%	14.4%	5.4%	13.7%	11.5%	25.9%	9.3%
	1995	29.2%	22.1%	2.3%	21.0%	5.9%	19.9%	10.7%
	2003	36.8%	20.4%	4.9%	22.4%	9.6%	20.1%	8.0%
Indonesia	1985	17.2%	25.8%	2.4%	13.5%	1.2%	18.7%	19.0%
	1995	24.6%	22.7%	3.7%	17.0%	3.9%	13.7%	20.1%
	2003	39.2%	13.0%	9.1%	20.8%	9.3%	9.3%	10.9%
N. America	1985	13.9%	17.7%	1.0%	10.2%	2.7%	27.9%	19.9%
	1995	20.4%	14.6%	5.6%	9.8%	5.1%	27.5%	16.4%
	2003	22.6%	8.5%	11.5%	6.7%	4.4%	24.1%	18.1%
EU 15	1985	3.0%	3.5%	0.4%	1.7%	0.9%	8.4%	56.2%
	1995	6.4%	4.1%	1.7%	3.0%	1.6%	8.1%	61.5%
	2003	8.7%	3.1%	3.8%	3.1%	1.8%	7.1%	57.6%
World	1985	9.6%	9.7%	1.5%	5.3%	2.8%	16.7%	36.5%
	1995	16.4%	9.5%	4.6%	7.6%	4.1%	16.6%	37.4%
	2003	19.8%	6.9%	8.1%	7.3%	4.5%	13.7%	35.0%

Source: IDE

Table 2.b The Geographic Destinations of East Asian Exports: 1985, 1995, 2003

		East Asia	Japan	China	NIEs	ASEAN4	N. America	EU15
East Asia	1985	25.5%	16.9%	4.7%	15.1%	5.7%	29.4%	11.4%
	1995	38.0%	12.9%	8.7%	20.9%	8.4%	21.1%	13.9%
	2003	40.0%	10.7%	12.7%	20.1%	7.3%	19.6%	14.3%
Japan	1985	24.1%	0.0%	7.1%	12.8%	4.2%	40.2%	13.2%
	1995	42.0%	0.0%	5.0%	25.0%	12.1%	28.9%	15.9%
	2003	44.8%	0.0%	12.2%	23.4%	9.2%	26.5%	15.4%
Korea	1985	10.8%	15.0%	0.0%	7.4%	3.4%	39.7%	11.7%
	1995	31.1%	13.7%	7.5%	15.9%	7.7%	21.3%	13.3%
	2003	37.8%	9.0%	18.3%	12.9%	6.6%	19.3%	13.0%
Taiwan	1985	15.1%	11.3%	0.0%	12.0%	3.1%	51.4%	9.4%
	1995	38.5%	11.8%	0.3%	29.6%	8.5%	25.0%	13.1%
	2003	47.7%	8.3%	14.8%	26.3%	6.5%	19.1%	12.9%
Hong Kong	1985	36.6%	4.2%	26.0%	7.0%	3.6%	33.2%	13.6%
	1995	44.0%	6.1%	33.3%	7.1%	3.6%	23.3%	15.0%
	2003	52.5%	5.4%	42.6%	6.5%	3.4%	20.0%	13.3%
Singapore	1985	31.4%	9.4%	1.5%	9.3%	20.6%	21.9%	11.0%
	1995	44.2%	7.8%	2.3%	15.4%	26.5%	18.8%	13.4%
	2003	48.4%	6.7%	7.0%	19.0%	22.3%	14.6%	13.4%
China	1985	36.4%	22.2%	0.0%	33.7%	2.7%	9.4%	9.2%
	1995	36.8%	19.1%	0.0%	33.1%	3.7%	17.7%	12.9%
	2003	30.1%	13.6%	0.0%	26.1%	4.0%	22.4%	16.5%
Thailand	1985	25.6%	13.4%	3.8%	15.4%	6.3%	20.9%	19.8%
	1995	30.9%	16.8%	2.9%	23.0%	4.9%	18.9%	15.1%
	2003	34.8%	14.3%	7.1%	18.0%	9.7%	18.3%	14.8%
Malaysia	1985	36.4%	23.8%	1.1%	29.1%	6.3%	13.7%	14.9%
	1995	40.4%	12.7%	2.7%	31.6%	6.2%	21.5%	14.2%
	2003	43.0%	10.7%	6.5%	28.7%	7.8%	20.2%	12.1%
Philippines	1985	20.6%	18.9%	1.6%	12.9%	6.1%	37.5%	16.2%
	1995	24.6%	15.9%	1.2%	16.2%	7.2%	37.4%	16.9%
	2003	42.6%	16.0%	5.9%	25.6%	11.0%	21.0%	16.2%
Indonesia	1985	18.4%	46.2%	0.5%	16.1%	1.9%	22.0%	6.4%
	1995	31.0%	27.1%	3.8%	22.2%	5.0%	14.7%	14.9%
	2003	35.5%	22.4%	6.3%	21.5%	7.7%	12.8%	13.1%
N. America	1985	9.1%	8.8%	1.6%	5.9%	1.6%	37.9%	18.9%
	1995	15.3%	9.5%	1.9%	10.2%	3.3%	35.9%	17.5%
	2003	13.7%	5.9%	3.2%	7.6%	2.9%	40.5%	16.5%
EU 15	1985	3.0%	1.2%	0.8%	1.5%	0.7%	10.8%	57.8%
	1995	5.7%	2.1%	1.0%	3.2%	1.6%	7.3%	61.8%
	2003	4.7%	1.6%	1.6%	2.3%	0.8%	9.6%	60.1%
World	1985	8.9%	4.9%	2.1%	5.0%	1.8%	22.1%	36.8%
	1995	16.9%	5.6%	2.9%	9.8%	4.1%	18.5%	37.7%
	2003	16.4%	4.3%	5.0%	8.2%	3.1%	19.6%	36.9%

Source: IDE

China managed to gain its share by 3.4% since 1985. For both regions, China accounts for approximately half of their imports from the East Asia in 2003.

The table shows that there have been significant changes in the pattern of China's imports as well. In 1985, more than one third of its imports originated from Japan. Almost two decades later, its reliance on Japan has declined to 18%. On the other hand, a large increase in the share of intra-regional imports from 14% in 1985 to 36.1% in 2003 is witnessed. The rise is largely from the increase in the share of the NIEs in China's imports. Table 2b reveals all the NIEs, particularly Korea, Taiwan and Hong Kong have experienced a dramatic increase in their share of exports to China.

On the export side, on average, the share of intra-regional exports increased from 25.5% to 40%. Of all countries examined, significantly higher increase in the share of intra-regional exports is reported for Taiwan by almost 33% and Korea by 27%. China accounts for almost half of the gain for Taiwan and two thirds for Korea. Increased dependency on regional trade is evidenced for all other Asian countries except China. While over 36% of Chinese goods destined to other East Asian countries in 1985, the figure declined to 30.1% in 2003. In contrast, much higher portion of Chinese goods is absorbed by both North America and to lesser extent by EU15 in 2003. China is an important exception, however. As we have shown in the import side, the reliance on North America declined for all other East Asian countries except Malaysia. The decline in the reliance appears to be even larger on the export side. Taiwan in particular, the share of North America declined from 51.4% in 1985 to 19.1% in 2003.

For non-regional trade partners, the table shows increased dependency on East Asia to absorb their exports however the impact is much smaller than the import side.

In Table 2c, we highlight the extent of East Asian trade, including Japan to other East Asian economies and to other countries such as North America and the European Union for the year 2005. It shows that in general, either China or Japan was the main sources of imports to other Asian economies. China has also become an important source of imports to the EU and to North America.[3]

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[3] We are indebted to Francis Ng for providing us with this set of data, which is based on calculations using the latest UN COMTRADE Statistics.
The trade intensity index is defined as:

$$\frac{X_{ij}/X_i}{X_{wj}/X_w}$$

Where X_{ij} and X_{wj} are country i and world exports to country j; X_i and X_w are country i and world total exports. The numerator indicates the share of country i's export to country j in total export of the country i, and the denominator indicates the share of world's export to country j in its total export. If the bilateral trade intensity index has a value greater than one, the export of country i outperforms in country j. It implies that country j is relatively important to country i's exports.

Table 2c: Matrix of East Asian Trade in All Goods, 2005

Partner (Importer)	Exporting Country										
	China	Hong Kong	Indonesia	Japan	Korea, Rep.	Malaysia	Philippines	Singapore	Taiwan	Thailand	E Asia (10)
Export Value of Total Trade in All Goods ($ million)											
China	0	130 426	6 662	80 074	61 915	9 302	4 077	19 757	40 879	9 134	362 227
Hong Kong	124 473	0	1 492	35 960	15 531	8 242	3 339	21 522	30 721	6 128	247 408
Indonesia	8 350	1 265	0	9 214	5 046	3 322	476	22 103	2 336	3 960	56 073
Japan	83 986	15 304	18 049	0	24 027	13 184	7 203	12 532	14 481	15 029	203 796
Korea, Rep.	35 108	6 540	7 086	46 630	0	4 739	1 391	8 052	5 575	2 250	117 371
Malaysia	10 606	2 419	3 431	12 531	4 608	0	2 457	30 385	4 154	5 685	76 277
Philippines	4 688	2 635	1 419	9 057	3 220	1 974	0	4 184	4 220	2 050	33 448
Singapore	16 632	6 046	7 837	18 436	7 407	22 009	2 706	0	7 656	7 459	96 187
Taiwan	16 550	6 769	2 475	43 578	10 863	3 912	1 887	8 976	0	2 694	97 704
Thailand	7 819	3 001	2 246	22 451	3 381	7 586	1 169	9 402	3 718	0	60 773
East Asia (10)	308 213	174 405	50 698	277 932	135 997	74 272	24 704	136 913	113 739	54 390	1 351 264
EU (27)	145 613	42 942	10 347	87 819	44 354	16 614	7 008	27 907	22 124	15 019	419 745
Nam (13)	192 173	53 088	11 478	158 201	54 543	29 879	7 945	26 411	33 272	19 702	586 691
World	761 953	292 119	85 660	594 941	284 418	140 963	41 221	229 652	189 393	110 110	2 730 431
Share of Intra-Regional Trade in All Goods from Importer (%)											
China	0	36,0	1,8	22,1	17,1	2,6	1,1	5,5	11,3	2,5	100,0
Hong Kong	50,3	0	0,6	14,5	6,3	3,3	1,3	8,7	12,4	2,5	100,0
Indonesia	14,9	2,3	0	16,4	9,0	5,9	0,8	39,4	4,2	7,1	100,0
Japan	41,2	7,5	8,9	0	11,8	6,5	3,5	6,1	7,1	7,4	100,0
Korea, Rep.	29,9	5,6	6,0	39,7	0	4,0	1,2	6,9	4,7	1,9	100,0
Malaysia	13,9	3,2	4,5	16,4	6,0	0	3,2	39,8	5,4	7,5	100,0
Philippines	14,0	7,9	4,2	27,1	9,6	5,9	0	12,5	12,6	6,1	100,0
Singapore	17,3	6,3	8,1	19,2	7,7	22,9	2,8	0	8,0	7,8	100,0
Taiwan	16,9	6,9	2,5	44,6	11,1	4,0	1,9	9,2	0	2,8	100,0
Thailand	12,9	4,9	3,7	36,9	5,6	12,5	1,9	15,5	6,1	0	100,0
East Asia (10)	22,8	12,9	3,8	20,6	10,1	5,5	1,8	10,1	8,4	4,0	100,0
EU (27)	34,7	10,2	2,5	20,9	10,6	4,0	1,7	6,6	5,3	3,6	100,0
Nam (13)	32,8	9,0	2,0	27,0	9,3	5,1	1,4	4,5	5,7	3,4	100,0
World	27,9	10,7	3,1	21,8	10,4	5,2	1,5	8,4	6,9	4,0	100,0

Trade Balance of Total Trade in All Goods ($ million)

	China	Hong Kong	Indonesia	Japan	Korea, Rep.	Malaysia	Philippines	Singapore	Taiwan	Thailand	Total
China	0	-4 540	819	-28 403	23 267	-3 871	1 026	-759	20 951	-2 024	6 466
Hong Kong	112 248	0	1 201	34 389	13 488	5 390	1 344	17 314	28 834	4 626	218 835
Indonesia	-87	-659	0	-11 603	-3 139	-1 052	-610	11 656	-2 202	832	-6 865
Japan	-16 421	-17 732	11 143	0	-24 376	-3 450	-827	-6 702	-31 460	-11 020	-100 845
Korea, Rep.	-41 713	-6 723	4 217	22 215	0	-946	-887	-548	-7 629	-1 622	-33 635
Malaysia	-9 487	-4 935	1 283	-2 138	-1 403	0	685	3 050	-1 039	-2 404	-16 388
Philippines	-8 182	-2 506	1 097	1 357	904	-1 246	0	-464	1 435	168	-7 437
Singapore	118	-11 374	-1 634	11 741	2 089	8 594	-1 024	0	2 716	2 078	13 304
Taiwan	-58 131	-14 874	1 134	25 514	2 813	-2 419	-1 561	-4 347	0	-1 808	-53 679
Thailand	-6 173	-3 049	-1 201	6 893	692	1 544	-489	1 888	851	0	956
East Asia (10)	-27 827	-66 393	18 059	59 966	14 335	2 544	-2 345	21 089	12 457	-11 173	20 712
EU (27)	71 641	20 169	4 488	28 976	16 940	3 260	3 328	4 612	4 599	4 211	162 224
Nam (13)	110 889	34 689	5 809	69 776	14 849	13 045	-1 154	552	7 622	8 528	264 606
World	102 001	-8 042	27 959	79 074	23 183	26 379	-5 732	29 602	7 801	-8 054	274 171

Trade Intensity Index of Total Trade in All Goods

	China	Hong Kong	Indonesia	Japan	Korea, Rep.	Malaysia	Philippines	Singapore	Taiwan	Thailand	Total
China	--	8,0	1,4	2,4	3,9	1,2	1,8	1,5	3,9	1,5	2,4
Hong Kong	5,1	--	0,5	1,9	1,7	1,8	2,5	2,9	5,0	1,7	2,8
Indonesia	1,5	0,6	--	2,1	2,4	3,1	1,5	12,8	1,6	4,8	2,7
Japan	2,7	1,3	5,2	--	2,1	2,3	4,3	1,4	1,9	3,4	1,9
Korea, Rep.	2,2	1,1	4,0	3,8	--	1,6	1,6	1,7	1,4	1,0	2,1
Malaysia	1,3	0,8	3,6	1,9	1,5	--	5,4	12,1	2,0	4,7	2,5
Philippines	1,2	1,8	3,3	3,0	2,2	2,8	--	3,6	4,4	3,7	2,4
Singapore	1,4	1,3	5,8	2,0	1,6	9,9	4,1	--	2,6	4,3	2,2
Taiwan	0,8	0,8	1,0	2,6	1,3	1,0	1,6	1,4	--	0,9	1,3
Thailand	1,1	1,1	2,8	4,1	1,3	5,8	3,1	4,4	2,1	--	2,4
East Asia (10)	4,9	7,3	7,2	5,7	5,8	6,4	7,3	7,3	7,3	6,0	6,1
EU (27)	1,7	1,3	1,0	1,3	1,4	1,0	1,5	1,1	1,0	1,2	1,3
Nam (13)	2,2	1,6	1,2	2,3	1,7	1,8	1,7	1,0	1,5	1,5	1,9

Note: The classifications of country groups are defined as follow:

    East Asia (10) = China, Hong Kong, Indonesia, Japan, Korea Rep., Malaysia, Philippines, Singapore, Taiwan and Thailand

    EU (27) = European Union 25 members plus Bulgaria and Romania.

    Nam (13) = Canada, United States, Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, Uruguay and Venezuela.

Source: Computations based on UN COMTRADE Statistics.

2.3 The composition of trade by stage of production in East Asia

The above section leads to the conclusion that East Asian countries generally became increasingly interdependent in trade. We now turn to the characteristics of intra-regional trade in East Asia. As before, similar statistics for EU, NAFTA and the world are also presented in the table for comparison.

Table 3
Average growth rate of total manufactured goods, intermediate goods and final goods, 1998-2004

	Imports			Exports		
	Total	Intermediate Goods	Final Goods	Total	Intermediate Goods	Final Goods
China	24.7%	22.8%	27.8%	22.1%	24.7%	20.0%
HongKong	7.5%	10.7%	3.6%	9.0%	12.7%	4.3%
Indonesia	10.2%	9.6%	9.0%	9.6%	8.1%	7.6%
Japan	9.3%	11.0%	7.4%	8.3%	9.3%	6.8%
Malaysia	10.8%	11.1%	10.3%	9.5%	10.1%	9.4%
Philippines	5.9%	6.9%	0.6%	-0.2%	-1.0%	2.3%
RepOfKorea	18.2%	16.3%	25.9%	13.9%	13.2%	14.8%
Singapore	8.1%	9.4%	5.5%	9.3%	13.2%	2.1%
Thailand	15.2%	15.5%	13.5%	11.3%	12.3%	7.1%
N. America	6.7%	5.6%	7.8%	3.9%	4.1%	3.3%
EU15	7.6%	6.8%	8.5%	7.7%	7.4%	7.8%
AsiaNations	13.1%	14.1%	10.5%	11.9%	12.6%	10.7%
World	8.5%	8.5%	8.3%	8.7%	8.9%	8.1%

Source: Compiled from UN Comtrade database
            Author's calculation

As mentioned earlier, recent decades have witnessed an increasing trend toward production fragmentation, which has been a key driver of global trade integration. In this section, in order to examine the extent to which each East Asian country specializes in trade of final goods and intermediate goods, the value of exports and imports for each country is decomposed accordingly. A similar decomposition is done for EU15, North America and the world for comparison.

Table 3 examines the annual growth rate of trade in total manufactured goods and compares them with the annual growth rate of finished goods and intermediate goods. The table provides strong evidence that trade in intermediate goods which is a result of the international fragmentation of production has been the engine of Asian trade during recent years. Between 1998 and 2004, exports of intermediate goods grew at annual rate of 12.6% among Asian nations on average, which is faster than the growth rate of exports of final goods at 10.7%. On the import side trade in intermediate goods grew almost 4% faster than trade in final goods. Compared with other parts of the world, the growth rate in intermediate goods is much faster in Asian nations both in exports and imports. The growth rate of intermediate goods in exports for the world, EU15 and North America was 8.9%, 7.4% and 4.1%, respectively and that in imports was 8.5%, 6.8% and 5.6%, respectively. This reflects the fact that international fragmentation of production has prevailed more among the countries of East Asia relative to other regions of the world.

Table 4 further distinguishes different types of intermediate goods, namely Parts and Components (IMPC) and Semi-finished goods (IMSF). Finished goods are also further classified into Consumption goods (FC) and Capital goods (FCA). The last category P stands for Primary goods. The classification by the different stage of production is

useful to show how each nation of the East Asia is involved in the production fragmentation and to what extent they differ from other regions of the world. The way that the classification is done is explained in Appendix 1.

The most notable difference between the world and the Asian nations can be found in the trade pattern of parts and components. At the global level, approximately one fifth of both imports and exports are the exchange of parts and components. The share has been stable between 1998 and 2004. The table shows very different trends for different regions. For example, North America experienced 5% and 2.8% decline in their share of parts and components imports and exports, respectively from 1998 to 2004. EU 15 as well experienced the similar declining trend in parts and components trade. The trend in Asia contrasts markedly with the other regions. Parts and components trade gained its share during the period in Asia in general. They account for over 30% of imports in 2004 which was 5% higher than the share in 1998. The upward trend in the share can be found although to a lesser extent in the export side as well. The share increased from 26.2% in 1998 to 28.8% in 2004.

Table 4: Trade Pattern by Stage of Production, 1998-2004

Import		China	HongKong	Korea	Singapore	Indonesia	Malaysia	Philippines	Thailand	Japan	Aisa	N. America	EU15	World
1998	FC	4.5%	34.0%	4.5%	34.0%	5.7%	5.9%	8.4%	8.1%	31.1%	19.5%	30.3%	28.0%	25.4%
	FCA	18.9%	15.6%	18.9%	15.6%	22.1%	18.1%	10.8%	18.3%	14.2%	16.5%	19.7%	17.5%	18.4%
	IMPC	23.3%	19.7%	23.3%	19.7%	17.3%	47.7%	49.4%	30.2%	14.9%	25.4%	22.7%	18.7%	20.7%
	IMSF	46.1%	27.3%	46.1%	27.3%	39.1%	21.1%	25.1%	35.8%	23.0%	28.6%	18.8%	27.1%	26.3%
	P	5.2%	1.8%	5.2%	1.8%	8.7%	2.9%	6.1%	6.3%	13.6%	7.4%	4.4%	5.6%	5.9%
2001	FC	4.3%	31.1%	4.3%	31.1%	5.8%	7.1%	8.1%	7.2%	30.5%	17.8%	31.8%	27.6%	25.1%
	FCA	20.5%	17.0%	20.5%	17.0%	16.7%	16.9%	10.9%	19.3%	14.1%	17.1%	19.1%	17.7%	18.1%
	IMPC	27.6%	25.2%	27.6%	25.2%	16.6%	46.0%	45.0%	32.1%	16.3%	27.2%	19.7%	18.5%	20.7%
	IMSF	37.8%	23.5%	37.8%	23.5%	39.4%	21.5%	25.9%	31.9%	22.3%	26.5%	18.2%	25.3%	24.9%
	P	7.6%	1.6%	7.6%	1.6%	13.0%	3.6%	8.5%	8.1%	12.7%	8.1%	6.1%	6.6%	7.0%
2004	FC	3.9%	25.1%	3.9%	25.1%	8.1%	7.5%	6.9%	7.6%	27.4%	14.0%	31.8%	29.6%	24.5%
	FCA	22.8%	15.6%	22.8%	15.6%	16.0%	15.3%	6.8%	18.1%	14.0%	17.7%	19.3%	16.7%	18.1%
	IMPC	31.9%	33.7%	31.9%	33.7%	15.2%	44.8%	55.0%	29.9%	17.5%	30.4%	17.6%	16.9%	20.6%
	IMSF	30.2%	22.2%	30.2%	22.2%	37.7%	23.0%	21.0%	33.6%	23.5%	26.0%	19.0%	25.5%	25.1%
	P	9.1%	1.5%	9.1%	1.5%	12.3%	3.9%	5.6%	8.9%	13.4%	8.5%	7.5%	7.0%	7.7%
Export		China	HongKong	Korea	Singapore	Indonesia	Malaysia	Philippines	Thailand	Japan	Asia	N. America	EU15	World
1998	FC	47.3%	37.2%	18.2%	10.1%	19.9%	13.3%	16.1%	35.5%	17.6%	25.3%	16.3%	27.7%	24.7%
	FCA	14.7%	12.5%	18.2%	27.2%	4.1%	17.3%	12.0%	12.4%	25.9%	18.9%	21.4%	19.2%	17.8%
	IMPC	10.4%	19.6%	25.2%	39.7%	5.2%	38.5%	61.2%	27.0%	31.2%	26.2%	26.9%	18.1%	20.5%
	IMSF	22.9%	27.7%	36.1%	13.8%	37.7%	23.4%	8.9%	18.6%	21.5%	23.8%	23.7%	28.1%	26.5%
	P	4.3%	1.7%	0.7%	0.8%	17.9%	5.5%	1.6%	4.4%	0.4%	2.6%	7.2%	3.0%	6.7%
2001	FC	41.3%	33.6%	18.0%	7.9%	20.3%	12.6%	14.4%	31.8%	17.5%	24.0%	16.7%	27.9%	23.6%
	FCA	18.3%	14.2%	22.3%	22.5%	6.5%	19.9%	16.0%	12.2%	23.9%	19.4%	20.0%	19.1%	17.2%
	IMPC	14.9%	26.2%	24.1%	45.3%	9.5%	37.7%	60.0%	27.6%	31.5%	28.0%	26.5%	18.0%	20.4%
	IMSF	20.6%	24.4%	28.7%	14.1%	40.6%	21.4%	7.4%	19.4%	22.0%	22.3%	23.4%	26.7%	24.6%
	P	3.8%	1.5%	0.4%	0.6%	20.6%	4.9%	1.4%	3.9%	0.6%	2.6%	8.1%	3.2%	9.3%
2004	FC	32.7%	25.8%	15.4%	6.8%	19.4%	10.6%	8.9%	27.5%	16.4%	21.1%	16.9%	29.1%	23.7%
	FCA	25.3%	13.8%	23.2%	17.8%	7.2%	18.4%	12.7%	15.2%	23.3%	20.8%	18.5%	17.2%	17.1%
	IMPC	18.2%	35.1%	29.2%	47.1%	10.6%	35.4%	30.4%	25.5%	31.4%	28.8%	24.1%	17.0%	20.4%
	IMSF	20.8%	23.6%	27.0%	17.1%	38.8%	25.2%	8.4%	21.8%	23.4%	22.8%	25.4%	27.5%	26.1%
	P	2.1%	1.5%	0.4%	0.6%	20.9%	6.3%	1.7%	6.4%	0.8%	2.4%	9.9%	3.8%	7.6%

For finished products, the most distinguishing difference between the world and the Asian nations can be found in the trade pattern of consumption goods particularly on the import side. Approximately 25% of the world imports take the form of consumption goods. In the case of North America the share is almost 32%. Among the Asian nations, the corresponding share only amounts to 14% in 2004 which declined by over 5% since 1998.

There is considerable variation in trade patterns across East Asian countries. A general picture of the division of production processes in Asia can be drawn from the table as follows: China's trade structure can be characterized by a larger import share of parts and components and semi-finished products and by a large export share of consumption goods as well as capital goods. This reflects China's role in the production fragmentation as processing and assembly base for the finished products destined to the world market. In final good exports, one notable trend is its shift from consumption goods to capital goods suggesting that China has been moving up the value added chain.

The general feature of the ASEAN countries, namely Malaysia, the Philippines and Indonesia is a large share of intermediate goods in both imports and exports. The decomposition of intermediate goods shows that while parts and components account for a large share of imports and exports of Malaysia and the Philippines, semi-finished goods account for a large share of Indonesia. The import structure of Thailand is similar to other ASEAN countries, however the distinctive difference can be found in its export structure, namely a much larger share of exports of consumption goods.

Japan's trade structure is quite a contrast to those of the developing Asian countries. Japan is a large supplier of parts and components, reflecting Japanese industries turning other countries of the region into assemblers of Japanese products (Jones, Kierzkowski, Lurong (2004)). The trend is also marked by a small export share of consumption goods. The table also indicates a large share of capital goods in its exports. Part of Japan's large share of capital goods exports reflects large FDI outflows from Japan. Production fragmentation has been facilitated greatly by multinational corporations and consequent foreign direct investment (FDI). FDI flows have a significant impact on

exports from investing country to host country. Perhaps because new production facilities need to be equipped using capital goods from investing country or because new capital goods are required to expand the existing production capacities.

A large share of parts and components trade can also be found in countries like Singapore and Hong Kong where wage costs are much higher relative to other developing countries of East Asia. In Singapore, parts and components make up a substantial share of its imports and exports. Almost 47% of both imports and exports are induced by parts and components. This represents Singapore's pivotal role as outsourcing centre in Asia particularly for high-tech manufacturing products and acting as a hub for many leading international firms. Their superior logistics sector as well as finance industry help to form world-class supply chains in the region.

Most noteworthy are a rapid increase in the imports share of parts and components of Hong Kong during the recent years. The share was less than 20% in 1998, whereas the share increased to almost 34% in 2004. Hong Kong is a trading hub for electronic parts and components in Asia. A number of multinational manufacturers have set their offices in Hong Kong and source parts of key components freely taking advantage of its free port status. At the same time Hong Kong's electronics industry is characterized by the heavy dependence on imported parts of key components. Hong Kong's firms source worldwide as well as local Chinese firms in the mainland. On the export side, Hong Kong's electronics industry is the largest export industry, which accounted for nearly 50% of Hong Kong's total exports in 2006. Furthermore, two-thirds of Hong Kong's electronics exports are accounted for by parts and components. What contributes to the large amount of parts and components exports is Hong Kong's involvement in outward

processing production in mainland China. This has lead to the increase in exports share

from 19.6% in 1998 to 35.1% in 2004.

3. General trend in Aggregated FDI inflow in East Asia

Table 5
Inward FDI and the share in World Inward FDI, 1985-2005

US$ million	1985	1990	1995	2000	2001	2002	2003	2004	2005
Japan	642.0	1,753.0	41.5	8,322.7	6,241.3	9,239.3	6,324.3	7,815.7	2,775.0
Rep.Korea	218.0	759.0	1,250.0	8,591.0	3,692.0	2,975.0	3,785.0	7,687.0	7,198.0
Taiwan	342.0	1,330.0	1,559.0	4,928.0	4,109.0	1,445.0	453.0	1,898.0	1,625.0
Hong Kong	-267.2	3,275.1	6,213.4	61,924.1	23,776.5	9,681.9	13,623.6	34,034.7	35,897.0
Singapore	1,046.8	5,574.7	11,591.3	16,484.5	14,121.6	5,821.5	9,330.8	16,059.8	20,083.0
China	1,956.0	3,487.1	37,520.5	40,714.8	46,877.6	52,742.9	53,505.0	60,630.0	72,406.0
Thailand	160.0	2,575.0	2,070.0	3,350.0	3,886.0	947.0	1,952.0	1,064.0	3,687.0
Malysia	694.7	2,611.0	5,815.0	3,787.6	553.9	3,203.4	2,473.2	4,624.2	3,967.0
Phillipines	12.0	550.0	1,459.0	1,345.0	899.0	1,792.0	347.0	469.0	1,132.0
Indonesia	310.0	1,092.0	4,346.0	-4,550.0	-2,978.4	145.0	-596.9	1,023.0	5,260.0
E. Asia	4472.2	21253.9	71824.2	136575.0	94937.2	78753.7	84872.6	127489.7	151255.0
N. America	21,862.0	56,004.0	68,027.0	380,788.0	187,144.0	96,608.0	60,761.0	123,910.0	133,265.0
EU15	15,965.0	89,459.0	116,324.0	674,278.0	362,418.0	283,863.0	240,572.0	185,227.0	387,858.0
World	57,959.0	201,614.0	340,336.0	1,409,568.0	832,248.0	617,732.0	557,869.0	710,755.0	916,277.0
%	1985	1990	1995	2000	2001	2002	2003	2004	2005
Japan	1.1%	0.9%	0.0%	0.6%	0.7%	1.5%	1.1%	1.1%	0.3%
Rep.Korea	0.4%	0.4%	0.4%	0.6%	0.4%	0.5%	0.7%	1.1%	0.8%
Taiwan	0.6%	0.7%	0.5%	0.3%	0.5%	0.2%	0.1%	0.3%	0.2%
Hong Kong	-0.5%	1.6%	1.8%	4.4%	2.9%	1.6%	2.4%	4.8%	3.9%
Singapore	1.8%	2.8%	3.4%	1.2%	1.7%	0.9%	1.7%	2.3%	2.2%
China	3.4%	1.7%	11.0%	2.9%	5.6%	8.5%	9.6%	8.5%	7.9%
Thailand	0.3%	1.3%	0.6%	0.2%	0.5%	0.2%	0.3%	0.1%	0.4%
Malysia	1.2%	1.3%	1.7%	0.3%	0.1%	0.5%	0.4%	0.7%	0.4%
Phillipines	0.0%	0.3%	0.4%	0.1%	0.1%	0.3%	0.1%	0.1%	0.1%
Indonesia	0.5%	0.5%	1.3%	-0.3%	-0.4%	0.0%	-0.1%	0.1%	0.6%
E. Asia	7.7%	10.5%	21.1%	9.7%	11.4%	12.7%	15.2%	17.9%	16.5%
N. America	37.7%	27.8%	20.0%	27.0%	22.5%	15.6%	10.9%	17.4%	14.5%
EU15	27.5%	44.4%	34.2%	47.8%	43.5%	46.0%	43.1%	26.1%	42.3%

Source: World Investment Report, various years
Note: E. Asia excludes Japan

As Table 5 indicates, although global FDI inflow continued to be dominated by the

EU15 since 1980, East Asia (without Japan) has gained in importance as recipients of

FDI over time until mid-1990s in terms of both volume of inward flows and their world

share. Total value of inflows of FDI into eight East Asian economies amounted to

US$4.5 billion in 1985 increased to US$71.8 billion in 1995. Their share in total world

inflows rose from 7.7% in 1985 to 22.9% in 1995. The surge of FDI came to a halt however in 1997 with the Asian financial crisis. The swift recovery from the crisis in terms of FDI volume in 1998 was only followed by another sharp downturn in 2001. Since 2003, FDI inflow to the region has been on a rise again. It reached US$1,274.9 billion in 2004, a 50% increase over 2003 with a backdrop of improved economic performance, a more favorable FDI policy environment and a rise in merger and acquisition activities in the region. Considering 6% increase in global FDI inflow in 2004, a gain in the region's FDI inflow is spectacular. It continued to grow in 2005 reaching US$1,512.6 billion, which was up almost thirty four-fold from 1985. The region accounted for over one fifth of global FDI inflow in 2005.

The largest contributor to the region's rising share in global FDI inflow has been China. FDI in China has grown dramatically over the past two decades since China initiated its 'open-door' policy in 1978. It was in the mid-1980s when FDI inflows in China surged and marked the beginning of China's ride on the wave of globalization. After it achieved the unprecedented growth during the early 1990s however, FDI inflow started to decline. This downturn continued until the next wave of FDI inflow hit China in 2000. Despite the widespread decline in global FDI inflow between 2000 and 2002, China was able to increase FDI inflow with expectations of further deregulation and opening up following China's accession to the WTO. FDI to China in 2005 was 37 times higher than in 1985 accounting for 7.9% of global FDI inflow and almost 48% of aggregated FDI inflow to East Asia.

ASEAN 4 experienced a significant increase in FDI inflow during the early 1990s accounting for 5.4% of global FDI inflow in 1992. The Asian financial crisis triggered a sharp overall decline in their FDI inflow of 27% over 1998, although individual

national performances varied greatly. In order to enhance the attractiveness of the region for FDI inflow, the ASEAN Investment Area was established in 1998 and required the member countries to reduce or eliminate investment regulations and condition that may impede investment flows. This provided a new impetus for economic integration among ASEAN member countries. The establishment of ASEAN free trade area added momentum for further economic integration in the region. Although FDI inflows to ASEAN 4 continued to increase for two consecutive years during recent years reaching US$14 billion in 2005, the figure is still below the 1997 peak.

FDI inflows to the NIEs began to increase rapidly in the early 1990s against the backdrop of strong economic growth and the liberalization of investment regimes. As seen in ASEAN4, the NIES saw a dramatic withdrawal of capital from the region. Since then, FDI inflow have gradually picked up. Their share in global FDI inflow peaked at 8.4% in 2004 before it declined slightly to 7.1% in 2005.

Among four countries of the NIEs, Hong Kong experienced an unprecedented FDI boom in 1999 after it recovered from the economic turmoil of the Asian financial crisis. The surge reflects Hong Kong's role as a financial hub for business in the region, particularly in China. The investments from Hong Kong to China have increased dramatically since early 1980s. Hong Kong is by far the largest foreign investor in China. A significant portion of the investment from Hong Kong to China originates from China itself. Much of China's capital outflow that takes place either through legal or illegal channels to Chinese firms located in Hong Kong finds its way back to China as FDI. This type of "round tripping" of funds is mostly used to escape regulations such as barriers to trade or to gain eligibility to incentives available to only foreign investors

(e.g. tax concessions). Hong Kong is also used as a stepping stone for investment to China. A large number of foreign firms use affiliates in Hong Kong to invest in China on their behalf. Many overseas companies have regional offices as well as regional headquarters in Hong Kong.

Hong Kong has been experiencing another surge in FDI inflows during recent years. This partly reflects the Closer Economic Partnership Arrangement (CEPA) signed between Hong Kong and China which opened up the new opportunities not only for firms in Hong Kong, but also for foreign investors that operate in Hong Kong. In 2005, Hong Kong attracted almost one quarter of FDI inflow that went into the region accounting for 3.9% of global FDI inflow.

FDI has also played the pivotal role in the Singaporean economy. A liberal open-door policy and extensive FDI promotion policies toward foreign investors attracted the massive amount of FDI. Since the late 1990's, however, Hong Kong has been ahead of Singapore in attracting FDI. In 2005, Singapore retained its position as third-largest recipients in East Asia, attracting US$ 20 billion.

After the 1997 financial crisis, Korea has adopted extensive policy reforms in favor of FDI such as simplifying approval procedure, removal of various restrictions on foreign ownership, strengthening tax incentive systems and financial support for foreign investors, and so on. As a result, FDI inflows began to surge in 1997 and maintained strong growth until 2000. In 2004, the inflows pick up once again and Korea absorbed over 1% of global FDI inflow.

Taiwan's inward FDI grew rapidly particularly toward the end of the 1990s due to a large-scale reform of various laws and regulations on FDI inflows as well as further

opening of financial sector. However, after 2001 the absolute magnitude of FDI in Taiwan has been small, which is quite a contrast to recent surge in FDI inflow in Korea.

4. Gravity equation

4.1 Model specification and estimation method

The gravity model has been widely applied in various studies of international trade. The gravity equation in international trade using cross-country data is commonly written as follows:

$$X_{ij} = f(GDP_i, GDP_i, F_{ij})\qquad\qquad(1)$$

where X_{ij} is the value of the trade flow of goods from country i to country j ,GDP_i and j are the gross domestic product in country i and j, respectively, F_{ij} is a vector of factors that influence the trade flow. The factors commonly used include the physical distance between the two countries i and j, which is used as a proxy for transportation cost, a dummy variable that assumes the value 1 if i and j share a common language and 0 otherwise, a binary variable assuming the value 1 if i and j share a common land border and 0 otherwise, a dummy variable assuming the value 1 if i and j have a free trade agreement and 0 otherwise.

Our model specification is augmented to examine the economic impact of FDI inflow on host country's trade. We include China, Hong Kong, Singapore, the Republic of Korea, Thailand, Malaysia, Philippines, Indonesia and Japan for the period of 1998-2004 in our estimation. We are particularly interested in the impact of FDI in the various forms of trade in East Asia. One possible specification issue for including FDI in the gravity analysis is the endogeneity problem. More specifically, the causal

relationship between FDI and trade may be driven by unobserved common factors such as variation in government policy, technology, tastes and so on. The strategy we adopt to deal with this issue is to estimate FDI at the first stage using various instrumental variables and in the second stage, we estimate bilateral trade with the predicted value of FDI as the additional independent variable. The error tem in the FDI equation then is uncorrelated with the error term in the trade equation.

The model predicts that FDI flow and bilateral trade flows between any two countries as:

$$FDI_i = \alpha_0 + \beta_1 DIFPGDP_i + \beta_2 DIFWAGE_j + \beta_3 DUTY_i + \beta_4 CTAX_i + \beta_5 CORRUPT_i$$
$$+ \beta_6 GSTAB_i + \beta_7 LAW_i + \beta_8 TEL_i + \varepsilon_{ij} \qquad (2)$$

$$T_{ij} = \gamma_0 + \rho_1 GDP_i + \rho_2 GDP_j + \rho_3 DIST_{ij} + \rho_4 DMB_i + \rho_5 FDI_i + \delta_{ij} \qquad (3)$$

where subscripts i and j refer to the reporting country and the partner country and the definition of the variables in the above equation are listed below. We estimate the model with annual data for 8 countries for the period of 1998 to 2004. Equation (3) is run on semi-finished products, parts and components, capital goods and consumption goods separately. Further we examine the impact of an each explanatory variable on bilateral import flows and export flows separately.

FDI $_i$: the level of inward foreign direct investment in reporting country

DIFPGDPij: the absolute value of the difference in per capita GDP between i and j

DIFWAGEij: the absolute value of the difference in wage between i and j

DUTYi: import tariff of host country

CTAX $_i$: corporate tax rate of host country

CORRUPT $_i$: an index of corruption of host country

GSTAB $_i$: an index of government stability of host country

LAW$_i$: an index of rule of law of host country

TEL $_i$: number of telephone mainlines per 1,000 people of host country

DISTij: geographical distance between the most important cities

Tij: the volume of exports or imports of country i to or from j in total trade, intermediate or final products

GDP: Gross domestic product

DMBij: a dummy variable which is 1 if i and j share a common border and 0 otherwise

   The independent variables included in equation (2) are believed to exert an influence on inward foreign direct investment in each country of Asia by changing the investment environment through institutional and policy changes, and economic conditions.

   We incorporate two variables that may influence the level of foreign production, the absolute difference of per capita GDP (DIFPGDP) and wage (DIFWAGE) in our analysis. The gap in per capita GDP and wage between a reporting country and a partner country should have a positive influence on FDI of the vertical type.[4] Trade in intermediate goods can be very sensitive to cost differences between two countries. For production fragmentation to take place, additional coordination costs must be offset by a reduction in the total production costs. Factor price differentials between countries allow at least one fragment to be produced more cheaply in another country (Deadorff,

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[4] For a very interesting study on how vertical intra-industry trade helps integrate East Asia, see Wakasugi (2007).

2001). The gap in production costs between the two countries must be sufficiently large in order for production fragmentation to occur.

We also incorporate policy-related variables, tariff barriers proxied by import duty and corporate tax rates. The MNEs, which set up vertical production networks may be encouraged to invest in a country with relatively low tariff barriers due to a lower cost of their imported intermediate products. Under such arrangement, goods-in-process may cross multiple borders while they are being produced. Each time these goods-in-process cross a border, a tariff is imposed. Therefore, the reduction in the cost of production of these goods as a result of the lower tariff rate can be magnified.

Another policy-related variable that can influence the host country's location advantage is the host country's corporate or other tax rates. The MNEs, as global profit maximizers, can be assumed to be sensitive to tax factors, since they have a direct effect on their profits. Evidence of significant negative influences of corporate tax rates on FDI are reported in previous studies by Wei (1997), Gastanaga, Nugent, and Pashamova (1998), and Hsiao (2001).

Also included in equation (2) are institutional factors, the level of corruption, stability of each government and the rule of law. Corruption can discourage FDI by inducing a higher cost of doing business. Hines (1995) shows that FDI from the United States grew more rapidly in less corrupt countries than in more corrupt countries after 1977. Wei (1997) presents alternative explanation of the large negative and significant effect of corruption on FDI. Unlike taxes, corruption is not transparent and involves many factors that are more arbitrary in nature. The agreement between a briber and a corrupt official is hard to enforce and creates more uncertainty over the total questionable payments or the final outcome. Wei demonstrates that this type of uncertainty induced

by corruption leads to a reduction in FDI. Political stability of a government and the sound rule of law can also be important factors in the inflow of FDI. Uncertain political environments and their related risks can impede FDI inflows in spite of favorable economic conditions.

The last variable included in equation (2), TEL, is a proxy for quality of infrastructure. On the other hand, as theorized by Jones and Kierzkowski (1990), such fragmentation is not costless. Unlike final goods, the intermediate goods produced among network member countries may cross multiple international borders. This incurs the additional costs of transportation as well as costs of a wide variety of services associated with coordinating production, shipments, sales of final goods, and so forth.

We will now turn to equation (3). The volume of trade in both intermediate and final products is expected to be positively related the market size of the two countries. The variable GDP captures the idea that larger countries trade more than small countries as they can offer more differentiated products to satisfy a wide variety of consumers. At the same time, for producers of both finished products and intermediate products the volume of trade will be larger, the larger the market size of both exporting and importing countries due to the presence of economies of scale. According to the theory of fragmentation sketched out by Jones et al (2004), scale of production would determine the lengths to which the division of labor can proceed as worker's level of specialization increases as scale of production increases. As Grossman and Helpman (2005) proposes, the variable can also be treated as a proxy for the "thickness" of the markets which has a positive impact on the location of outsourcing as the likelihood of the firms finding an appropriate partner in their search increases as the size of a country increases.

The distance variable is considered to be a crucial factor to explain international trade since distance increase transportation costs, which is a trade resistance factor that negatively influences the bilateral trade volume. In particular, transportation costs is considered to have a larger impact on decision on production fragmentation since each intermediate product that belong to the same value added chain main cross national boarder multiple times. Geographical proximity on the other hand promotes bilateral trade flows as it reduced transport, information cost, cultural unfamiliarity, etc. Therefore the expected sign of the variable is negative. In this study we use the great circle distance between the capital cities of the reporting country and the partner country.

The final variable is a dummy variable whether the importing country and exporting country are adjacent. As the variable is assumed to capture additional proximity between trading partners that facilitate trade, it is expected to be positively related to the level of trade.

Except of the dummies, all variables are log-linearized. Sources for the variables are listed in Appendix 2.

4.2 Estimation results

Table 6 represents the results of our estimations for aggregate FDI. Table 6 reveals positive and statistically significant influence of FDI inflow on trade across the board indicating complementary relationship between trade and FDI inflow in Asia. However, the large variation exists in the magnitude of the impact of the variable between exports and imports, and across the four types of disaggregated data. Firstly, FDI inflow appears to have a much larger effect on total imports compared to exports. It

shows that 1% increase in FDI inflow leads to 0.1% increase in the region's exports, whereas it will lead to 0.24% increase in imports.

Secondly, an examination of the disaggregated data shows that there are stark differences in the size of the coefficient among four types of trade flows. The impact of FDI inflow is the largest on trade in parts and components in both exports and imports. This suggests strong two-way trade expansion effect of production fragmentation reflecting network member countries supply these intermediate goods to each other. Interesting finding on parts and components trade is that FDI inflow leads to a greater expansion of imports of parts and components than exports. This is generally consistent with the fact that members of regional production networks with low wage costs, such as Malaysia, the Philippines and Thailand had deficits in regional parts and components trade (Ng and Yeats (2003)).

Table 6: Aggregate FDI a Determinant for Different Modes of East Asian Trade

Explanatory variables	Exports									
	TotalEX		SF		PC		CA		Con	
	Coefficient		Coefficient		Coefficient		Coefficient		Coefficient	
GDP, reporter	0.468	***	0.612	***	0.308	***	0.564	***	0.456	***
	(0.033)		(0.034)		(0.043)		(0.041)		(0.038)	
GDP, partner	0.530	***	0.577	***	0.398	***	0.529	***	0.613	***
	(0.030)		(0.031)		(0.040)		(0.038)		(0.035)	
DIST	-0.646	***	-0.548	***	-0.898	***	-0.830	***	-0.895	***
	(0.071)		(0.073)		(0.094)		(0.089)		(0.083)	
DB	0.470	***	0.766	***	-0.202		0.149		0.357	*
	(0.130)		(0.135)		(0.173)		(0.164)		(0.153)	
FDIHAT	0.103	***	0.051	*	0.288	***	0.286	***	0.127	***
	(0.020)		(0.023)		(0.024)		(0.025)		(0.026)	
Adj. R-Sqr	0.557		0.598		0.442		0.580		0.534	
# of obs.	489		489		489		489		489	

Explanatory Variables	Imports									
	TotalIM		SF		PC		CA		Con	
	Coefficient		Coefficient		Coefficient		Coefficient		Coefficient	
GDP, reporter	0.293	***	0.436	***	0.095	**	0.302	***	0.358	***
	(0.029)		(0.035)		(0.042)		(0.041)		(0.038)	
GDP, partner	0.651	***	0.734	***	0.638	***	0.794	***	0.690	***
	(0.027)		(0.032)		(0.039)		(0.038)		(0.035)	
DIST	-0.548	***	-0.459	***	-0.794	***	-0.700	***	-0.734	***
	(0.063)		(0.076)		(0.091)		(0.089)		(0.081)	
DB	0.334	***	0.675	***	-0.197		0.015		0.410	***
	(0.117)		(0.140)		(0.167)		(0.164)		(0.151)	
FDIHAT	0.236	***	0.079	***	0.377	***	0.301	***	0.269	***
	(0.018)		(0.021)		(0.025)		(0.025)		(0.023)	
Adj. R-Sqr	0.660		0.588		0.535		0.587		0.598	
# of obs.	489		489		489		489		489	

Note: Heteroskedasticity-consistent standard errors are in parentheses.

*significant at 10%, ** significant at 5%, ***significant at 1%

SF, PC, CA and Con denote semi-finished goods, parts and components, capital and consumption goods

Equally large impact of FDI inflow is found on trade in capital goods. On the import side, the result may be attributed to various trade liberalization policies and institutional changes that many East Asian economies pursued during the 1990s to help generate greater openness for trade.   For example, many East Asian nations unilaterally eliminated their tariffs on capital and intermediate goods. In addition, duties on trade in information technology products were completely eliminated due to the completion of the Information Technology Agreement (ITA) in 1996. This is important because among the commodities actively traded in the East Asian region (excluding Japan), the leading category is information-technology-products.   Regarding institutional changes, the establishments of the export processing zones (EPZ), where manufacturers can enjoy import duty exemption on imported inputs and extensive usage of duty drawback system on the imported parts and components used for the production of exports effectively reduce the impact of tariff barriers on trade.

The coefficient on Consumption goods behave differently compared to other categories of trade flows in response to FDI inflow. The size of the coefficient on exports of consumption goods is less than half the size of that on imports. While production fragmentation boosted intra-regional trade in parts and components, Asia shows heavy reliance on the rest of the world for its exports of final goods. As a result, Asia continues to increase trade surplus during the last decade with the largest part of the surplus accounted by trade in consumption goods (Gaulier, Lemoine and Unal-Kesenci (2006). The high dependence on the extra-regional trade flow of consumption goods may be reflected to the low responsiveness of consumption goods exports to FDI inflow in the region.

Exports of semi-finished goods in contrast appear to be explained by basic gravity equation without FDI inflow. Unlike in other trade flow categories, the coefficient on FDI inflow is found to be extremely small and marginally significant. On the import side, although the level of significance increases the size of the coefficients remains small.

The coefficients for the two standard variables, the market size of both reporting and partner countries and the distance have expected signs and are statistically significant at the 1% level for both intermediate goods and final goods. Overall results for GDP is consistent with the hypothesis that larger countries with a large production capacity are more likely to enjoy economies of scale and export more, at the same time they import more due to a higher capability of absorption.

Between imports and exports, GDP of the partner country appears to play more important role in imports than exports. The difference is pronounced for parts and components and capital goods, whose coefficients for exports are 1.6 times and 1.5 times larger than those for imports, respectively. The results are indicative of extensive involvement of Asian countries in production fragmentation. Under such arrangement, each country limits home production to particular product lines and complements them with imports of other parts and components. The demand for imports of those products is largely driven by their partner's demand which is affected by their economic condition. At the same time, increased demand from one's trade partner may necessitate higher import of capital goods to compensate for required higher production capacity.

The other potential role that GDP can play for trade in parts and components is to act as a proxy for the thickness of the intermediate goods market. The relatively small coefficient indicates that while this can play a role, it is not a perfect proxy.

Although Asia is reported to have the lowest freight costs among developing countries (UNCTAD (2004)), distance is found to be an important resistance factor for trade flows for both export and import flows under each type of trade. Among the different type of trade the influence of distance is equally large for parts and components, capital goods and consumption goods.

Distance is likely to represent not only transport cost, but also other costs incurred in delivering a good to the final user. These costs include telecommunication coasts, local distribution costs, regulatory costs, and so on. Lowering the costs of these service links that connect the two production blocks is crucial for countries to successfully be an integral party of production networks. Relatively large impact of the distance variable found in this study implies high potential benefits for Asian countries to accrue by reducing the level of trade costs.

The adjacency dummy which is included to capture additional advantages arise from geographical proximity shows significant empirical evidence in explaining both total exports and total imports. The dummy variables may capture various factors that lead to reduce the business transaction costs. For example, firms in adjacent countries are likely to have a better understanding of business practices than firms from different business environment. This familiarity certainly helps to reduce the cost involving uncertainty. The familiarity of business environment also helps reducing the difficulty of finding an appropriate outsourcing partner in production networks. The significance is lost, however for parts and components trade and capital goods trade.

Table7: Japanese FDI as a Determinant for Different Modes of East Asian Trade

Explanatory variables	Exports									
	TotalEX		SF		PC		CA		Con	
	Coefficient		Coefficient		Coefficient		Coefficient		Coefficient	
GDP, reporter	0.468	***	0.625	***	0.123		0.586	***	0.537	***
	(0.712)		(0.073)		(0.102)		(0.100)		(0.079)	
GDP, partner	0.553	***	0.583	***	0.438	***	0.556	***	0.660	***
	(0.033)		(0.034)		(0.047)		(0.046)		(0.037)	
DIST	-0.739	***	-0.582	***	-1.085	***	-0.971	***	-1.034	***
	(0.080)		(0.082)		(0.114)		(0.111)		(0.878)	
DB	0.508	***	0.791	***	-0.078		0.248		0.251	*
	(0.138)		(0.142)		(0.197)		(0.193)		(0.152)	
FDIHAT	-0.067		-0.069		0.453	*	0.274		0.632	***
	(0.208)		(0.213)		(0.297)		(0.291)		(0.230)	
Adj. R-Sqr	0.491		0.533		0.265		0.388		0.565	
# of obs.	433		433		433		433		433	

Explanatory Variables	Imports									
	TotalIM		SF		PC		CA		Con	
	Coefficient		Coefficient		Coefficient		Coefficient		Coefficient	
GDP, reporter	0.344	***	0.521	***	0.050		0.340	***	0.247	***
	(0.072)		(0.071)		(0.108)		(0.098)		(0.084)	
GDP, partner	0.664	***	0.753	***	0.670	***	0.840	***	0.689	***
	(0.033)		(0.033)		(0.050)		(0.045)		(0.039)	
DIST	-0.683	***	-0.598	***	-0.954	***	-0.909	***	-0.859	***
	(0.080)		(0.079)		(0.121)		(0.109)		(0.094)	
DB	0.378	***	0.577	***	-0.115		0.056		0.628	***
	(0.140)		(0.138)		(0.210)		(0.190)		(0.163)	
FDIHAT	0.284	*	0.230		0.995	***	0.410	*	-0.261	
	(0.210)		(0.208)		(0.316)		(0.286)		(0.245)	
Adj. R-Sqr	0.528		0.608		0.334		0.472		0.471	
# of obs.	433		433		433		433		433	

Note: Notations are the same as in Table 8.

Table 7 shows the impact of Japanese FDI on different forms of bilateral trade in East Asia. Compared to Table 6, three results stand out. First, Japanese FDI is generally not significant for most forms of trade, with two major exceptions. It is an important factor for the import of components and parts and the export of final consumption good. This suggests that while most multinationals are involved in both the export and import of components and parts in East Asia, Japanese multinationals perform more specific roles. They import parts and components into East Asian host countries and then export the assembled finished consumption goods out. The production network weaved by Japanese firms in East Asia can thus be called *asymmetric,* while in contrast the network maintained by non-Japanese multinationals in East Asia is *symmetric*.

A second result that we can see from Table 7 is that unlike Table 6, only GDP for the partner economy is significant for exports and imports of parts and components. This partly reflects the asymmetric nature of the Japanese FDI-trade network. Japanese firms are involved in the import of components and parts, so the "thickness" of the market for suppliers in the partner countries (the GDP of the partner) is important to ensure the quality of the parts. When the Japanese multinationals are exporting, from East Asia, they export mostly consumption goods. The size of the export market is thus a significant factor. In both cases, the GDP of the reporting country is then not an important determinant. Finally, the rest of the variables such as distance and the dummy for border have similar effects on East Asian trade as in Table 6.

4. Conclusion and Policy implications

In this paper we examine the trend and nature of East Asian trade, paying particular attention to East Asian trade integration via the trade of components and parts. We show that East Asia has been rising as an important trading entity in the world. We utilize the United Nations BEC classification to categorize our trade into trade in semi-finished goods, trade in components and parts, trade in capital goods as well as trade in final consumption goods. This classification allows us to more clearly decipher the growing importance of the various modes of trade in East Asia. We found that the increasing importance of East Asia as a trading region is due at least partially to the rising trade in components and parts, i.e. due to the increasing density of the production and trade network in East Asia.

We are particularly interested in finding out if foreign direct investment plays a role in the import and export behaviour of East Asian intra-regional trade. Using an instrumental variable approach, we find that in general aggregate FDI is indeed important in explaining both the imports and exports of intra-East Asian trade. In particular, aggregate FDI is particularly important in explaining trade in components and parts, followed by trade in capital goods. This helps confirm that aggregate FDI and trade associated with production fragmentation in East Asia are indeed complementary.[5]

We did further analysis with respect to Japanese FDI alone. The difference here is quite pronounced. Japanese FDI is a major determinant for the import of parts and components. But it is not a significant factor in the export of parts. In contrast, Japanese FDI is an important factor in exporting final consumption goods. In

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[5] A study by Chantasasawat, Fung, Iizaka and Siu (2004) also show that FDI in East Asia and China are complementary.

general, one can view that the network created by the Japanese multinationals is *asymmetric*, while for non-Japanese multinationals, the network is symmetric.

Furthermore, in terms of the stages of product cycle associated with production fragmentation, we can view fragmentation as having at least two broad phases: one associated with intra-firm trade or trade with other foreign multinationals, a second associated with outsourcing to local firms. Given our results which show that aggregate FDI is an important factor in explaining both the export and the import of components and parts as well as capital goods, we can conclude that the fragmentation stage of outsourcing by non-Japanese multinationals to the local firms is still premature for East Asia. In contrast, the behaviour of Japanese multinationals in the context of East Asian trade suggest that they may have outsourced a significant amount of parts production to non-Japanese firms. They are now at a stage where they import these parts from non-Japanese companies, assembled them and distribute them to the export market. Viewing our results from the recent literature of trade with heterogeneous firms, we can see that our results are consistent with the empirical findings in this growing body of work. Much of the U.S. firms that trade (both imports and exports) are large multinationals. There is a general belief that these firms are responsible for the production network phenomenon in East Asia. The fact that we found aggregate FDI to be important in trade in components and parts as well as in capital goods show that foreign affiliates are important participants in these forms of trade. In contrast, Japanese multinationals are much more involved in the import of components and parts and not so much in their exports.

Given the general importance of FDI in the production network in East Asia, one direct policy implication is that measures that aim at trade liberalization is not going to be sufficient. Policymakers who wish to further participate in the network will also need to enact policies that will facilitate FDI. These policies include lower tax rates, a more stable and transparent government and an economy governed with a better rule of law. Localization of the fragmentation process will also require better institutions such as better enforcement of the intellectual property rights and a more impartial and predictable judicial system. To sum up, *improving the institutions* of the East Asian economies will be important policies to further and deepen the production and trade network in East Asia, which in turn will deepen the economic integration among the East Asian economies.

References:

Athukorala, Prema-Chandra. (2006). Product Fragmentation and Trade Patterns in East Asia. *Asian Economic Papers* 4:3

Aminian, Nathalie, K.C. Fung and Francis Ng, 2007, "Market Integration vs. Agreements between Markets", paper presented at the International Seminar on New Agenda for International Relations as the Doha Round Draws to a Close, OBREAL, Barcelona, Spain.

Chantasasawat, Busakorn, K.C. Fung, Hitomi Iizaka and Alan Siu, 2004, " Foreign Direct Investment in East Asia and Latin America: Is there a PRC Effect?" Asian Development Bank Institute Discussion Paper #17, Tokyo: Japan.

Coe, D.T., A. Subramanian and N. Tamirisa. (2002), The missing globalization puzzle, IMF Working Paper, Washington.

Deardorff, A.V. (2001). Fragmentation across Cones, in Arndt S. and Kierzkowski H. (eds), *Fragmentation. New production patterns in the world economy*, Oxford University Press.

Gastanaga, Victor M., Jeffrey B. Nugent, and Bistra Pashamova (1998). "Host Country Reforms and FDI Inflows: How Much Difference Do They Makre?" *World Development*, 26:7, 1299-1314.

Gaulier G., F. Lemoine and D. Unal-Kesenci. (2006). "China's Emergence and the Reorganisation of Trade Flows in Asia", CEPII Working Paer, No.2—6-05, March.

Grossman, G. M. and Helpman, E. (2005). Outsourcing in a global economy. *Review of Economic Studies*, 72(1), 135-159.

Hines, James R. Jr. (1995). "Forbidden Payment: Foreign Bribery and American Business After 1977" *NBER Working Paper*: No. 5266.

Hsiao, Chen (2001). "Efficient Estimation of Dynamic Panel Data Models – With an Application to the Analysis of Foreign Direct Investment to Developing Countries," Paper prepared for the 2001 Econometric Society Far Eastern Meeting in Kobe, Japan.

Hummels, David, Jun Ishii, and Kei-Mu Yi (2001). The Nature and Growth of Vertical Specialization in World Trade. *Journal of International Economics* 54 (1): 75-96

Krugman, Paul. (1995). Growing World Trade: Causes and Consequences. *Brooking Papers on Economic Activity* 1:327-77.

Ng, Francis, and Alexander Yeats (2001). Production Sharing in East Asia: Who Does What for Whom, and Why? In *Global Production and Trade in East Asia*, edited by Leonard K. Cheng and Henryk Kierzkowski, pp. 63-109. Boston, Kluwer Academic.

Ng. Francis, and Alexander Yeat. (2003). Major trade trends in East Asia: What are their implications for regional cooperation and growth? *Policy Research Working paper 3084*, Washington DC: World Bank.

Hanson, Gordon H., Raymond J. Mataloni, Jr., and Mathew J. Slaughter (2001). Expansion Strategies of U.S. Multinational Firms. In *Brookings Trade Forum 2001*, edited by Susan M. Collins and Dani Rodrik, pp.245-82. Washington, D.C.: Brookings Institution Press.

Jones, R. W., Kierzkowski, H. and Lurong, C. (2004). What does the evidence tell us about fragmentation and outsourcing. *International Review of Economics and Finance*, 14 (3), p305-316

UNCTAD, "Review of Maritime Transport, "2004.

Wakasugi, Ryuhei, 2007, "Vertical Intra-Industry Trade and Economic Integration in East Asia," *Asian Economic Paper*, Winter, v.6, No.1, pp.26-39.

Wei, Shang-Jin (1997). "Why Is Corruption So Much More Taxing Than Tax? Arbitrariness Kills," *NEBR Working Paper*: No. 6255.

Yi, Kei-Mu (2003). Can Vertical Specialization Explain The Growth of World Trade. *Journal of Political Economy*, 111 (1), p52-102.

Appendix 1

Commodity Code

1	Food and beverages
11	Food and beverages, primary
111	Food and beverages, primary, mainly for industry (P)
112	Food and beverages, primary, mainly for household consumption (F-C)
12	Food and beverages, processed
121	Food and beverages, processed, mainly for industry (IM-SF)
122	Food and beverages, processed, mainly for household consumption (F-C)
2	Industrial supplies nes
21	Industrial supplies nes, primary (P)
22	Industrial supplies new, processed (IM-SF)
3	Fuels and lubricants
31	Fuels and lubricants, primary (P)
32	Fuels and lubricants, processed
321	Fuels and lubricants, processed, motor spirit
322	Fuels and lubricants, processed (other than motor spirit) (IM-SF)
4	Capital goods (except transport equipment), and parts and accessories thereof
41	Capital goods (except transport equipment) (F-CA)
42	Parts and accessories of capital goods (except transport equipment) (IM-PC)
5	Transport equipment, and parts and accessories thereof
51	Transport equipment, passenger motor cars (F-C)
52	Transport equipment, other
521	Transport equipment, other, industrial (F-CA)
522	Transport equipment, other, non-industrial (F-C)
53	Parts and accessories of transport equipment (IM-PC)
6	Consumption gods nes
61	Consumption goods nes, durable (F-C)
62	Consumption goods nes, semi-durable (F-C)
63	Consumption goods nes, non-durable (F-C)

7   Goods nes

Note:
P: Primary goods
IM-SF: Semi-finished goods under Intermediate goods
IM-PC: Parts & components under Intermediate goods
F-CA: Capital goods under Final goods
F-C: Consumption goods under Final goods
321 and 7 are treated as "others"

Appendix 2
Source of Variables
FDI: Aggregate FDI inflows of each country, aggregate FDI inflows to Asia, and aggregate FDI to the world are from UNCTAD.

CORRUPT: An index of corruption from International Country Risk Guide (ICRG) from the PRS Group. It ranges from 0 to 6, where a higher number means a lower level of corruption.

GSTAB: An index of government stability from International Country Risk Guide (ICRG) from the PRS Group. The range is from 0 to 12. A higher score means higher stability of a government.

Law: An index of Law and Order from International Country Risk Guide (ICRG) from the PRS Group. It ranges from 0 to 6, where a higher number indicates a better system of law and order.

DUTY: Import duties are from IMF's Government Finance Statistic Yearbook.

WAGE: Average wages in manufacturing; from UN Common Database, LABORSTA, and countries' official websites.

CPTAX: Corporate income tax rate, measured in percentage points, from Price Waterhouse' s "Worldwide summary" book.

TEL: Telephone mainlines (per 1,000 perople) from World Development Indicators.

GDP: GDP in US dollars arefrom EconStats.

PGDP: Per capita GDP are from EconStats.

WAGE: Average wage in manufacturing; from UN Common Database, LABORSTA, and countries' official websites.