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# Foreign direct investment, intraregional trade and production sharing in East Asia

by

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# FOREIGN DIRECT INVESTMENT, INTRAREGIONAL TRADE AND PRODUCTION SHARING IN EAST ASIA

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## Introduction

Free trade agreements (FTAs) have gained increasing global popularity. Although East Asia has lagged behind other regions in concluding FTAs, the 1990s saw a marked change in considering formal regional cooperation treaties in East Asia.<sup>1</sup> One of the leading factors that led to the emergence of such heightened interest is the rapid growth of intraregional trade. In turn, an important new development that has 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 the production process of a final product is split 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, Ishii and Yi, 2001), “international production sharing” (Ng and Yeats, 2001) and “outsourcing” (Hanson and others, 2001).

There has been growing evidence of the phenomenal increase in the 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 transportation and communications costs are also enhancing this trend. Moreover, the dispersed production networks created by such fragmentation appear to be more extensive in East Asia than in other parts of the world (Athukorala, 2006; Ng and Yeats, 2001 and 2003).

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, it is

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<sup>1</sup> For a comparative study of regional trade agreements in East Asia and Latin America, see Aminian and others, 2007.

known that trade in components and parts in general can be tied to foreign investment in the host countries or 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; 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 FDI have been instrumental in creating the prevalence of production fragmentation in East Asia. The international fragmentation of production occurs if such fragmentation leads to sufficient reduction in production costs. A part of cost reduction arises from the standard theory of comparative advantage. The theory predicts that firms locate a relatively labour-intensive segment of the production in the country where labour is abundant and locate the relatively capital-intensive segment of the production where capital is abundant. In other words, fragmentation of production is encouraged by factor-endowment dissimilarities. Unlike intra-industry trade of similar goods that favours exchanges of final goods among developed economies, this opens the door for many developing countries to be a part of the production network and to 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. However, 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 an FDI source country to the host country *since* the reallocation of production sites increases exports of intermediate goods as well as capital goods required to engage in production. It may also increase imports by an FDI source country as a host country increases 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 a third country.

Section A of this chapter examines the extent and patterns of trade activities among East Asian nations. An attempt is then made to analyse the impact of inward FDI on four types of trade flow: 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 product (GDP) and a negative function of the geographical distance between them. Starting with the specification, this analysis incorporates host country FDI inflow to examine the influence of FDI on trade in

Asia.

Section B describes some characteristics of international trade in East Asia, particularly the extent of intraregional trade and the characteristics of trade by stages of production for each country. Section C discusses the general trend of inward FDI in East Asia. Section D presents a statistical analysis investigating the effects of FDI on the volume of trade in various East Asian countries. It begins with a description of the variables used in the regression analysis, followed by the estimation methodology. The results for all regressions are reported and analysed in Section D2. A conclusion is given in section E.

## A. Patterns of trade in East Asia<sup>2</sup>

### 1. Intraregional trade

Table 1 highlights the extent of East Asian trade, including Japan, with other East Asian economies and with other countries such as North America and the European Union in 2005. To do so, the overall trade matrix for the region is provided. It shows that, in general, either China or Japan was the main source of imports to other East Asian economies. The importance of China as an import source country can be seen in all East Asian countries. China has also become an important source of imports for non-regional markets such as the European Union and North America.<sup>3</sup> On the export side, table 1 acknowledges East Asia's importance in exporting to the world. The key players in the importance of global share of East Asia are again China and Japan, followed by Hong Kong, China. The share of intraregional exports is relatively high. Of all the countries examined, a significantly high share of intraregional exports is reported for China, Japan and Hong Kong, China. Another way the intensity of intraregional trade can be analysed is through the use of the trade intensity index. The trade intensity index is defined as:

$$\frac{X_{ij} / X_i}{X_{wj} / X_w} \quad (1)$$

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 exports to country  $j$  in

<sup>2</sup> As defined in table 1, in this chapter East Asia consists of China, Indonesia, Japan, the Republic of Korea, Malaysia, the Philippines, Singapore, Taiwan Province of China, Thailand and Hong Kong, China.

<sup>3</sup> This set of data, which are based on calculations using the latest United Nations COMTRADE statistics, was provided by Francis Ng.

total exports of country  $i$ , and the denominator indicates the share of world exports to country  $j$  in its total exports. If the bilateral trade intensity index has a value greater than one, the exports of country  $i$  to country  $j$  are larger than average world exports to country  $j$ . It implies that country  $j$  is relatively more important to country  $i$ 's exports than to world exports.

Table 1 presents calculations of the trade intensity indices for East Asian countries as well as for some of their major trading partners. The overall intra-East Asia trade intensity index is 6.1, showing a high dependency on regional trade by all East Asian countries, although sizeable differences exist among those countries with regard to the extent of the dependency.

**Table 1. Matrix of East Asian trade in all goods, 2005**

Partner (importer)	Exporting country/area										
	China	Hong Kong, China	Indonesia	Japan	Republic of Korea	Malaysia	Philippines	Singapore	Taiwan Province of China	Thailand	East Asia (10)
	<b>Export value of total trade in all goods (US\$ million)</b>										
China	0	130 426	6 662	80 074	61 915	9 302	4 077	19 757	40 879	9 134	362 227
Hong Kong, China	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
Republic of Korea	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 Province of China	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) <sup>a</sup>	308 213	174 405	50 698	277 932	135 997	74 272	24 704	136 913	113 739	54 390	1 351 264
European Union (27) <sup>b</sup>	145 613	42 942	10 347	87 819	44 354	16 614	7 008	27 907	22 124	15 019	419 745
Americas (13) <sup>c</sup>	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
	<b>Share of intraregional trade in all goods from importer (%)</b>										
China	0.0	36.0	1.8	22.1	17.1	2.6	1.1	5.5	11.3	2.5	100.0
Hong Kong, China	50.3	0.0	0.6	14.5	6.3	3.3	1.3	8.7	12.4	2.5	100.0
Indonesia	14.9	2.3	0.0	16.4	9.0	5.9	0.8	39.4	4.2	7.1	100.0
Japan	41.2	7.5	8.9	0.0	11.8	6.5	3.5	6.1	7.1	7.4	100.0
Republic of Korea	29.9	5.6	6.0	39.7	0.0	4.0	1.2	6.9	4.7	1.9	100.0
Malaysia	13.9	3.2	4.5	16.4	6.0	0.0	3.2	39.8	5.4	7.5	100.0
Philippines	14.0	7.9	4.2	27.1	9.6	5.9	0.0	12.5	12.6	6.1	100.0

Singapore	17.3	6.3	8.1	19.2	7.7	22.9	2.8	0.0	8.0	7.8	100.0
Taiwan Province of											
China	16.9	6.9	2.5	44.6	11.1	4.0	1.9	9.2	0.0	2.8	100.0
Thailand	12.9	4.9	3.7	36.9	5.6	12.5	1.9	15.5	6.1	0.0	100.0
East Asia (10) <sup>a</sup>	22.8	12.9	3.8	20.6	10.1	5.5	1.8	10.1	8.4	4.0	100.0
European Union (27) <sup>b</sup>	34.7	10.2	2.5	20.9	10.6	4.0	1.7	6.6	5.3	3.6	100.0
Americas (13) <sup>c</sup>	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
<b>Trade balance of total trade in all goods (US\$ million)</b>											
China	0	-4 540	819	-28 403	23 267	-3 871	1 026	-759	20 951	-2 024	6 466
Hong Kong, China	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
Republic of Korea	-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 Province of											
China	-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) <sup>a</sup>	-27 827	-66 393	18 059	59 966	14 335	2 544	-2 345	21 089	12 457	-11 173	20 712
European Union (27) <sup>b</sup>	71 641	20 169	4 488	28 976	16 940	3 260	3 328	4 612	4 599	4 211	162 224
Americas (13) <sup>c</sup>	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
<b>Trade Intensity Index of total trade in all goods</b>											
China	--	8.0	1.4	2.4	3.9	1.2	1.8	1.5	3.9	1.5	2.4
Hong Kong, China	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
Republic of Korea	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 Province of											
China	0.8	0.8	1.0	2.6	1.3	1.0	1.6	1.4	--	0.9	1.3



China											
Thailand	1.1	1.1	2.8	4.1	1.3	5.8	3.1	4.4	2.1	--	2.4
East Asia (10) <sup>a</sup>	4.9	7.3	7.2	5.7	5.8	6.4	7.3	7.3	7.3	6.0	6.1
European Union (27) <sup>b</sup>	1.7	1.3	1.0	1.3	1.4	1.0	1.5	1.1	1.0	1.2	1.3
Americas (13) <sup>c</sup>	2.2	1.6	1.2	2.3	1.7	1.8	1.7	1.0	1.5	1.5	1.9

*Source:* Computations based on United Nations COMTRADE statistics.

*Note:* The country/area groups are:

<sup>a</sup>East Asia (10) = China, Indonesia, Japan, Republic of Korea, Malaysia, Philippines, Singapore, Taiwan Province of China, Thailand and Hong Kong, China.

<sup>b</sup>European Union (27) = European Union 25 members in 2005 plus Bulgaria and Romania.

<sup>c</sup>Americas (13) = Canada, United States, Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, Uruguay and Venezuela.

## **2. Composition of trade by stage of production in East Asia**

The above section leads to the conclusion that East Asian countries have generally become increasingly interdependent in trade. This section considers the characteristics of intraregional trade in East Asia.

As mentioned above, recent decades have witnessed an increasing trend towards production fragmentation, which has been a key driver of global trade integration. In order to examine the extent to which each East Asian country specializes in the 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 the European Union 15, North America and the world by way of comparison.

Table 2 examines the annual growth rate of trade in total manufactured goods and compares them with the rate of trade in finished and intermediate goods. The table provides strong evidence that trade in intermediate goods resulting from the international fragmentation of production has been the engine driving Asian trade during recent years. Between 1998 and 2004, exports of intermediate goods grew at a rate of 12.6 per cent among Asian nations on average, which is faster than the growth rate of 10.7 per cent for exports of final goods. On the import side, trade in intermediate goods grew almost 4 per cent faster than trade in final goods. Compared with other parts of the world, the growth rate in intermediate goods is much faster among Asian nations, both for exports and imports. The growth rate of exports of intermediate goods for the world, European Union 15 and North America was 8.9 per cent, 7.4 per cent and 4.1 per cent, respectively, while that of imports was 8.5 per cent, 6.8 per cent and 5.6 per cent, 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 2. Average growth rate of total manufactured goods, intermediate goods and final goods, 1998-2004**

Country/area	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
Hong Kong, China	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	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
Republic of Korea	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	121.3	7.1
North America	6.7	5.6	7.8	3.9	4.1	3.3
European Union 15	7.6	6.8	8.5	7.7	7.4	7.8
East Asian nations*	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

*Sources:* Compiled from United Nations COMTRADE database and author's calculations.

\*Countries/areas included in East Asian nations are Japan, Ryukyu Islands, China, Republic of Korea, Taiwan Province of China,

Singapore, Thailand, Sarawak, peninsular Malaysia, Sabah, the Philippines, Indonesia and Hong Kong, China.

Table 3 further distinguishes different types of intermediate goods, that is, parts and components (IMPC) and semi-finished goods (IMSF). Finished goods are also further classified into consumption goods (FC) and capital goods (FCA). Primary goods (P) form the last category. This classification by different stages of production is useful in showing how each nation of East Asia is involved in production fragmentation and to what extent they differ from other regions of the world. The classification is explained in annex 1.

The most notable difference between the world and the East 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 comprise the exchange of parts and components. That share remained stable between 1998 and 2004. Table 3 shows very different trends for different regions. For example, North America experienced declines of 5.1 and 2.8 percentage points, respectively, in its import and export shares of parts and components from 1998 to 2004. The European Union 15 also experienced a similar declining trend in its parts and components trade. The trend in East Asia contrasts markedly with the other regions, with the share of the parts and components trade increasing during the same period. It accounted for more than 30 per cent of imports in 2004, which was 5 percentage points higher than the share in 1998. The upward trend can also be found, although to a lesser extent, on the export side, the share of which increased from 26.2 per cent in 1998 to 28.8 per cent in 2004.

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 per cent of world imports take the form of consumption goods. In the case of North America, the share is almost 32 per cent. Among the East Asian nations, the corresponding share only amounts to 14 per cent in 2004, which was a decline of more than 5 percentage points from 1998.

There is considerable variation in the trade patterns across East Asian countries. A general picture of the division of production processes in East Asia can be drawn from table 3 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 production fragmentation as a processing and assembly base for finished products destined for the world market. In final goods exports, one notable trend is the shift from consumption goods to capital goods, suggesting that China has been moving up the value-added chain.

**Table 3. Trade pattern by stage of production, 1998-2004**

(Unit: Per cent)

<b>Import year</b>		<b>China</b>	<b>Hong Kong, China</b>	<b>Republic of Korea</b>	<b>Singapore</b>	<b>Indonesia</b>	<b>Malaysia</b>	<b>Philippines</b>	<b>Thailand</b>	<b>Japan</b>	<b>East Asian nations*</b>	<b>North America</b>	<b>European Union 15</b>	<b>European Union 16</b>	<b>World</b>
1998	FC	4.52	33.95	5.50	12.70	5.72	5.87	8.41	8.13	31.13	19.46	30.30	0.28	27.95	25.39
	FCA	18.89	15.58	13.80	21.80	22.13	18.08	10.84	18.33	14.16	16.53	19.70	0.17	17.45	18.37
	IMPC	23.27	19.67	28.40	42.60	17.27	47.70	49.40	30.18	14.90	25.40	22.66	0.19	18.70	20.65
	IMSF	46.13	27.30	34.30	16.30	39.14	21.12	25.14	35.77	23.05	28.64	18.84	0.27	27.14	26.31
	P	5.17	1.84	16.30	3.40	8.69	2.87	6.06	6.28	13.59	7.42	4.39	0.06	5.58	5.92
2001	FC	4.29	31.07	9.20	12.10	5.82	7.09	8.14	7.21	30.54	17.82	31.83	0.28	27.63	25.09
	FCA	20.49	17.01	16.40	20.50	16.68	16.91	10.85	19.28	14.12	17.14	19.06	0.18	17.66	18.07
	IMPC	27.57	25.22	26.80	44.10	16.58	46.02	45.05	32.07	16.25	27.25	19.67	0.19	18.52	20.71
	IMSF	37.84	23.53	29.80	14.30	39.36	21.54	25.91	31.85	22.31	26.48	18.18	0.25	25.27	24.90
	P	7.61	1.65	15.00	3.50	13.04	3.61	8.46	8.06	12.66	8.09	6.06	0.07	6.57	6.97
2004	FC	3.90	25.10	8.80	10.40	8.15	7.53	6.85	7.63	27.38	14.02	31.77	0.30	29.60	24.47
	FCA	22.85	15.57	18.20	18.70	15.96	15.28	6.81	18.05	13.98	17.71	19.31	0.17	16.68	18.06
	IMPC	31.92	33.72	24.50	46.90	15.19	44.78	55.01	29.89	17.55	30.44	17.64	0.17	16.86	20.62
	IMSF	30.24	22.16	32.70	13.60	37.75	23.04	20.96	33.55	23.54	26.03	18.98	0.26	25.55	25.09
	P	9.05	1.54	13.70	4.00	12.35	3.89	5.62	8.89	13.37	8.52	7.47	0.07	6.98	7.69
<b>Export year</b>		<b>China</b>	<b>Hong Kong, China</b>	<b>Republic of Korea</b>	<b>Singapore</b>	<b>Indonesia</b>	<b>Malaysia</b>	<b>Philippines</b>	<b>Thailand</b>	<b>Japan</b>	<b>East Asian nations*</b>	<b>North America</b>	<b>European Union 15</b>	<b>European Union 16</b>	<b>World</b>
1998	FC	47.27	37.18	18.16	10.11	19.85	13.27	16.13	35.45	17.60	25.30	16.32	0.28	27.70	24.66
	FCA	14.66	12.45	18.22	27.22	4.08	17.33	12.03	12.43	25.90	18.93	21.37	0.19	19.15	17.84

	IMPC	10.42	19.61	25.17	39.75	5.18	38.55	61.23	27.01	31.20	26.22	26.92	0.18	18.07	20.50
	IMSF	22.86	27.74	36.14	13.84	37.67	23.38	8.95	18.57	21.50	23.80	23.74	0.28	28.10	26.51
2001	P	4.30	1.69	0.66	0.79	17.86	5.52	1.61	4.43	0.40	2.58	7.22	0.03	3.05	6.71
	FC	41.31	33.56	18.04	7.86	20.30	12.60	14.38	31.77	17.50	23.99	16.68	0.28	27.93	23.62
	FCA	18.33	14.18	22.29	22.51	6.55	19.92	16.05	12.19	23.90	19.37	20.04	0.19	19.10	17.20
	IMPC	14.94	26.16	24.13	45.30	9.54	37.68	59.97	27.59	31.50	28.00	26.55	0.18	18.04	20.43
	IMSF	20.64	24.40	28.67	14.11	40.58	21.40	7.36	19.38	22.00	22.34	23.42	0.27	26.73	24.59
	P	3.81	1.47	0.40	0.61	20.63	4.89	1.36	3.92	0.60	2.64	8.08	0.03	3.18	9.33
2004	FC	32.67	25.79	15.45	6.76	19.38	10.60	8.90	27.52	16.40	21.07	16.87	0.29	29.13	23.69
	FCA	25.34	13.76	23.16	17.81	7.21	18.43	12.70	15.22	23.30	20.77	18.49	0.17	17.23	17.10
	IMPC	18.23	35.14	29.22	47.11	10.57	35.37	30.38	25.48	31.40	28.84	24.12	0.17	17.01	20.43
	IMSF	20.78	23.58	27.04	17.09	38.84	25.19	8.38	21.79	23.40	22.82	25.39	0.28	27.51	26.07
	P	2.14	1.48	0.44	0.61	20.93	6.31	1.70	6.37	0.80	2.37	9.92	0.04	3.83	7.59

The general feature of three Association of Southeast Asian Nations (ASEAN) countries, Malaysia, the Philippines and Indonesia, is a large share of intermediate goods among both imports and exports. The decomposition of intermediate goods shows that while parts and components account for a large share of imports and exports in Malaysia and the Philippines, semi-finished goods account for a large share in Indonesia. The import structure of Thailand is similar to the above-mentioned three ASEAN countries; however, the distinctive difference can be found in its export structure, that is, a much larger share of exports of consumption goods. In this comparison, Singapore is treated separately from the four other ASEAN countries due to its relatively high wages, and is discussed in later paragraphs.

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 to other countries of the region for the assembly of Japanese products (Jones and others, 2004). The trend is also marked by a small export share of consumption goods. Table 3 also indicates that capital goods hold a large share of Japan's exports, which reflects in part large foreign direct investment (FDI) outflows from Japan. Production fragmentation has been facilitated greatly by multinational corporations and consequent FDI, which has had a significant impact on exports from investing countries to host countries. This may be due to the fact that new production facilities need to be equipped using capital goods from the investing country or because new capital goods are required for expanding existing production capacities.

A large share of parts and components trade can also be found in countries such as Singapore and Hong Kong, China, 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 per cent of both imports and exports are induced by the need for parts and components. This represents Singapore's pivotal role as an outsourcing centre in East Asia, particularly high-tech manufacturing, and as a hub for many leading international firms. Singapore's superior logistics sector as well as finance industry helps to form world-class supply chains in the region.

Most noteworthy is the rapid increase in the parts and components share of imports by Hong Kong, China, during recent years. The share increased from less than 20 per cent in 1998 to almost 34 per cent in 2004. Because it is a trading hub for electronic parts and components in Asia, a number of multinational manufacturers have set their

offices in Hong Kong, China, in order to source parts of key components and take advantage of its free port status. At the same time, the Hong Kong, China, electronics industry is characterized by the heavy dependence on imported parts of key components. Local firms source worldwide as well as from Chinese firms on the mainland. On the export side, electronics industry is the largest export industry, accounting for nearly 50 per cent of the total exports of Hong Kong, China, in 2006. Furthermore, two thirds of the electronics exports of Hong Kong, China, comprise parts and components. What contributes to the large amount of parts and components exports is the involvement of Hong Kong, China, in outward processing production in China. This led to an increase in the export share of Hong Kong, China, from 19.6 per cent in 1998 to 35.1 per cent in 2004.

### **B. General trend in FDI inflow in East Asia**

Table 4 shows that 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 that 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 per cent in 1985 to 22.9 per cent 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\$ 127.49 billion in 2004, a 50 per cent 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 27 per cent 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\$ 151.26 billion, which was up almost thirty four-fold from 1985. The region accounted for over one fifth of global FDI inflow in 2005.



**Table 4. Inward FDI and share of world inward FDI, 1985-2005**

<b>US\$ million</b>	<b>1985</b>	<b>1990</b>	<b>1995</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
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
Republic of 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 Province of China	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, China	-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
China	1 956.0	3 487.1	37 520.5	40 714.8	46 877.59	52 742.86	53 505.0	60 630.0	72 406.0
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
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
Malaysia	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
Philippines	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
East Asia*	4 472.2	21 253.9	71 824.2	136 575.0	94 937.2	78 753.7	84 872.6	127 489.7	151 255.0
ASEAN 5	2 223.5	12 402.7	25 281.3	20 417.1	16 482.1	11 908.9	13 506.0	23 240.0	34 129.0
North America	21 862.0	56 004.0	68 027.0	380 788.0	187 144.0	96 608.0	60 761.0	123 910.	133 265.0
European Union 15	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
<b>Percentage</b>	<b>1985</b>	<b>1990</b>	<b>1995</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
Japan	1.11	0.87	0.01	0.59	0.75	1.50	1.13	1.10	0.30
Republic of Korea	0.38	0.38	0.37	0.61	0.44	0.48	0.68	1.08	0.79
Taiwan Province of China	0.59	0.66	0.46	0.35	0.49	0.23	0.08	0.27	0.18
Hong Kong, China	-0.46	1.62	1.83	4.39	2.86	1.57	2.44	4.79	3.92
China	3.37	1.73	11.02	2.89	5.63	8.54	9.59	8.53	7.90
Singapore	1.81	2.77	3.41	1.17	1.70	0.94	1.67	2.26	2.19

Thailand	0.28	1.28	0.61	0.24	0.47	0.15	0.35	0.15	0.40
Malaysia	1.20	1.30	1.71	0.27	0.07	0.52	0.44	0.65	0.43
Philippines	0.02	0.27	0.43	0.10	0.11	0.29	0.06	0.07	0.12
Indonesia	0.53	0.54	1.28	-0.32	-0.36	0.02	-0.11	0.14	0.57
East Asia*	7.72	10.50	21.10	9.70	11.40	12.70	15.20	17.90	16.50
ASEAN 5	3.84	6.15	7.43	1.45	1.98	1.93	2.42	3.27	3.72
North America	37.72	27.78	19.99	27.01	22.49	15.64	10.89	17.43	14.54
European Union 15	27.55	44.37	34.18	47.84	43.55	45.95	43.12	26.06	42.33

Source: UNCTAD, *World Investment Report*, various years.

\*East Asia excludes Japan.

The largest contributor to the region's rising share in global FDI inflow has been China. FDI inflow to 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 surged and marked the beginning of China's ride on the wave of globalization. After it achieved 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 that country's accession to WTO. In 2005, FDI in China was 37 times higher than in 1985, accounting for 7.9 per cent of global FDI inflow and almost 48 per cent of aggregated FDI inflow to East Asia.

ASEAN 5 experienced a significant increase in FDI inflow during the early 1990s, accounting for 7.4 per cent of global FDI inflow in 1995. The Asian financial crisis in 1997 triggered a sharp overall decline in the region's FDI inflow of 40 per cent during 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 conditions that might impede investment flows. This provided a new impetus for economic integration among ASEAN member countries. The ASEAN Free Trade Area (AFTA) became fully operational on 1 January 2003 and this added momentum to economic integration in the region. FDI inflows to the ASEAN 5 continued to increase for two consecutive years, reaching US\$ 34 billion in 2005.

Among the ASEAN 5, Singapore has been a leader in attracting FDI, which has played a pivotal role in that country's economy. A liberal open-door policy and extensive FDI promotion policies towards foreign investors attracted a massive amount of FDI. In 2005, Singapore retained its position as third-largest recipient in East Asia, attracting US\$ 20 billion, which accounted for approximately 59 per cent of total FDI inflow to the ASEAN 5.

FDI inflows to the East Asian "tigers" (the Republic of Korea, Taiwan Province of China and Hong Kong, China) began to increase rapidly in the early 1990s against the backdrop of strong economic growth and the liberalization of investment regimes. The slowdown of the domestic economy and the regional economic situation as a result of the Asian financial crisis prompted the sharp decline of FDI inflows to Taiwan Province of

China in 1998. As a result, the share of the East Asian “tigers” in global FDI declined to 2.8% during the year. Since then, the share of these economies has quickly picked up and has reached at 5.4% in 2000. Their share in global FDI inflow peaked at 6.1 per cent in 2004 before declining slightly to 4.9 per cent in 2005.

Hong Kong, China, experienced an unprecedented FDI boom in 1999 after it recovered from the turmoil of the Asian financial crisis. The surge reflected the role of Hong Kong, China, as a financial hub for business in the region, particularly in China. Hong Kong, China, is by far the largest foreign investor in China, and its investments have increased dramatically since early 1980s. A significant portion of the investment originates from China itself. Much of the capital outflow of China that takes place either through legal or illegal channels to Chinese firms located in Hong Kong, China, 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 for incentives available only to foreign investors (for example, tax concessions). Hong Kong, China, is also used as a stepping stone for investment to China. A large number of foreign firms use affiliates in Hong Kong, China, to invest in China on their behalf. In addition, many overseas companies have regional offices as well as regional headquarters in Hong Kong, China.

Hong Kong, China, has been experiencing another surge in FDI inflows during recent years. This partly reflects the Closer Economic Partnership Arrangement (CEPA) signed between China and Hong Kong, China, which opened up new opportunities not only for firms in Hong Kong, China, but also for foreign investors. In 2005, Hong Kong, China, attracted almost 25 per cent of the FDI inflow into the region, and accounting for 3.9 per cent of global FDI inflow.

Since the 1997 Asian financial crisis, the Republic of Korea has adopted extensive policy reforms in favour of FDI such as simplifying the approval procedure, the removal of various restrictions on foreign ownership, strengthening tax incentive systems and financial support for foreign investors, among others. As a result, FDI inflows began to surge in 1997 and maintained strong growth until 2000. In 2004, the inflows picked up once again and the Republic of Korea absorbed more than 1 per cent of global FDI inflow.

The inflow of FDI to Taiwan Province of China grew rapidly, particularly towards the end of the 1990s, due to a large-scale reform of various laws and regulations on FDI inflows as well as further opening up of the financial sector. However, after 2001, the

absolute magnitude of FDI in Taiwan Province of China has been small, which is a clear contrast to the recent surge in FDI inflow in the Republic of Korea.

### **C. Gravity equation**

#### **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:

$$X_{ij} = f(\text{GDP}_i, \text{GDP}_j, F_{ij}) \quad (2)$$

where  $X_{ij}$  is the value of the trade flow of goods from country  $i$  to country  $j$ ,  $\text{GDP}_i$  and  $j$  are the GDP in country  $i$  and  $j$ , respectively, and  $F_{ij}$  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 costs, 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, and a dummy variable assuming the value 1 if  $i$  and  $j$  have a free trade agreement and 0 otherwise.

The model specification is augmented in order to examine the economic impact of FDI inflow on the host country's trade. China, Singapore, the Republic of Korea, Thailand, Malaysia, the Philippines, Indonesia, Japan and Hong Kong, China, are included in the estimation here for 1998-2004. Of particular interest is the impact of FDI on 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 forth. The strategy adopted here to deal with this issue is to estimate FDI at the first stage using various instrumental variables while in the second stage, bilateral trade is estimated with the predicted value of FDI as the additional independent variable. The error term 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:

$$FDI_i = \alpha_0 + \beta_1 DIFPGDP_{ij} + \beta_2 DIFWAGE_{ij} + \beta_3 DUTY_i + \beta_4 CTAX_i + \beta_5 CORRUPT_i + \beta_6 GSTAB_i + \beta_7 LAW_i + \beta_8 TEL_i + \varepsilon_{ij} \quad (3)$$

$$T_{ij} = \gamma_0 + \rho_1 GDP_i + \rho_2 GDP_j + \rho_3 DIST_{ij} + \rho_4 DMB_i + \rho_5 FDI_i + \delta_{ij} \quad (4)$$

where subscripts *i* and *j* refer to the reporting country and the partner country. The definitions of the variables in the above equation are listed below. Annual data for eight countries from 1998 to 2004 are used in the estimation. Equation (4) is run on semi-finished products, parts and components, capital goods and consumption goods separately. In addition, the impact of an each explanatory variable on bilateral import flows and export flows are examined separately.

- $FDI_i$  – the level of inward FDI in the reporting country.
- $DIFPGDP_{ij}$  – the absolute value of the difference in per capita GDP between *i* and *j*.
- $DIFWAGE_{ij}$  – the absolute value of the difference in wages between *i* and *j*.
- $DUTY_i$  – import tariff of the host country.
- $CTAX_i$  – corporate tax rate of the host country.
- $CORRUPT_i$  – an index of corruption in the host country.
- $GSTAB_i$  – an index of Government stability in the host country.
- $LAW_i$  – an index of rule of law in the host country.
- $TEL_i$  – the number of telephone main lines per 1,000 people in the host country.
- $DIST_{ij}$  – the geographical distance between the most important [cities in i and j](#).
- $T_{ij}$  – the volume of exports or imports by country *i* to or from *j* in total trade, intermediate or final products.
- GDP – gross domestic product.
- $DMB_{ij}$  – a dummy variable that is 1 if *i* and *j* share a common border and 0 otherwise.

The independent variables included in equation (3) are believed to exert an influence on inward foreign direct investment in each country of East Asia by changing the investment environment through institutional and policy changes, and economic conditions.

Two variables have been incorporated in this analysis that may influence the level of foreign production – the absolute difference of per capita GDP ( $DIFPGDP$ ) and wages ( $DIFWAGE$ ). The gap in per capita GDP and wages between a reporting country and a partner country should have a positive influence on FDI of the vertical type.<sup>4</sup> Trade in intermediate goods can be very sensitive to cost differences between two countries. For

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

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

Policy-related variables, tariff barriers proxied by import duty and corporate tax rates have also been incorporated. MNEs, which set up vertical production networks, may be encouraged to invest in a country with relatively low tariff barriers due to lower costs of their imported intermediate products. Under such an arrangement, goods-in-process may cross multiple borders while they are being produced. Since a tariff may be imposed each time these goods-in-process cross a border, the effect of the lower tariff rate on the reduction in the cost of production of these goods can be magnified.

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

Also included in equation (3) are institutional factors, the level of corruption, the stability of each Government and the rule of law. Corruption can discourage FDI by inducing a higher cost of doing business. Hines (1995) showed that FDI from the United States grew more rapidly in less corrupt countries than in more corrupt countries after 1977. Wei (1997) presented an alternative explanation of the negative and significant effect of corruption on FDI. Unlike taxes, corruption is not transparent and involves many factors that are more arbitrary in nature. An agreement between a briber and a corrupt official is difficult to enforce and it creates more uncertainty over the total questionable payments or the final outcome. Wei demonstrated the fact 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 despite favourable economic conditions.

The last variable, TEL, included in equation (3) 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 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 now turn to equation (4). The volume of trade in both intermediate and final products is expected to be positively related the market size of the two countries concerned. 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 larger the market size of both exporting and importing countries due to the presence of economies of scale, the larger the volume of trade. According to the theory of fragmentation outlined by Jones and others (2004), scale of production would determine the lengths to which the division of labour can proceed since the level of the workers' specialization increases as the scale of production rises. As Grossman and Helpman (2005) proposed, the variable can also be treated as a proxy for the "thickness" of the markets; this 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 in explaining international trade since distance increases transportation costs, which is a trade-resistance factor that negatively influences the bilateral trade volume. In particular, transportation costs are considered to have a larger impact on decisions concerning production fragmentation, as each intermediate product that belongs to the same value-added chain may cross national boarder multiple times. Geographical proximity, on the other hand, promotes bilateral trade flows as it reduces transportation needs, information costs, cultural unfamiliarity and so forth. Therefore, the expected sign of the variable is negative. In this study, the great circle distance between the capital cities of the reporting country and the partner country is used.

The final variable is a dummy variable with regard to 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 for the dummies, all variables are log-linearized. Sources for the variables



are listed in annex 2.

## **2. Estimation results**

Table 5 represents the results of the estimations. It reveals a positive and statistically significant influence of FDI inflow on trade across the board, indicating a complementary relationship between trade and FDI inflow in East Asia. However, a large variation exists in the magnitude of the impact of the variable between exports and imports, and across the four types of disaggregated data. First, FDI inflow appears to have a much larger effect on total imports compared to exports. It shows that a 1 per cent increase in FDI inflow leads to a 0.1 per cent increase in regional bilateral exports, whereas it leads to a 0.24 per cent increase in regional bilateral imports.

Second, 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 a strong two-way trade expansion effect from production fragmentation, reflecting the supply of these intermediate goods by network member countries to each other. An interesting finding is that FDI inflow leads to a greater expansion of parts and components imports 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 5. Regression estimates of the determinants of bilateral trade flows, 1998-2004**

	<b>Exports</b>				
<b>Explanatory variables</b>	<b>Total EX</b>	<b>SF</b>	<b>PC</b>	<b>CA</b>	<b>Con</b>
	<b>Coefficient</b>	<b>Coefficient</b>	<b>Coefficient</b>	<b>Coefficient</b>	<b>Coefficient</b>
GDP, reporter	0.468 <sup>c</sup> (0.033)	0.612 <sup>c</sup> (0.034)	0.308 <sup>c</sup> (0.043)	0.564 <sup>c</sup> (0.041)	0.456 <sup>c</sup> (0.038)
GDP, partner	0.530 <sup>c</sup> (0.030)	0.577 <sup>c</sup> (0.031)	0.398 <sup>c</sup> (0.040)	0.529 <sup>c</sup> (0.038)	0.613 <sup>c</sup> (0.035)
DIST	-0.646 <sup>c</sup> (0.071)	-0.548 <sup>c</sup> (0.073)	-0.898 <sup>c</sup> (0.094)	-0.830 <sup>c</sup> (0.089)	-0.895 <sup>c</sup> (0.083)
DB	0.470 <sup>c</sup> (0.130)	0.766 <sup>c</sup> (0.135)	-0.202 (0.173)	0.149 (0.164)	0.357 <sup>a</sup> (0.153)
FDIHAT	0.103 <sup>c</sup> (0.020)	0.051 <sup>a</sup> (0.023)	0.288 <sup>c</sup> (0.024)	0.286 <sup>c</sup> (0.025)	0.127 <sup>c</sup> (0.026)
Adj. R-Sqr	0.557	0.598	0.442	0.580	0.534
No. of obs.	489	489	489	489	489
	<b>Imports</b>				
<b>Explanatory variables</b>	<b>Total IM</b>	<b>SF</b>	<b>PC</b>	<b>CA</b>	<b>Con</b>
	<b>Coefficient</b>	<b>Coefficient</b>	<b>Coefficient</b>	<b>Coefficient</b>	<b>Coefficient</b>
GDP, reporter	0.293 <sup>c</sup> (0.029)	0.436 <sup>c</sup> (0.035)	0.095 <sup>b</sup> (0.042)	0.302 <sup>c</sup> (0.041)	0.358 <sup>c</sup> (0.038)

GDP, partner	0.651 <sup>c</sup> (0.027)	0.734 <sup>c</sup> (0.032)	0.638 <sup>c</sup> (0.039)	0.794 <sup>c</sup> (0.038)	0.690 <sup>c</sup> (0.035)
DIST	-0.548 <sup>c</sup> (0.063)	-0.459 <sup>c</sup> (0.076)	-0.794 <sup>c</sup> (0.091)	-0.700 <sup>c</sup> (0.089)	-0.734 <sup>c</sup> (0.081)
DB	0.334 <sup>c</sup> (0.117)	0.675 <sup>c</sup> (0.140)	-0.197 (0.167)	0.015 (0.164)	0.410 <sup>c</sup> (0.151)
FDIHAT	0.236 <sup>c</sup> (0.018)	0.079 <sup>c</sup> (0.021)	0.377 <sup>c</sup> (0.025)	0.301 <sup>c</sup> (0.025)	0.269 <sup>c</sup> (0.023)
Adj. R-Sqr	0.660	0.588	0.535	0.587	0.598
No. of obs.	489	489	489	489	489

<sup>a</sup> Significant at 10 per cent; <sup>b</sup> Significant at 5 per cent; <sup>c</sup> Significant at 1 per cent.

*Notes:* Heteroskedasticity-consistent standard errors (White) are in parentheses. A constant is included in the model, but is not reported. SF, PC, CA and Con denote semi-finished, parts and components, capital and consumption.

An 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 economies 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 establishment of export processing zones (EPZ), where manufacturers can enjoy import duty exemption on imported inputs as well as extensive usage of a duty drawback system on the imported parts and components used for the production of exports, effectively reduces the impact of tariff barriers on trade.

The coefficient on consumption goods behaves differently compared with 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 intraregional trade in parts and components, East Asia shows heavy reliance on the rest of the world for its exports of final goods. As a result, East Asia continued to increase its trade surplus during the past decade with the largest part of the surplus accounted for by trade in consumption goods (Gaulier and others, 2006). The high dependence on the extraregional trade flow of consumption goods may be reflected in the low responsiveness of consumption goods exports to FDI inflow in the region.

In contrast, exports of semi-finished goods appear to be explained by the 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 per cent level for intermediate goods and final goods. The overall results for GDP are consistent with the hypothesis that larger countries with a large production capacity are more likely to enjoy economies of scale and to export more, while at the same time importing more due to a higher capability of absorption.

Between imports and exports, the GDP of the partner country appears to play a more important role in imports than exports. The difference is pronounced in the case of 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 East Asian countries in production fragmentation. Under such an 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 and economic condition. At the same time, increased demand from a trading partner may necessitate higher imports of capital goods to compensate for required higher production capacity.

The other potential role that GDP can play in trading 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 it 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 of both exports and imports under each type of trade. Among the different types 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 transportation costs, but also other costs incurred in delivering a good to the final user, such as telecommunications, local distribution, and regulatory costs. 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. The relatively large impact of the distance variable found in this study implies that high potential benefits for East Asian countries can accrue by reducing the level of trade costs.

The adjacency dummy, which is included to capture additional advantages arising 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 reduced business transaction costs. For example, firms in adjacent countries are likely to have a better understanding of business practices than firms from a different business environment. This familiarity certainly helps to reduce the cost involving uncertainty. The familiarity with the business environment also helps to reduce the difficulty of finding an

appropriate outsourcing partner in production networks. The significance is lost, however, in the case of parts and components trade and capital goods trade.

#### **D. Conclusion and policy implications**

This chapter examines the trend and nature of East Asian trade, paying particular attention to East Asian trade integration via the trade of components and parts. It shows that East Asia has been rising as an important trading entity in the world. The United Nations COMTRADE BEC classification is utilized to categorize trading into semi-finished goods, components and parts, capital goods and final consumption goods. This classification makes it possible to more clearly decipher the growing importance of the various modes of trade in East Asia. The study finds that the increasing importance of East Asia as a trading region is due, at least partially, to the rising trade in components and parts, that is, due to the increasing density of the production and trade network in East Asia.

The question of whether foreign direct investment plays a role in import and export performance and trends of intra-East Asian trade is a very interesting one. Using an instrumental variable approach, the present study reveals that, in general, FDI is indeed important in explaining the performance of intra-East Asian import and export trade, particularly in the case of trade in components and parts, followed by trade in capital goods. This helps to confirm that FDI is an important driving force in trade associated with production fragmentation in East Asia.<sup>5</sup> Furthermore, in terms of the stages of product cycle associated with production fragmentation, fragmentation can be viewed as having at least two broad phases: (a) one phase associated with intra-firm trade or trade with other foreign multinationals; and (b) a second phase associated with outsourcing to local firms. Given the results of the present study, which show that FDI is an important factor in explaining trade in components and parts as well as capital goods, it can be concluded that the fragmentation stage of outsourcing to the local firms is still premature for East Asia. In comparing the results with recent literature on trade with heterogeneous firms, it is clear that these results are consistent with the empirical findings in this growing body of work. Many of the United States firms that [trade](#) (imports and exports) with East Asia are large multinationals. There is a general belief that these firms (together with Japanese multinationals) are responsible for the production network phenomenon in East Asia. The fact that the present study finds FDI to be important to trading in components and parts as

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<sup>5</sup> A study by Chantasasawat and others (2004) also showed that FDI in East Asia and China were complementary.

well as in capital goods shows that foreign affiliates play a significant and necessary role in these forms of trade.

Given the importance of FDI to the production network in East Asia, one direct policy implication is that measures aimed at trade liberalization are not going to be sufficient. Policy makers who wish to participate further in the network will also need to enact policies that will facilitate FDI. These policies include lower tax rates, more stable and transparent Government and an economy governed by a better rule of law. The localization of the fragmentation process will also require better institutions such as improved enforcement of intellectual property rights as well as a more impartial and predictable judicial system. In summary, improving the institutions of the East Asian economies will be important policies to expanding and strengthening the production and trade network in East Asia, which, in turn, will strengthen economic integration among the East Asian economies.

#### **Annex 1. Commodity codes**

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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 goods 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*

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*Note:* P = primary goods; IM-SF = semi-finished goods under intermediate goods; IM-PC = parts and 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”.

## **Annex 2. Source of variables**

**FDI:** Aggregate FDI inflows of each country, aggregate FDI inflows to East Asia, and aggregate FDI to the world are from UNCTAD.

**CORRUPT:** An index of corruption from the International Country Risk Guide by the PRS Group. It ranges from 0 to 6, with a higher number indicating a lower level of corruption.

**GSTAB:** An index of Government stability from the International Country Risk Guide by 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 the International Country Risk Guide by 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 the International Monetary Fund's Government Finance Statistic Yearbook.

WAGE: Average wages in manufacturing from the United Nations Common Database, LABORSTA and official country websites.

CPTAX: Corporate income tax rate, measured in percentage points, from *Worldwide Summary* by [PricewaterhouseCoopers website](#).

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

GDP: GDP in United States dollars are from EconStats.

PGDP: Per capita GDP are from EconStats.

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