Chapter 2

Assessment of the Current East Asian Economies

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CHAPTER 2.

ASSESSMENT OF THE CURRENT EAST ASIAN ECONOMIES

This chapter presents quantitative evidence of the superior features, as well as uneven development, of international production networks in East Asia. These networks in East Asia have been the most advanced and sophisticated in the world and have been the source of dynamism for East Asian economies, with strong resilience against macro shocks. However, the geographical distribution of international production networks has been highly skewed and has covered just limited areas of East Asia. The mechanics of fragmentation and agglomeration should be more aggressively utilized in order to pursue both deeper economic integration and narrowing development gaps. Logistics and economic infrastructure is often the key to activating private dynamism

2-1. East Asian production networks leading the world

2-1-1. Global production networks and East Asia

The last two decades have been epoch-making in the development of international production networks all over the world. Some scholars prefer the word "global" instead of "international" or "regional" production networks or production sharing.[1] Indeed, some industries, such as electronics, have extended their production networks to the global scale with the involvement of MNEs with various firm nationalities. If we consider a longer value chain including not only manufacturing activities but also wholesales and retails, more industries can be regarded as possessing global networks. We would like to stress, however, that East Asian countries have often been at the center of such global production networks, particularly in quantitatively and qualitatively important sectors, i.e., machinery industries.

Figures 2-1 and 2-2 present the interconnectivity of international production networks, by illustrating the distribution pattern of two indicators for interconnectivity in machinery parts and components trade: the number of links and the clustering coefficient.[2] "Links" are here defined as two-way bilateral trade linkages in machinery

[1] See, for example, Ernst (2004) and Athukorala and Menon (2010).

[2] Machinery industries include general machinery, electrical machinery, transport equipment, and

parts and components. For the horizontal axis, the number of trading partners with two-way trade in machinery parts and components is counted and is divided by the maximal possible trading partners (100-1=99 in 1994, 85-1=84 in 2007). On the vertical axis, the "clustering coefficient" is the ratio of the number of links among the partner countries that a country of interest actually possesses. In sum, the horizontal axis represents the diversity or the extension of two-way trade linkages that a country of interest has participated in, and the vertical axis denotes the density of the links. The size of a bubble represents the volume of the two-way trade in machinery parts and components. Bubbles are shown in different colors by region: the blue colored bubbles for East Asian countries (ASEAN+6), red for European countries (EU27), green for American countries (North American Free Trade Agreement (NAFTA) and the Union of South American Nations (CSN)), and gray for others.

The larger the size of bubble and the higher the levels of the two indicators for the interconnectivity of networks, the more actively a country participates in production networks at the global level. Note, however, that there is a trade-off between the number of links, i.e., the number of partner countries, and the clustering coefficient whose denominator depends on the number of the partners. Despite such a trade-off, on the whole, bubbles shift to the upper right from 1994 to 2007, which indicates the networking in the two-way trade linkages of machinery parts and components, or the development of international production networks, stretched across the increasingly large number of countries. More importantly, East Asian countries except Brunei show outstanding shifts toward the upper right, and in particular, shifts to the right, from 1994 to 2007. As of 2007, along with larger sizes of bubbles, China, Japan, Korea, and other East Asian countries are concentrated in the upper right part of the plot region, suggesting that East Asian countries play a particularly important role in international production networks.

precision machinery (HS84-92). Machinery is classified into parts and components and finished products. The definition of machinery parts and components and other details of the figures are found in Kimura and Obashi (2010).

Figure 2-1. Inter-connectivity of international production networks in 1994

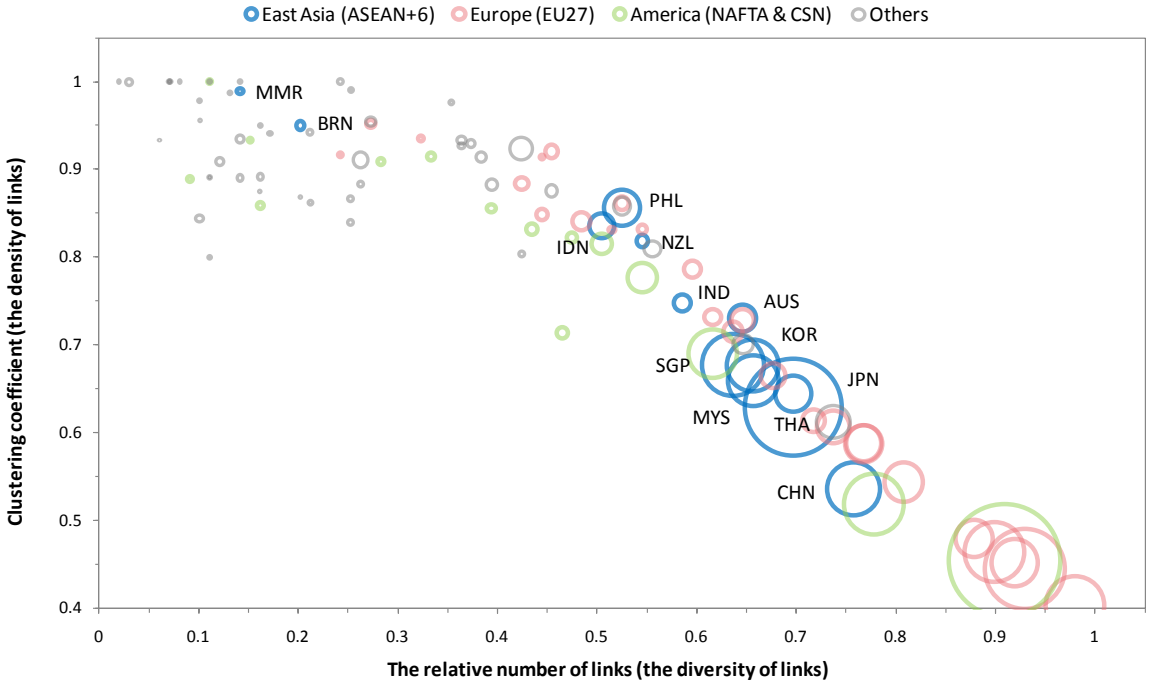
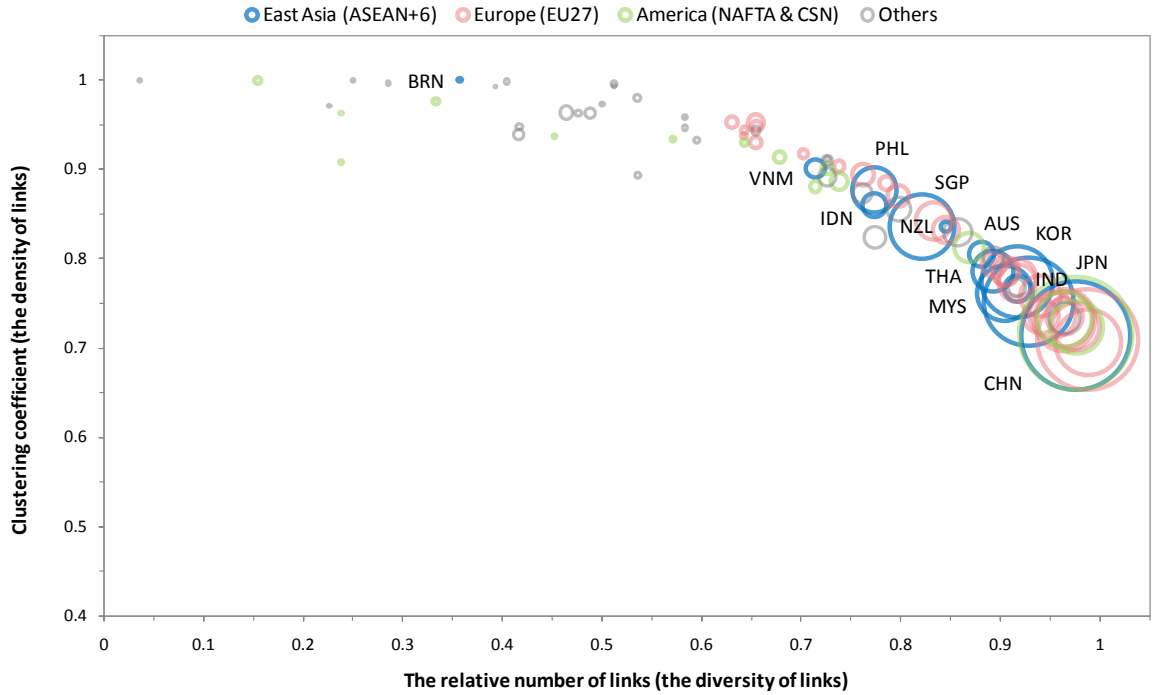


Figure 2-2. Inter-connectivity of international production networks in 2007

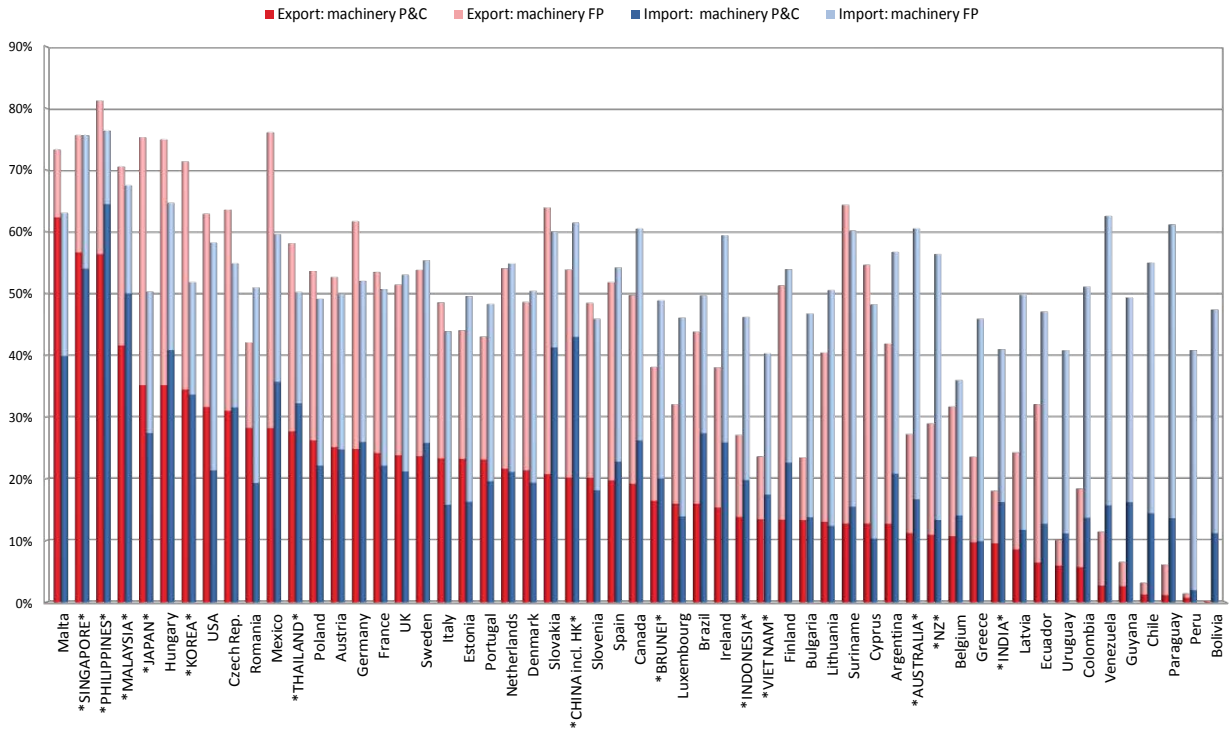


Note: "Links" are defined as two-way bilateral trade linkages for machinery parts & components, and "clustering coefficient" is the relative number of links among the partner countries that a country of interest actually has links with.
Source: Kimura and Obashi (2010).

2-1-2. Who is active in international production networks?

Figure 2-3 presents the proportion of machineries in total exports and imports of manufactured goods with the world for East Asian countries (ASEAN+6), European countries (EU27), and American countries (NAFTA) and CSN). Red stacked bars indicate the percentage of machineries in total manufactured goods exports, and the blue bars do the same for the import side. For both the red and blue bars, dark-colored portions represent machinery parts and components, and the light-colored portions denote machinery finished products. The bars are in the descending order of the percentage of machinery parts and components in total manufactured goods exports, from the left to the right. The percentage of machineries in exports indicates the extent to which a country is involved in international production networks while the percentage for the import side does not differ much across countries regardless of their degree of involvement. In particular, the percentages accounted for by exports and imports of machinery parts and components reflect active back and forth transactions in intermediate goods and are good proxies for the degree of a country's participation in the networks.

Figure 2-3. Shares of machineries in total exports/imports of manufactured goods to/from the world in 2007



Source: Kimura and Obashi (2010).

In the cases of Singapore, the Philippines, Malaysia, Japan, Korea, and Thailand, the percentages of all machineries exceed 50%, and those of parts and components reach almost 30% or more for both the export and import sides, indicating their deep participation in international production networks. China (including Hong Kong) is also actively involved in networks, as indicated by the fact that more than half of both exports and imports of manufactured goods are accounted for by machineries. However, parts and components account for only 20% for the export side, but more than 40% for the import side, which suggests the role of China as a "factory for the world". In the cases of Indonesia and Viet Nam, the percentages of parts and components exports are much higher than most of the CSN member countries except Brazil, though the corresponding figures for the import side are not much different. Still, Indonesia, Viet Nam, Australia, New Zealand, and India seem to be far behind in their degree of participation in production networks, compared with other East Asian countries.[3]

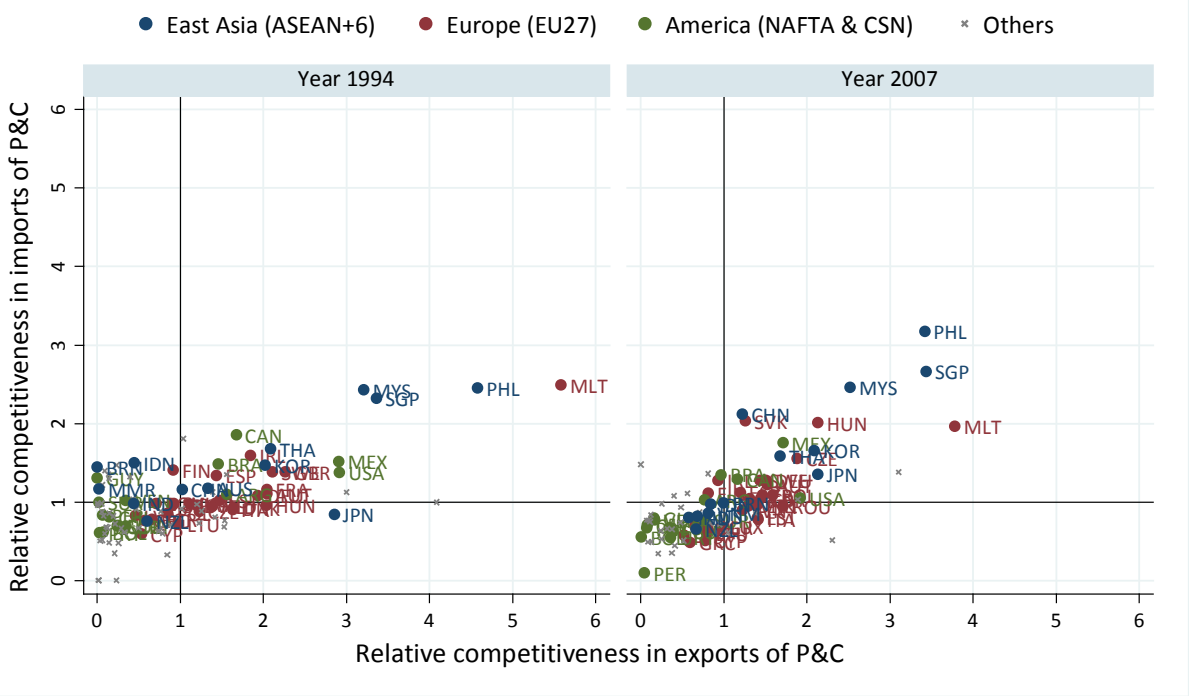
2-1-3. Export and import specialization in machinery parts and components

Figure 2-4 presents the degrees of specialization in exports and imports of machinery parts and components for respective countries in the world in 1994 and 2007. The horizontal axis indicates the international specialization index for exports of machinery parts and components, which ranges from 0 to the number of countries in the sample, i.e., 103 in 1994 and 85 in 2007, with a mean value of 1 as indicated by the solid line in the plot region. The vertical axis indicates the corresponding specialization index for the import side. The higher the international specialization index, the larger the proportion of machinery parts and components in total exports/imports of manufactured goods to/from the world, compared with other countries.[4] Points are plotted in different colors by regions: the blue colored circles for East Asian countries (ASEAN+6), red for European countries (EU27), green for American countries (NAFTA and CSN), and gray for others in the world.

[3] For a comparison between East Asia and other parts of the world, including the US-Mexico nexus and the Western-Eastern Europe connection, see Kimura and Ando (2003), Ando and Kimura (2007), and Kimura, Takahashi, and Hayakawa (2007).

[4] Export- and import based international specialization indices are calculated, following Amador, Cabral, Maria (2007) and Amador and Cabral (2009), as an alternative to the Balassa (1965)'s RCA index. In order to conduct a cross-country comparison of export/import competitiveness in a given sector, or the degree of specialization in exports/imports in the sector compared to other countries, Amador et al. (2007) and Amador and Cabral (2009) suggest employing the following index: $B_{ij}^{*} = (x_{ij} / X_i) / (\sum(x_{ij} / X_i) / N)$, which is the relative proportion of sector/product j in total exports/imports by country i compared to the average proportion among N countries in the sample. This alternative index has fixed lower and upper bounds across countries and time, given by 0 and N, and its mean is always equal to 1. Such proper cardinal properties across countries in a given sector make the index suitable for a cross-country comparison, especially over time.

Figure 2.4. Specialization patterns by region: Total exports/imports of parts and components to the world



Note: The international specialization index is defined as the relative proportion of machinery parts and components in total exports/imports of manufactured goods to/from the world compared with the average proportion among countries in sample.
Source: Kimura and Obashi (2010).

As of 1994, the Philippines, Singapore, and Malaysia already had remarkably high levels of specialization in both exports and imports of machinery parts and components. Malta was at the highest level for the export side, but the level of specialization for the import side is not much different from the above three East Asian countries. In 2007, the Philippines, Singapore, and Malaysia remain high for both export and import sides and moved to a higher level for the import side. Among European countries, not only Malta but Hungary also achieved a high level of specialization for both export and import sides. As of 2007, Korea, Thailand, Japan, and China are also located in the Northeast, meaning that they have high levels of specialization compared with other countries. Brunei, Indonesia, Viet Nam, Australia, New Zealand, and India still seem to be far behind, compared with other East Asian countries. However, East Asia as a whole is obviously most advanced in back-and-forth transactions of machinery parts and components.

2-2. Spatial structure of production networks

2-2-1. Evolutionary process of formation of production networks in East Asia

East Asia as a forerunner in developing international production networks has evolved its spatial structure of production networks since the late 1980s. In the 1990s, intra-regional production networks were constructed. After overcoming the Asian currency crisis and an IT bubble burst, intra-regional production networks enhanced their competitiveness together with rapid expansion of regional markets.

Table 2-1. Export structure of East Asian countries

(a) By-destination shares and annual average growth rates

	1994	1997	2001	2007	1994-1997	1997-2001	2001-2007
Within East Asia	43.6%	45.3%	43.5%	45.1%	5.6%	-0.9%	14.2%
United States	30.2%	28.1%	29.0%	22.6%	1.8%	1.0%	8.9%
European Union	17.2%	17.5%	18.0%	18.4%	4.9%	0.8%	14.0%
Others	9.0%	9.1%	9.5%	13.8%	4.4%	1.3%	20.9%
Total	100.0%	100.0%	100.0%	100.0%	4.3%	0.1%	13.5%

(b) By-commodity shares and annual average growth rates

	1994	1997	2001	2007	1994-1997	1997-2001	2001-2007
Machinery parts and components	24.0%	24.7%	25.8%	24.3%	5.3%	1.2%	12.4%
Machinery finished products	29.5%	28.1%	27.2%	26.4%	2.6%	-0.6%	13.0%
Other manufactured goods	31.4%	31.2%	30.6%	32.2%	4.0%	-0.3%	14.5%
Non-manufactured goods	15.1%	16.0%	16.3%	17.1%	6.3%	0.6%	14.4%
Total	100.0%	100.0%	100.0%	100.0%	4.3%	0.1%	13.5%

East Asia includes ASEAN10, Japan, Korea, China, Australia, New Zealand, and India.

Annual average growth rates are caluculated by using export data deflated by the US CPI (2005 basis).

Data source: UN Comtrade.

Table 2-1 presents changes in the export structure of East Asian countries. The period of 1994-1997 was the era when intra-East Asian production networks were initiated. Intra-regional export shares reached above 40%, and exports of machinery parts and components occupied about a quarter of the export total. The period of 1997-2001 was a stagnant period in which export growth became slow due to the Asian currency crisis and the bursting of the IT bubble. The period of 2001-2007 was an era with explosively expanding exports.

In the 2001-2007 period, exports within East Asia increased a little faster than exports to the rest of the world. Intra-regional exports mean intra-regional imports.

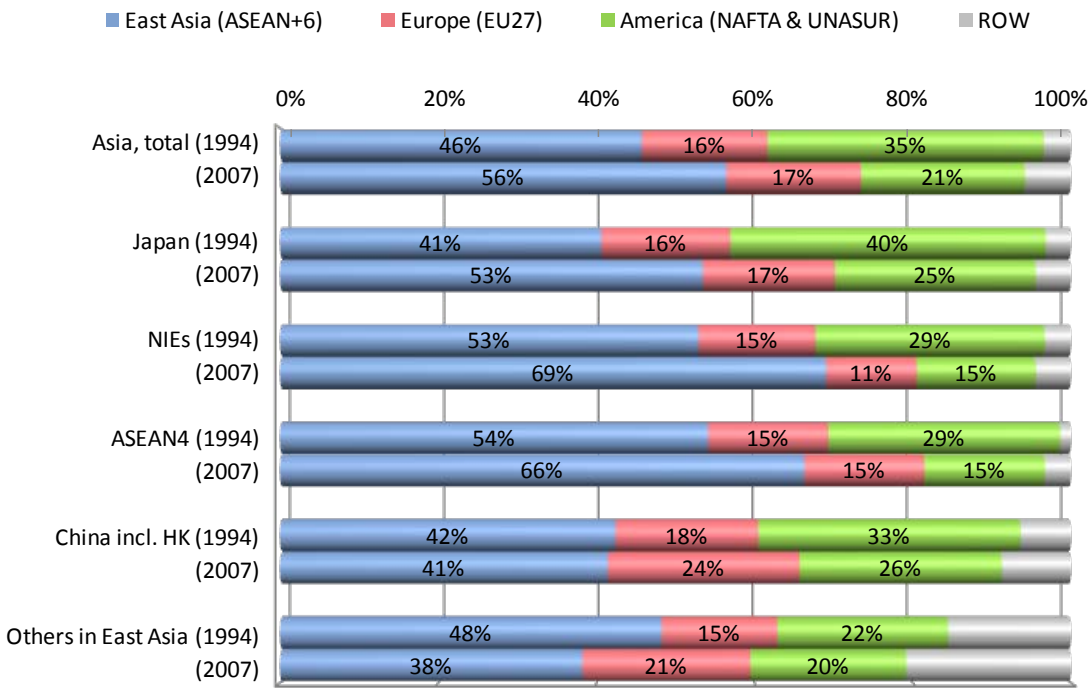
East Asian countries actually enhanced intra-regional trade openness, not only for machinery parts and components but also for other manufactured and non-manufactured goods. Vigorous growth of regional trade was due to trade liberalization, particularly through AFTA and China's WTO accession, reshuffling of production sites to pursue plant-level economies of scale, and the growth of middle-income population replacing people below the poverty line.

It is sometimes claimed that East Asian countries depend largely on countries outside the region, especially the US, as an ultimate source of demand for their exports of machineries. However, the importance of intra-regional trade has been rather rising or, at least, has remained unchanged since 2001. The share of the US market as an export destination has steadily reduced. Export markets outside East Asia have been diversified due to the enhanced international competitiveness of East Asian products.

2-2-2. Commodity composition and trading partners in international trade

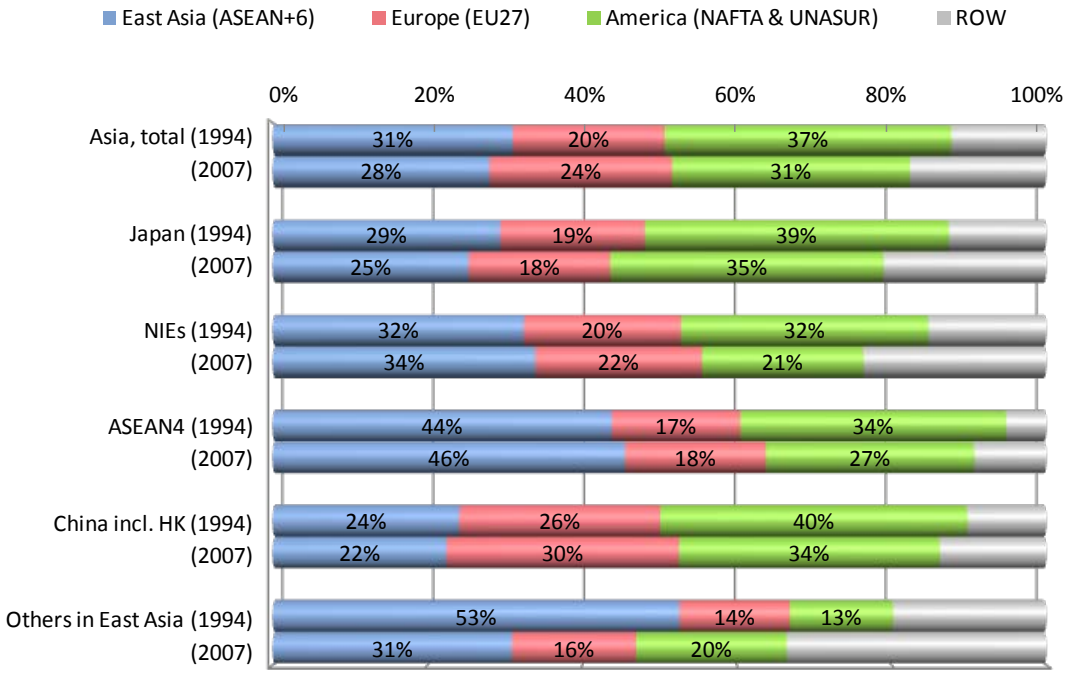
Figure 2-5 shows the composition of East Asia's exports of machinery parts and components by export destination. East Asia is divided into five subgroups, i.e., Japan, the newly industrialized economies (NIEs), the ASEAN4 (Indonesia, Malaysia, the Philippines, and Thailand), China (including Hong Kong), and others. The blue portions represent intra-regional exports within East Asia, the red portions represent exports to Europe, the green portions exports to America, and the gray portions show exports to the rest of the world (ROW). The percentages by destination are reported for two points in time, in 1994 and 2007. Japan, the NIEs, and the ASEAN4 increased their proportions of intra-regional exports from 1994 to 2007. In particular, for exports of machinery parts and components by NIEs and ASEAN4, intra-regional exports are of considerable importance, as indicated by the proportions of nearly 70%. Although the proportion of intra-regional exports remained mostly unchanged in the case of China and decreased by 10% points in the case of others in East Asia, the proportions of intra-regional exports still stand at about 40% or more. More interestingly, the proportion of exports to the US is uniformly decreasing over time across the five subgroups, particularly for the NIEs and the ASEAN4.

Figure 2-5. Shares by destination: East Asia's exports of machinery parts & components in 1994 and 2007



Source: Kimura and Obashi (2010).

Figure 2-6. Shares by destination: East Asia's exports of machinery finished products in 1994 and 2007

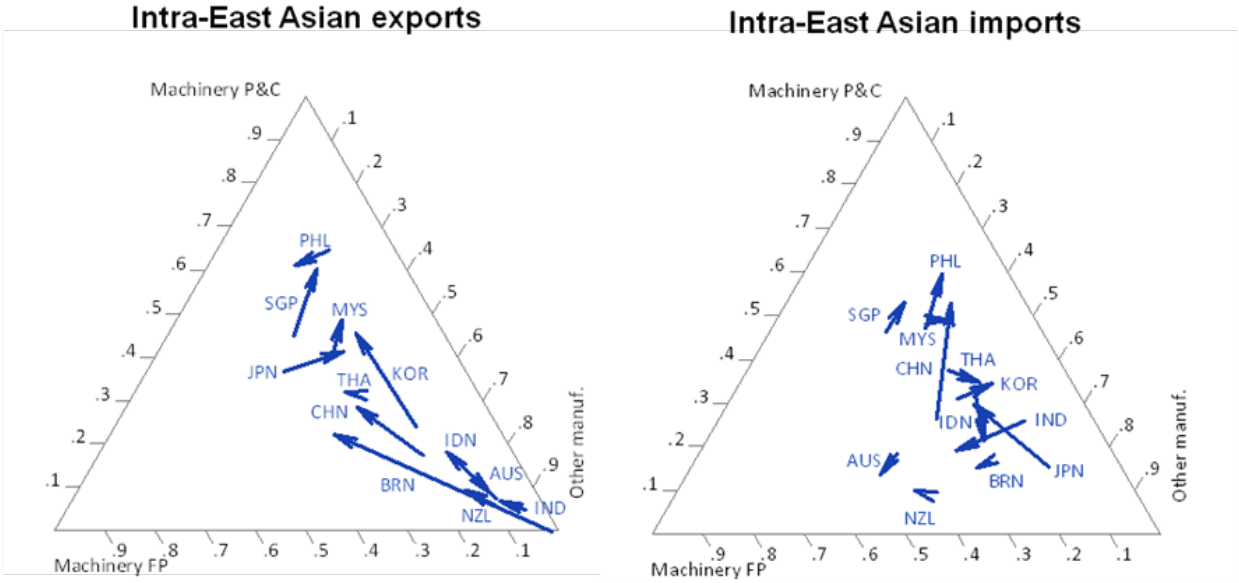


Source: Kimura and Obashi (2010).

Figure 2-6 presents the composition of the exports of machinery finished products by export destinations for the five subgroups of East Asian countries. The proportions of intra-regional exports are smaller for exports of machinery finished products than for parts and components. However, intra-regional transactions account for more than 40% and 30% of the exports of machinery finished products for the NIEs and the ASEAN4, respectively. Other economies in East Asia experienced a slight decline in the percentage of intra-regional exports from 1994 to 2007, though the relative importance of intra-regional transactions remain mostly unchanged. As in the case of exports of machinery parts and components, there is no evidence that East Asian countries increased their dependence on the US as an ultimate source of demand. Rather, East Asian countries seemed to diversify their export destinations, as indicated by the increasing proportions of exports to the rest of the world (ROW).

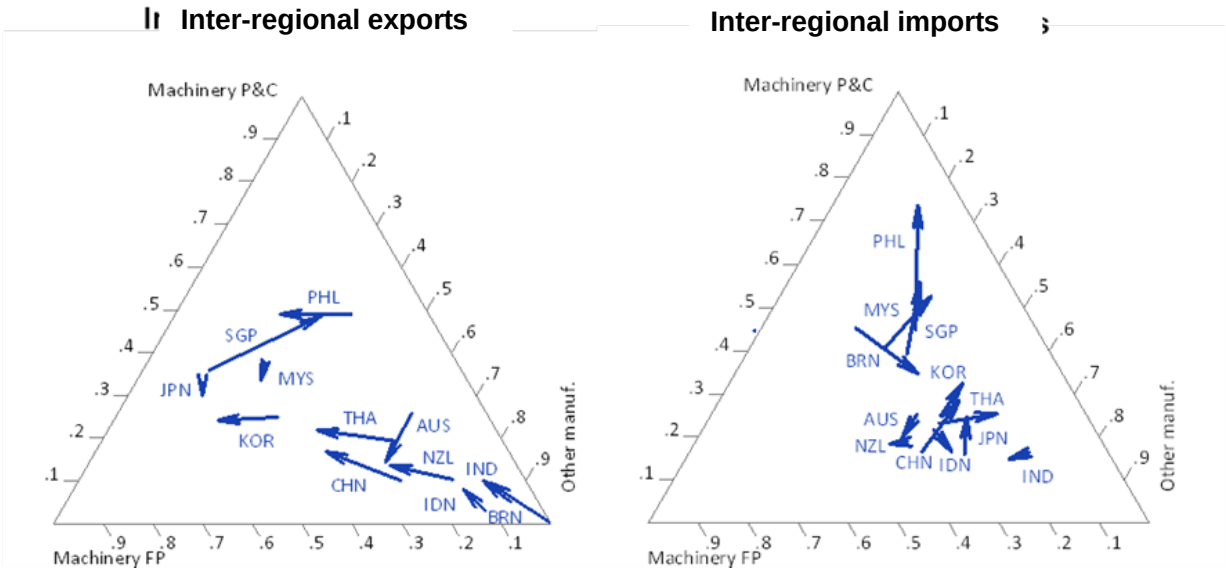
An unusually large proportion of East Asia's manufactured goods exports/imports is accounted for by machinery parts and components. This fact can be further examined by applying the method of triangular display by Leamer (1987) (Figures 2-7 and 2-8). The coordinate point in the triangle represents a country's product composition, i.e., proportions of machinery parts and components, finished products, and other manufactured goods. Each vertex represents a product composition that exports/imports of manufactured goods consist of that type of product. The midpoint indicates that the proportions of each of three types of products are equally 33.3%. In order to compare changes in product composition from 1994 to 2007 between East Asian countries, the changes of product composition between 1994 and 2007 are indicated using arrows. The product composition changes in the direction of an arrow from 1994 to 2007, to the extent indicated by the length of the arrow. The triangles are drawn for intra-regional exports and imports in Figure 2-7 and for inter-regional exports and imports in Figure 2-8.

Figure 2-7. Product composition of East Asia's intra-regional trade in manufacturing goods: Changes in 1994 to 2007.



Source: Kimura and Obashi (2010).

Figure 2-8. Product composition of East Asia's inter-regional trade in manufacturing goods: Changes in 1994 to 2007.



Source: Kimura and Obashi (2010).

As for intra-regional exports, most East Asian countries, except Japan and the Philippines, experienced increases in the proportion of machineries, especially parts and components, as indicated by arrows pointing to the upper left. Compared to their

export performance, East Asian countries experienced relatively small changes in the product composition of intra-regional imports. An exception is the case of China, whose arrow pointing upward is remarkably long. Also, in the case of Japan an increase in the proportion of machineries was biased toward parts and components.

It is noteworthy that directions of arrows are obviously different between intra-regional and inter-regional exports. Although most East Asian countries experienced increases in the proportion of machineries in both intra-regional and inter-regional exports, the increases are biased toward parts and components in intra-regional exports while they are skewed relatively toward finished products in inter-regional exports. An exception is the case of Singapore, whose long arrow points to the upper right in inter-regional exports, indicating a decrease in the proportion of machinery finished products along with simultaneous increases in the proportions of parts and components.

2-2-3. Geographical layers of transactions in production networks

In the mechanics of production networks, service link costs are sensitive to geographical distance, which is crucially important for constructing a spatial development plan. In particular, not only service link costs for fragmentation along the geographical distance but also those for fragmentation along the disintegration dimension, in other words intra-firm transaction costs, are highly sensitive to geographical distance. This observation provides the economic logic for the geographical structure of production networks.

Ando and Kimura (2009) present statistical evidence from transactions by Japanese MNEs. They find that long distance transactions such as those between Japan and ASEAN countries are predominantly intra-firm transactions. On the other hand, transactions within host countries by Japanese subsidiaries in developing East Asia are mostly arm's length. Transactions in the middle distance such as transactions among ASEAN countries are half intra-firm and half arm's length.

Although it is not at all easy to statistically capture the structure of intra-firm and arm's length (i.e., inter-firm) transactions, a typical machinery manufacturing firm seems to stratify its transactions in four layers in terms of gate-to-gate lead time and the frequency of delivery (Table 2-2).[5]

[5] More detailed discussion on the four layers of transactions in production networks is found in Kimura (2009a).

Table 2-2. Four layers of transactions in production/distribution networks

	1st layer (local)	2nd layer (sub-regional)	3rd layer (regional)	4th layer (world)
Lead time	Less than 2.5 hours	1 to 7 days	1 to 2 weeks	2 weeks to 2 months
Frequency	Once or more per day	Once or more per week	Once a week	Once a week
Transport mode	Trucks	Trucks/ships/airplanes	Ships	Ships
Trip length	Less than 100km	Less than 1,500km	Less than 6,000km	Longer

Source: Kimura (2008).

The first layer covers transactions with gate-to-gate lead time of less than 2.5 hours and delivery frequency of once or more per day. Most of such transactions are handled by trucks and are arm's-length. The geographical area of such transactions corresponds to what we call "industrial agglomeration" in which tight just-in-time systems with frequent deliveries and monitoring are operated.[6] Transactions with business partners that are new, small, and are not 100% trusted are mostly conducted within this geographical boundary.

The second layer consists of transactions with lead time of 1 to 7 days and delivery frequency of once or more per week. Transport modes vary; they can be trucks, ships, or airplanes. In cases of intra-firm transactions, the second layer covers transactions between plants owned by the same multinationals. In cases of arm's-length transactions, parts and components with modular interfaces occupy a large proportion of the trade; modules for computers and transactions with EMS firms are typical examples. Some transactions have integral-type interface; in such cases, parts and components producers often have high reputation and negotiating power so that they do not need to follow any request for relocation from the downstream firms. In addition, plant-level economies of scale are sometimes crucial in this type of transactions.

The third layer includes transactions with lead time of 1 to 2 weeks and typical delivery frequency of once a week. The corresponding geographical area covers the whole East Asia; transactions between Japan and China/ASEAN fall into this category. Because transactions are allowed some flexibility in their delivery timing, marine transportation is the major mode. Air transportation is utilized as a supplement in case of urgency. Intra-firm transactions between parent firms and affiliates are included in this layer.

[6] Machikita and Ueki (2010a, 2010b) provide empirical evidence on the geographical extension of industrial agglomerations in ASEAN.

The fourth layer includes transactions covering the whole world. The lead time is typically 2 weeks to 2 months, and the frequency of delivery is, say, once per week. The predominant delivery mode is marine container transportation via regular shipping routes. Although rapid air transportation is sometimes used, the proportion is relatively small.

Major factors that affect which transaction layers are chosen are summarized in Table 2-3. Arrows in the table denote the typical extent of the choice of transaction layers, if other factors are set at an average level.

Table 2-3. Factors affecting transaction choices

	1st layer (local)	2nd layer (sub-regional)	3rd layer (regional)	4th layer (world)
Re: fragmentation along the distance axis				
Network set-up cost / relocation cost	small ←		→ large	
Service link cost (esp. transport cost (cost, lead time, quality))	large ←			→ small
Location advantages (esp. production conditions, economies of scale)	small ←		→ large	
Re: fragmentation along the disintegration axis				
Intimacy of inter-firm relationship				
Intra-firm vs. arm's-length (capital holdings)	arm's-length ←		→ intra-firm	
Credibility	weak ←		→ strong	
Power balance	unbalanced ←		→ balanced	
Architecture of inter-firm interface				
Modular vs. integral	integral ←		→ modular	

Source: Kimura (2008).

Turning to the economic logic in fragmentation along the distance axis, there are three kinds of costs to be considered: (i) network set-up cost or relocation cost, (ii) service link cost, and (iii) location advantages which save production cost *per se*. When the network set-up cost or relocation cost is small, it may be better to relocate production plants and carry out transactions over shorter distances, and vice versa. When the service link cost, including transport, is large, transactions over shorter distances are chosen, and vice versa. When differences in location advantages are large, long-distance transactions are permitted, and vice versa. When plant-level economies of scale are strong, long-distance transactions would be warranted.

In considering fragmentation along the disintegration axis, the relationship between transaction cost and geographical proximity is crucial. If the intimacy or level of trust between business partners is high, geographical distance in transactions can be

far, and vice versa. Therefore, arm's-length transactions are predominant in the 1st layer while intra-firm transactions occupy a large share in the 3rd layer. In cases of arm's-length transactions, when credibility is weak (strong), the 1st layer (2nd layer) is chosen. When the power balance between upstream and downstream firms is unbalanced, the 1st layer is chosen. When the power of upstream and downstream firms is balanced, the 2nd layer can be selected. In addition, the architecture of the inter-firm interface is important. When modular interface is selected, transactions can be in the 2nd layer or 3rd layer. On the other hand, when the interface is in total integration, the 1st layer is predominantly chosen.

2-3. Policy environment in East Asia

Why was East Asia able to start developing international production networks, well ahead of other developing areas in the world? One of the important factors was certainly a policy environment consistent with new development strategies. This was not, however, a well-planned move from the beginning.[7]

The period before the Asian currency crisis is characterized as competitive unilateral liberalization of trade and investment, and progressive improvement of the business environment. Major policy reform was initiated by Singapore, and then Malaysia and Thailand in the mid-1980s. In the midst of a serious recession, they decisively shifted their FDI-hosting policies from cautious and selective acceptance to aggressive attraction in most of the manufacturing sectors. Emerging China, under Deng Xiaoping's leadership, then further stimulated the competitive unilateral liberalization. Policymakers in these countries did not originally have a clear idea of the policy environment that would foster international production networks. However, by accumulating small unilateral reforms, and trouble shooting, responding to various requests by multinationals, a favorable environment for production networks gradually came into shape.

Trade liberalization, together with investment liberalization and facilitation, was substantial. In particular, tariffs imposed on machinery parts and components were reduced or completely removed, unilaterally, from the beginning of the 1990s, and such trade liberalization was further pursued under the initiative of the Information Technology Agreement (ITA) in the latter half of the 1990s. We here observe a "race to the bottom" type of trade liberalization (Baldwin, 2006) where developing countries

[7] More detailed discussion on policy environment is found in Kimura (2009b).

aggressively competed in attracting FDI and conducting trade liberalization. Consequences of the policy reform were the formation of extensive production networks in the electronics industry, including semiconductors, hard disk drives (HDD), other modules, and computers themselves.

It should however, be noted that trade protection was preserved for some key import-substituting industries dominated by national projects or import-substituting MNEs; such industries include automotive, electric appliances, iron and steel, petrochemicals, and others. The Asean Free Trade Area (AFTA) agreement was concluded in 1992 and started a liberalization process in 1993 at the same time as China began to emerge as a powerful attracter of FDI. It certainly played a symbolic role in advertising ASEAN's intention of stepping forward to trade and FDI liberalization. However, actual trade liberalization under the Common Effective Preferential Tariff (CEPT) scheme in AFTA moved very slowly before the Asian currency crisis.

The Asian currency crisis, starting from 1997, triggered a breakthrough in the policy environment of East Asia. By creating hardship for individual countries in East Asia, the Asian currency crisis nurtured the regional concept of East Asia, and Free Trade Agreements (FTAs) came to center stage. Ultimately an FTA hub-and-spoke system with ASEAN centrality has emerged (Table 2-4).

Table 2-4. FTA networking in extended East Asia

(As of November 2009)

	Japan	Korea	China	ASEAN	Brunei	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam	CLM	India	Australia	New Zealand
Japan		○ (suspended)	△	◎: 2008 -	◎: 2008	◎: 2008	◎: 2006	◎: 2008	◎: 2002	◎: 2007	◎		○	○	
Korea	○ (suspended)		△	◎: 2007 -					◎: 2006				◎	○	○
China	△	△		◎: 2005 -					◎: 2009				△	○	◎: 2008
ASEAN	◎: 2008 -	◎: 2007 -	◎: 2005 -	◎: 1993 -	(1992)	(1992)	(1992)	(1992)	(1992)	(1992)	(1995)	(LM:1997/C:1999)	◎	◎: 2010 -	◎: 2010 -
Brunei	◎: 2008			(1992)		(1992)	(1992)	(1992)	(1992)	(1992)	(1995)	(LM:1997/C:1999)			◎: 2006
Indonesia	◎: 2008			(1992)	(1992)		(1992)	(1992)	(1992)	(1992)	(1995)	(LM:1997/C:1999)		△	
Malaysia	◎: 2006			(1992)	(1992)	(1992)		(1992)	(1992)	(1992)	(1995)	(LM:1997/C:1999)	○	○	◎
Philippines	◎: 2008			(1992)	(1992)	(1992)	(1992)		(1992)	(1992)	(1995)	(LM:1997/C:1999)			
Singapore	◎: 2002	◎: 2006	◎: 2009	(1992)	(1992)	(1992)	(1992)	(1992)		(1992)	(1995)	(LM:1997/C:1999)	◎: 2005	◎: 2003	◎: 2001
Thailand	◎: 2007			(1992)	(1992)	(1992)	(1992)	(1992)	(1992)		(1995)	(LM:1997/C:1999)	△	◎: 2005	◎: 2005
Vietnam	◎			(1995)	(1995)	(1995)	(1995)	(1995)	(1995)	(1995)		(LM:1997/C:1999)			
CLM				(LM:1997/C:1999)	(LM:1997/C:1999)	(LM:1997/C:1999)	(LM:1997/C:1999)	(LM:1997/C:1999)	(LM:1997/C:1999)	(LM:1997/C:1999)	(LM:1997/C:1999)				
India	○	◎	△	◎			○		◎: 2005	△				△	△
Australia	○	○	○	◎: 2010 -		△	○		◎: 2003	◎: 2005			△		◎: 1983
New Zealand		○	◎: 2008	◎: 2010 -	◎: 2006		◎		◎: 2001	◎: 2005			△	◎: 1983	

Notes: ◎: signed or being effective, ○: under negotiation or agreed to negotiate, △: feasibility study or preparatory talks. The year indicates when the concerned FTA was in force. "-" after the year means that some ASEAN countries are under the corresponding FTAs in force and other countries follow later. Dark blue indicates FTAs signed before or in the 1990s, blue indicates FTAs signed in the first half of the 2000s, and light blue indicates FTAs signed in the second half of the 2000s. For some FTAs, their status in this table is based on the agreement of trade in goods; negotiations may be still ongoing over other areas such as investment and services even if the agreements are identified as those signed or being effective here. The year in parenthesis shows the year for the corresponding ASEAN country to be the member of ASEAN/AFTA.

Sources: Websites of trade ministries in each country and others including JETRO website (http://www.jetro.go.jp/world/).

FTAs create a better policy environment in two ways: restructuring import-substituting industries and further activating production networks.

The restructuring of import-substituting industries is inevitable in resolving inconsistency in trade policies. Network-forming industries prefer free trade regimes, while import-substituting industries call for trade protection. Before the Asian currency crisis, the conflict between these two was partially reconciled by Export Processing Zones (EPZs), duty-drawback systems, and other policy arrangements. However, once the Asian currency crisis started, ASEAN member countries were forced to propose and take more drastic measures in order to keep attracting FDI. There was of course resistance from companies and entrepreneurs who worked for national products, as well as import-substituting MNEs, and thus collective effort in the region was required to remove trade barriers from these industries. In this context, AFTA has been a particular success, and has become one of the "cleanest" FTAs in terms of the liberalization coverage for trade in goods.

The contents of FTAs, beyond tariff removal, work strongly to further activate production networks. The introduction of expanded policy modes to FTAs is a pragmatic response to large and small requests from the private sector wishing to extend international production networks. As a consequence, facilitation and cooperation are often emphasized more than liberalization.

The ASEAN Economic Community (AEC) initiative is an ambitious effort to extend the effort of AFTA to a wide range of policy modes. Various trade facilitation measures, including the national/ASEAN single window and other initiatives will have beneficial effects. Japanese bilateral FTAs with ASEAN were also specifically designed to favor production networks, and include trade facilitation such as customs procedures, the establishment of business-government dialogues, and economic and technical cooperation. A series of these small measures have been specifically designed to reflect the issues and requirements of MNEs operating production networks. The emphasis on investment liberalization and facilitation is another aspect of importance.

It should be noted that most of the measures of trade and investment facilitation would be applied on the Most Favored Nation (MFN) basis rather than the infamous discriminatory basis. In other words, firms of any nationality can enjoy the improvement in a policy environment brought about by FTAs. This is an important characteristic of competing FTAs in an open setting.

Some people may have a concern that overlapping bilateral/multilateral FTAs would cause confusion in trade regimes. This is the so-called "spaghetti bowl" or "noodle bowl" phenomenon. However, recent empirical observations reveal that trade

deterrence effects due to such confusion seem to be small while trade liberalization effects look positively significant, at least in ASEAN and East Asia. Rules of origin (RoO) are thought to generate complications, but the RoO system in East Asian FTAs is relatively trade-friendly, compared with FTAs in other parts of the world (Estevadeordal, Harris, and Suominen (2007)). Medalla and Balboa (2009) conduct a thorough survey on RoOs in ASEAN and ASEAN+1 FTAs and find that the co-equal system, i.e., providing multiple choices of RoO rules for traders (for example, traders can choose either the value added rule or the change-in-tariff-classification rule), seems to work as a simple and liberal RoO. Hayakawa, Hiratsuka, Shiino, and Sukegawa (2009) analyze the pattern of FTA utilization by Japanese firms and conclude that the complication of overlapping FTAs is not very serious though more facilitation is certainly called for.

2-4. Durability and resiliency of production networks

2-4-1. Are production networks footloose?

FDI is sometimes criticized as being footloose; MNEs do not commit deeply to local production, and slight changes in competitive conditions may easily cause local production plants to move. In the case of FDI in the context of production networks, however, production blocks tend to carry thin slices of value added, and such FDI might present an even stronger footloose character. However, this claim is not empirically warranted.

A series of empirical studies as well as the extended fragmentation theory have claimed quite the opposite. Transactions in production networks, particularly international trade in machinery parts and components, are much more stable than other types of transactions. The stability is due to the relation-specific nature of transactions compared with the spot-market, open-bidding type of transactions. To set up or restructure production networks, a firm has to pay a substantial amount of sunk cost in identifying location advantages and checking the strength of potential business partners, as well as in building up reliable links. Hence, once production networks are constructed, transactions become relation-specific and stable. Furthermore, as is presented below, production networks are resilient and elastic even against large macro shocks such as an Asian currency crisis or a global financial crisis.

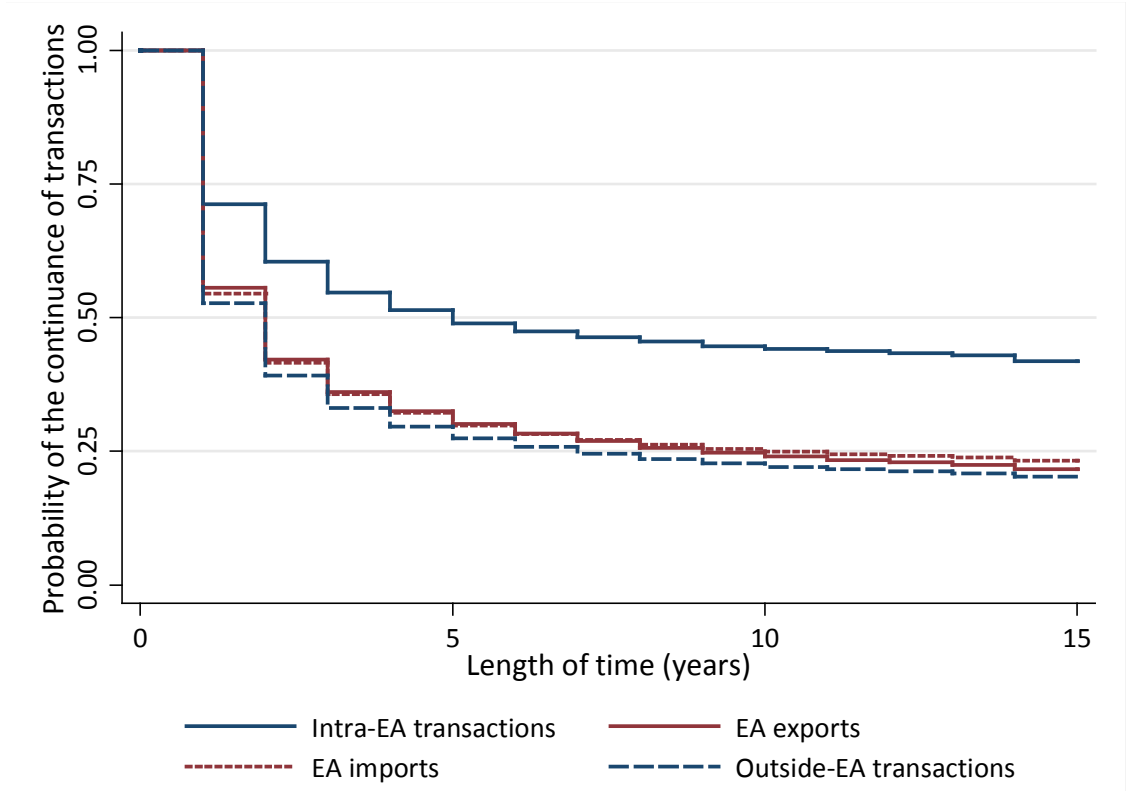
In the past, policies for hosting FDI have sometimes contained measures against the footloose behavior of MNEs. Such policy measures include requirements of thicker slices of value added and large local procurement of parts and components, and

even restriction on exit. These policy measures, however, are likely to affect the development of production networks adversely. Once production networks are developed and industrial agglomerations start to emerge, transactions are stabilized. Therefore, rather than restricting the footloose characteristics of MNEs, it seems better take advantage of the possible footloose moves of MNEs in order to attract a critical mass of FDI, and thereby promote the development of industrial agglomerations.

2-4-2. Evidence from survival analysis

At the detailed level of trade commodity classification, bilateral trade is quite often interrupted year by year. Obashi (2010a) applies the method of survival analysis to intra-East-Asian trade and proves that trade in machinery parts and components is longer-lived and more stable than trade in machinery finished products. Trade relationships in machinery parts and components are more likely to be maintained between countries even at a long distance, regardless of exchange-rate fluctuations. The probability of discontinuing trade relationships of machinery finished products is more likely to be sensitive to the level of trade cost as well as exchange-rate fluctuations.

Figure 2.9. Stability of East Asian Production Networks



Source: Obashi (2010).

Figure 2-9 presents further results (Obashi, 2010b). Even in bilateral trade in machinery parts and components, transactions within East Asia are longer-lived and more stable than transactions with outsiders. East Asian countries are more likely to engage in long-lived trade relationships in machinery parts and components with each other than with outsiders, as well as compared to outside the region, unlike the case of finished products. Moreover, Obashi (2009) conducts a detailed analysis on the period of the Asian currency crisis and finds the resiliency of production networks even against negative macro shocks.[8]

2-4-3. Trough and rebound in the global financial crisis

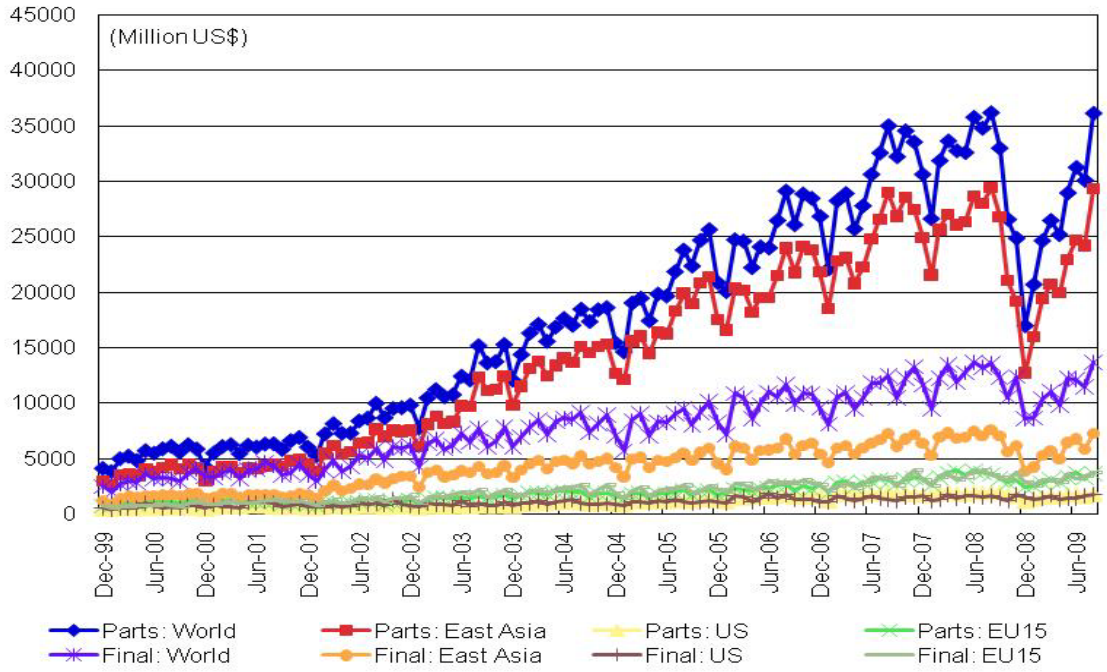
In the current global financial crisis, massive negative shocks came from the US and Europe to East Asia through both trade and financial channels. In particular, international production networks became one of the major transmission lines of negative shocks, and transactions within international production networks drastically declined. However, we observe that the rebound of regional trade was also quick and strong after passing through a deep trough.

Figure 2-10 (a)-(h) presents monthly exports and imports of machinery parts and components as well as machinery finished products by China, the ASEAN4 (Malaysia, Thailand, Indonesia, and the Philippines), the NIEs4 (Korea, Taiwan, Hong Kong, and Singapore), and Japan (Ando, 2010b). From 2001 to September 2008, both exports and imports grew strongly in most of the countries. Then came the Lehman shock, and trade shrank drastically. With the trough bottomed in around February 2009, exports and imports rebounded.

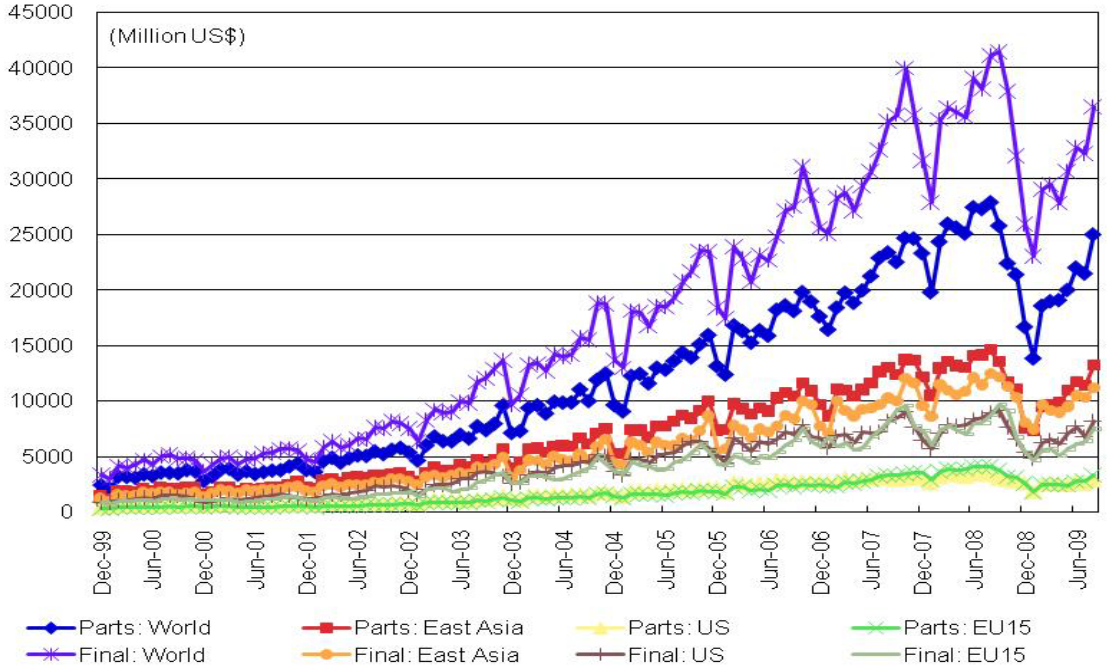
[8] Ando and Iriyama (2009) conduct a micro-data analysis of exports and imports by Japanese manufacturing firms in 1994-2004 and find that Japanese manufacturing firms, particularly machinery firms, with greater foreign operations under their own corporate control would better absorb shocks of exchange rate fluctuations by adjusting intra-firm transactions more significantly than others. Relation-specific transactions in production networks can also work as shock absorbers.

Figure 2-10. Monthly exports and imports of machinery parts & components, and machinery finished products

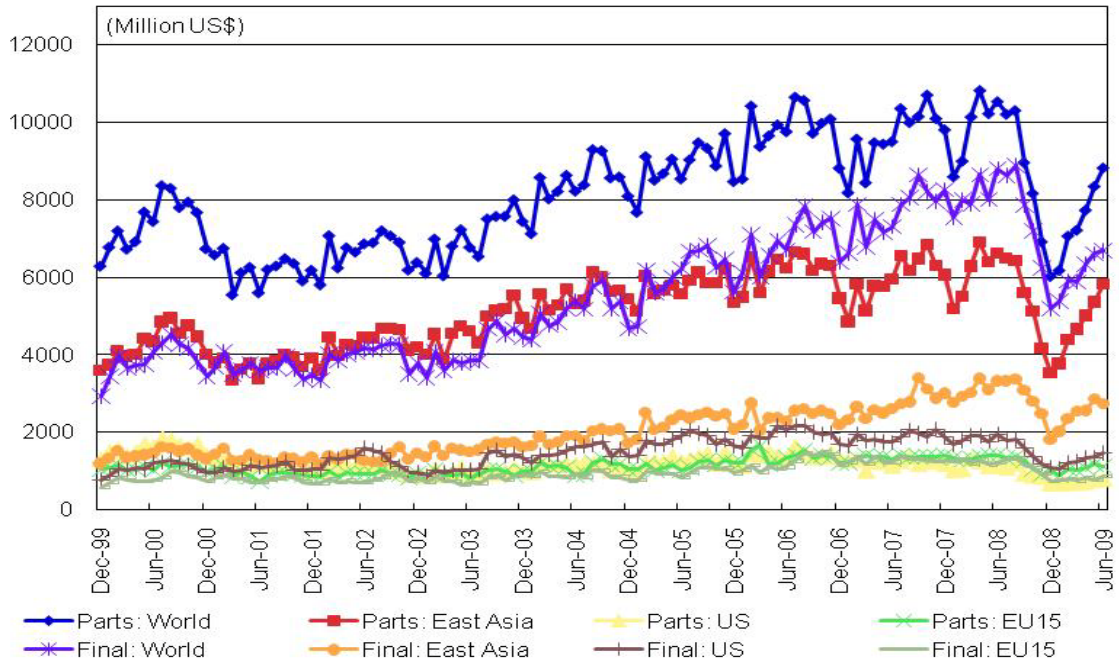
(a) Machinery Exports: China



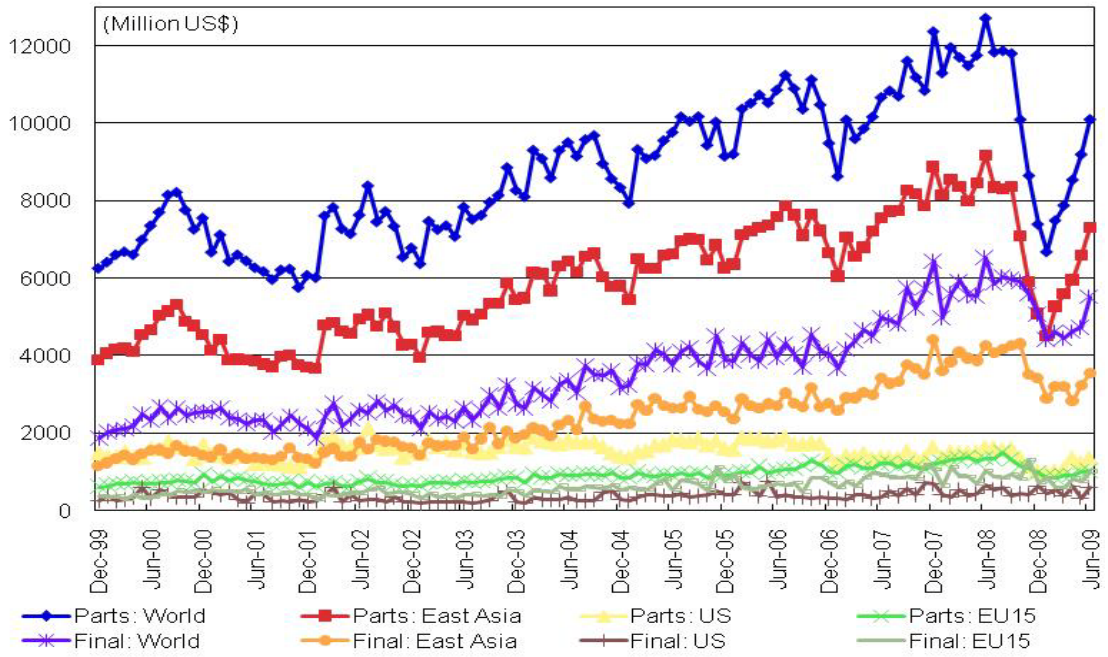
(b) Machinery Imports: China



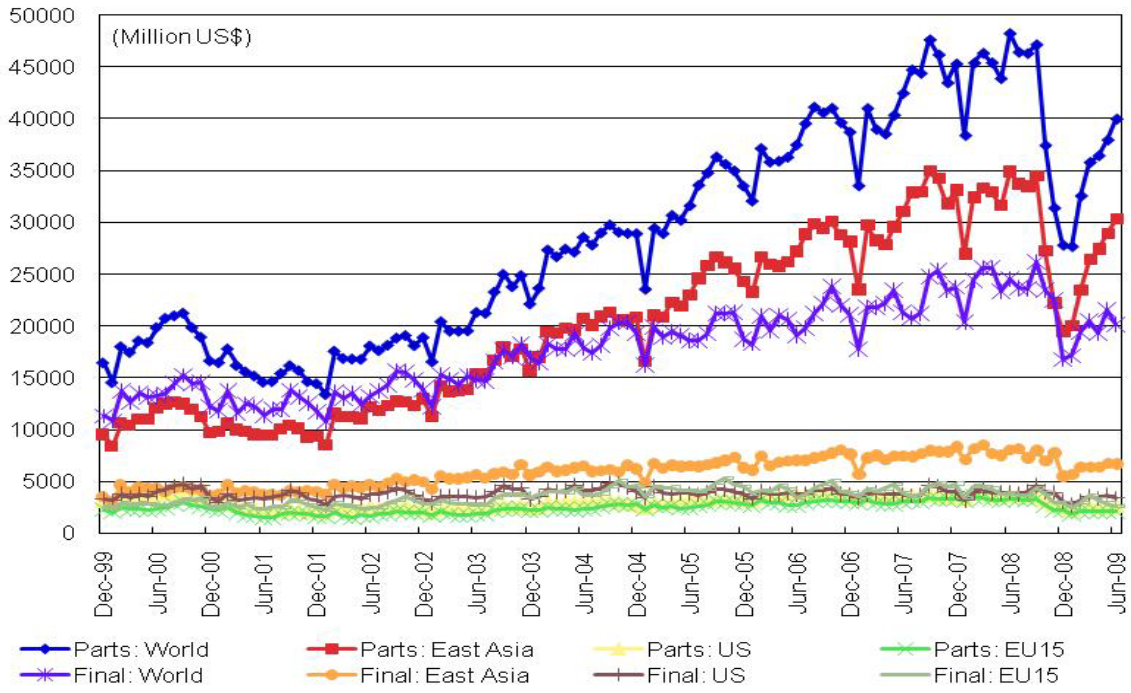
(c) Machinery Exports: ASEAN4



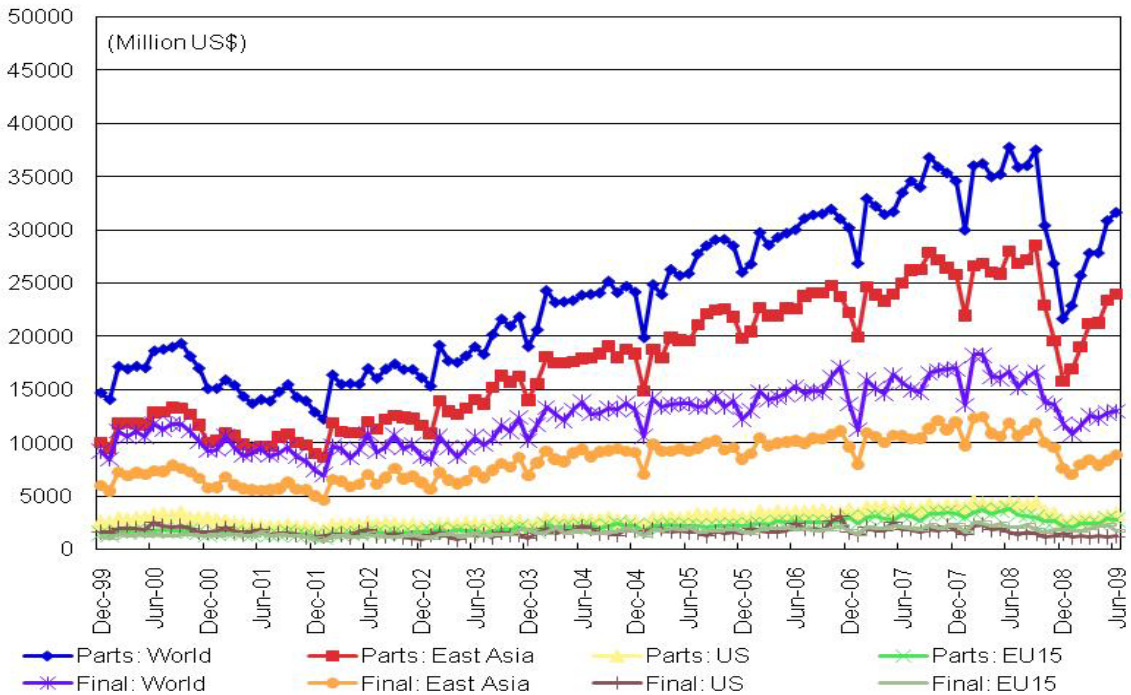
(d) Machinery Imports: ASEAN4



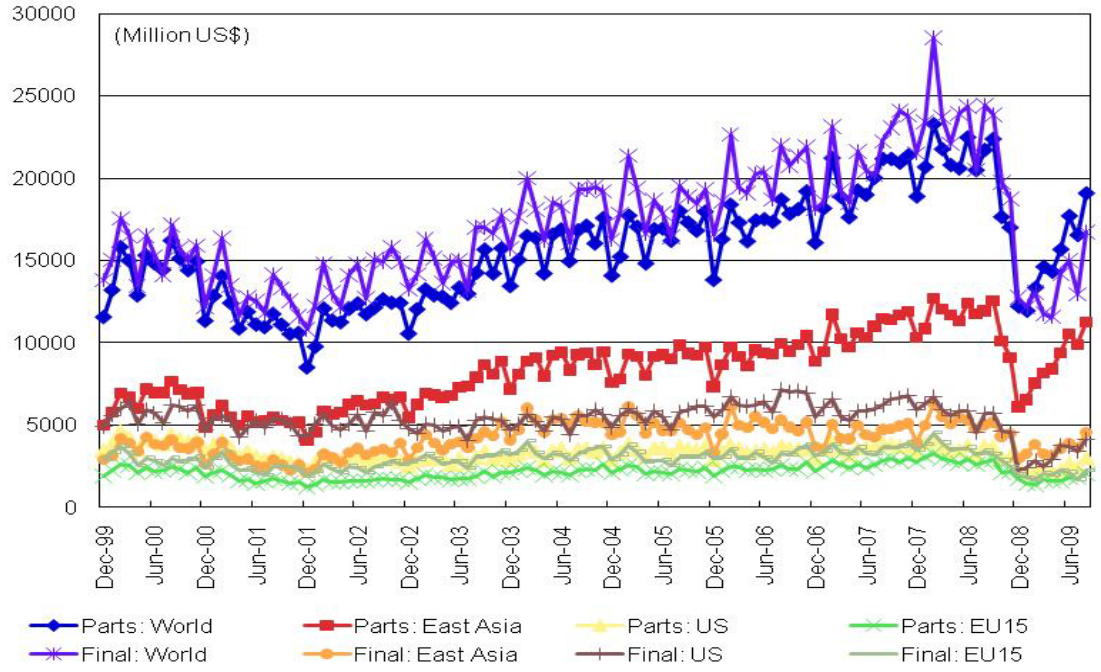
(e) Machinery Exports: NIEs4



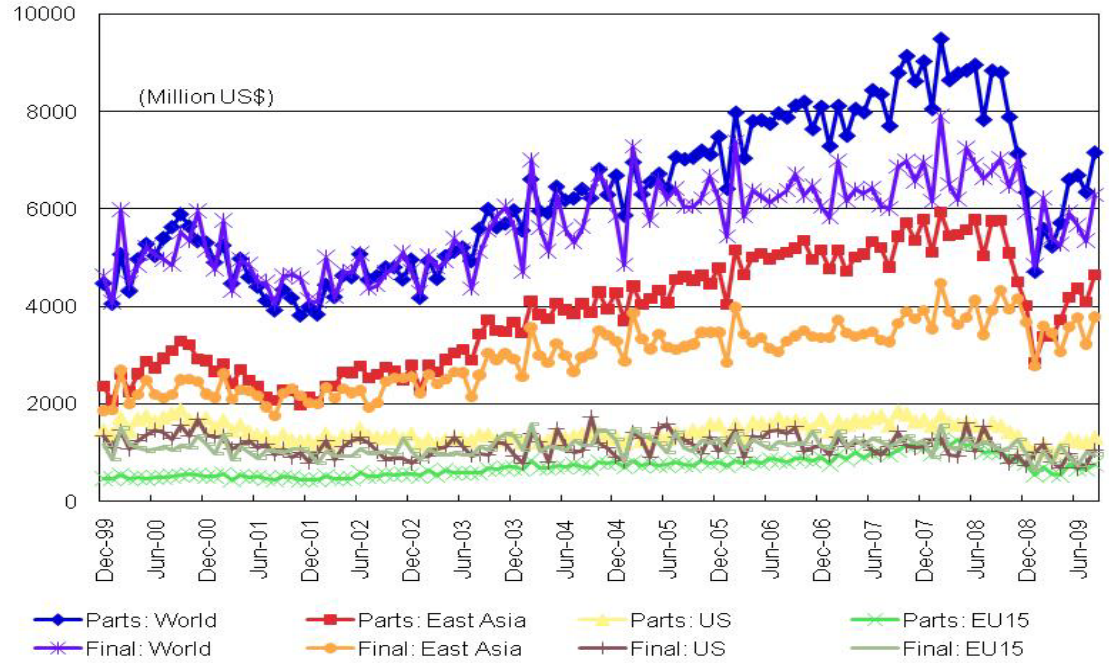
(f) Machinery Imports: NIEs4



(g) Machinery Exports: Japan



(h) Machinery Imports: Japan



Source: Ando (2010b).

Table 2-5 summarizes trough and rebound indices calculated by setting the trade values in September 2008 at 100. The troughs are typically in February 2009, and recovery started after that.[9] The troughs are certainly deep; trade values go down by 30-50%, particularly on the export side. The recovery is quick and strong, however. Some would have expected that troughs for machinery parts and components would be deeper than those for machinery finished products, due to the magnification effect in parts and components trade.[10] However, such an effect does not seem to be strong; the depth of troughs and the speed of rebounds do not look much different between trade in machinery parts and components and trade in machinery finished products.

Table 2-5. Trade index for machinery trade in East Asia (2008.9=100)

			China			ASEAN4		NIES4		Japan		
			2009.2	2009.7	2009.9	2009.2	2009.7	2009.2	2009.7	2009.2	2009.7	2009.9
(a) Machinery (HS84-92)												
EX	Parts	World	50	79	90	60	86	60	86	55	82	88
	Parts	East Asia	51	80	91	59	91	60	91	55	88	94
	Parts	US	54	82	85	57	67	61	76	54	72	80
	Parts	EU15	43	67	81	64	80	58	66	52	65	73
	Final	World	56	80	89	61	75	73	86	50	61	68
	Final	East Asia	60	84	90	60	81	79	92	64	78	90
	Final	US	54	86	92	58	80	67	83	42	65	72
	Final	EU15	53	70	86	58	65	66	70	52	62	64
IM	Parts	World	57	86	100	56	85	63	88	53	76	81
	Parts	East Asia	54	84	100	54	88	62	88	49	76	81
	Parts	US	69	91	92	63	87	66	80	64	77	82
	Parts	EU15	69	102	102	58	68	66	87	54	65	75
	Final	World	64	89	101	73	91	67	81	71	84	93
	Final	East Asia	56	89	96	69	85	63	80	71	97	97
	Final	US	80	85	107	72	99	73	76	85	58	90
	Final	EU15	73	90	106	101	119	75	75	57	66	84

Source: Ando (2010b).

Table 2-6 presents contribution ratios during the downturn and upturn by trading partners. Trade shares by trading partners before the Lehmann shock are also tabulated. In the downturns from September 2008 to February 2009, contribution ratios in exports by trading partners are about the same as the export shares, which means that intra-regional and inter-regional exports shrank almost equally. Note that

[9] Most of the bilateral trade has a seasonal pattern with a peak in August-September and a trough in February. Such "normal" seasonality at least partially contributed to the ups-and-downs in 2008-2009.

[10] For the magnification effect in parts and components trade, see Yi (2003).

direct effects of the decline is US demand are not huge, even in the case of exports of machinery finished products. On the other hand, in the upturn from February 2009 to July 2009, intra-regional exports typically have more than proportional contribution to the recovery of exports.

Table 2-6. Contribution of each region to changes in machinery trade in East Asia

			China			ASEAN4			NIEs4			Japan		
			Share in world trade (2007.10-2008.9)	Drop (2008.9 - 2009.2) Contribution ratio	Recover (2009.2 - 2009.7) Contribution ratio	Share in world trade (2007.10-2008.9)	Drop (2008.9 - 2009.2) Contribution ratio	Recover (2009.2 - 2009.7) Contribution ratio	Share in world trade (2007.10-2008.9)	Drop (2008.9 - 2009.2) Contribution ratio	Recover (2009.2 - 2009.7) Contribution ratio	Share in world trade (2007.10-2008.9)	Drop (2008.9 - 2009.2) Contribution ratio	Recover (2009.2 - 2009.7) Contribution ratio
(a) Machinery (HS84-92)														
EX	Parts	East Asia	52.7	51.1	53.2	62.6	64.6	77.7	72.4	72.3	83.6	55.1	54.9	69.2
	Parts	US	12.6	10.8	11.3	11.7	12.4	4.3	8.1	7.4	4.2	17.3	17.6	11.5
	Parts	EU15	14.7	16.6	12.0	13.5	12.1	8.7	7.4	7.3	2.1	13.7	13.7	6.1
	Final	East Asia	30.4	27.5	30.5	37.9	39.0	54.5	32.7	24.3	32.1	21.7	14.7	24.1
	Final	US	21.7	22.8	29.0	22.5	21.9	31.4	16.8	21.0	21.4	25.5	26.9	46.5
	Final	EU15	21.7	22.6	14.9	15.2	15.9	6.9	17.4	19.2	4.2	15.6	13.6	12.4
IM	Parts	East Asia	81.2	87.2	83.2	71.6	73.0	81.6	74.6	78.1	80.7	63.2	70.4	76.9
	Parts	US	5.4	3.7	3.8	12.8	11.2	10.8	11.6	10.8	6.9	18.6	13.8	10.2
	Parts	EU15	10.1	7.1	11.1	11.0	12.3	4.8	9.5	8.2	7.7	12.7	11.3	6.0
	Final	East Asia	55.2	68.3	73.0	68.3	79.0	59.5	69.0	78.0	86.1	56.4	58.9	121.2
	Final	US	11.8	6.6	2.1	9.1	10.2	14.4	11.1	8.2	2.2	17.8	9.0	-37.8
	Final	EU15	27.1	19.9	18.1	15.8	-0.5	14.1	13.4	10.9	0.5	17.7	25.5	12.8

Note: Contribution ratios during the drop and recovery periods express ratios of contribution to the reduction in trade with the world during the period between September 2008 and February 2009, and of contribution to the increase in trade with the world during the period between February 2009 and July 2009. In the cases of underlined figures for transport equipment, trade with the world increased during the drop period and decreased during the recovery period.
Source: Ando (2010b).

These observations verify that production networks are robust and elastic even against massive macro shocks such as the current financial crisis. They also indicate that the importance of the East Asian market itself was already significant before the crisis, and that its significance was enhanced through the recovery process.

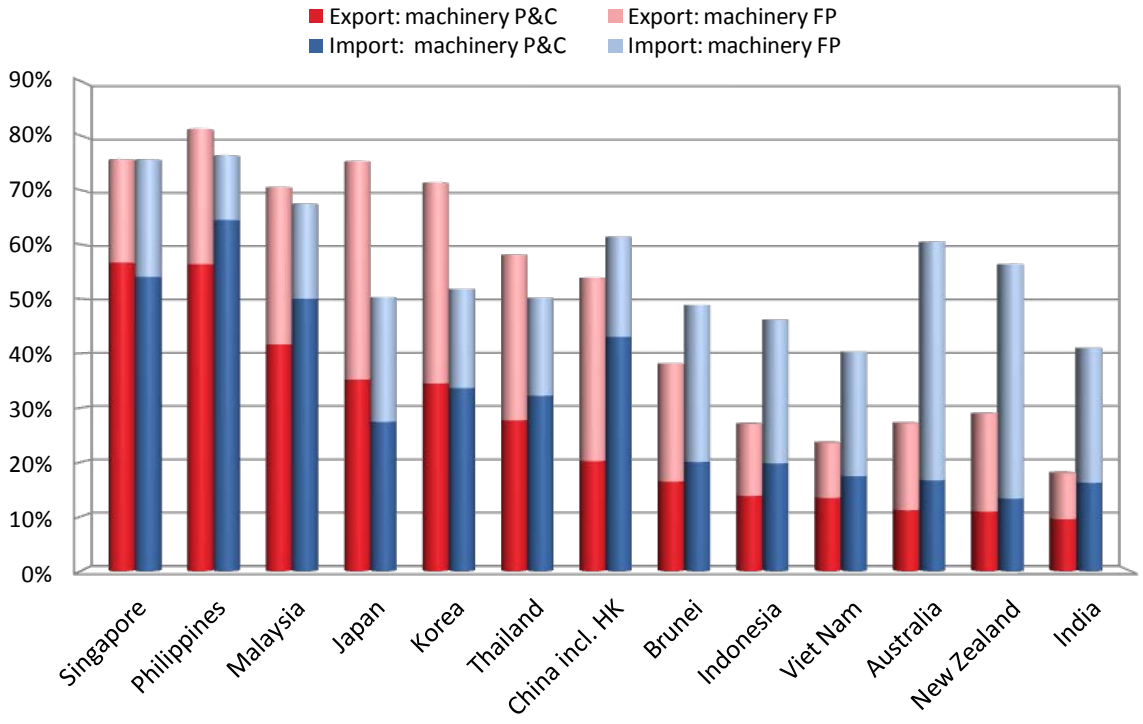
2-5. Diversified degree of participation in production networks

2-5-1. Skewed geographical distribution of production networks

East Asian production networks are now the most advanced and sophisticated in the world. However, we must note that not all countries and regions in East Asia are included in networks. Actually, only a small portion of East Asia participates in the quick high-frequency production networks in the machinery industries. There exist significant thresholds which countries or regions must surmount before they can enter

production networks. This is in fact the other side of the coin of durability and stability.

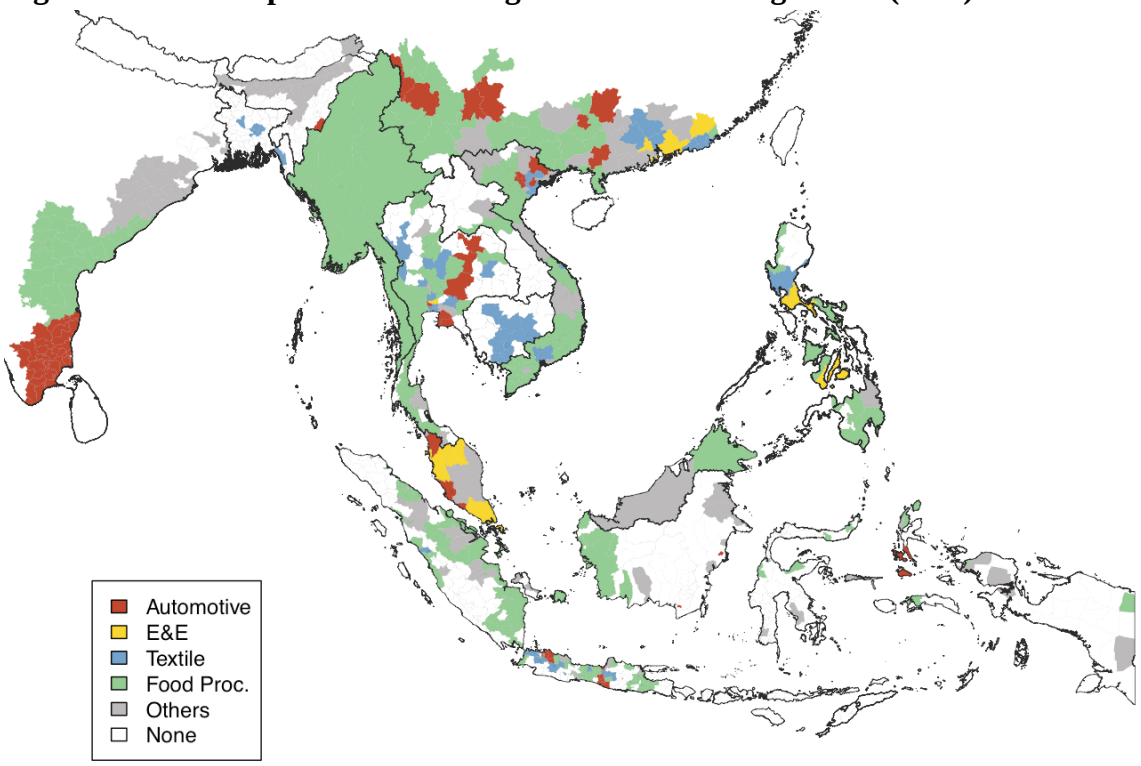
Figure 2-11. Shares of machineries in total exports/imports of manufactured goods to/from the world in 2007



Source: Kimura and Obashi (2010).

Figure 2-11 is another version of Figure 2-3, focusing only on East Asian countries. Proportions of machinery trade in total manufacturing trade, particularly on the export side, are widely different between countries. In Singapore, the Philippines, Malaysia, Japan, and Korea, over 70% of manufacturing exports are machineries. Thailand and China, including Hong Kong, are above 50% in the ratio of machinery exports in total manufacturing exports. The proportion of machinery parts and components exports is also rather high in these countries. However, other East Asian countries, especially Indonesia, Viet Nam, and India, have low export ratios of machineries, which vividly indicates that their participation in international production networks is not yet at full scale.

Figure 2-12. Comparative Advantage in Manufacturing Sector (2005)

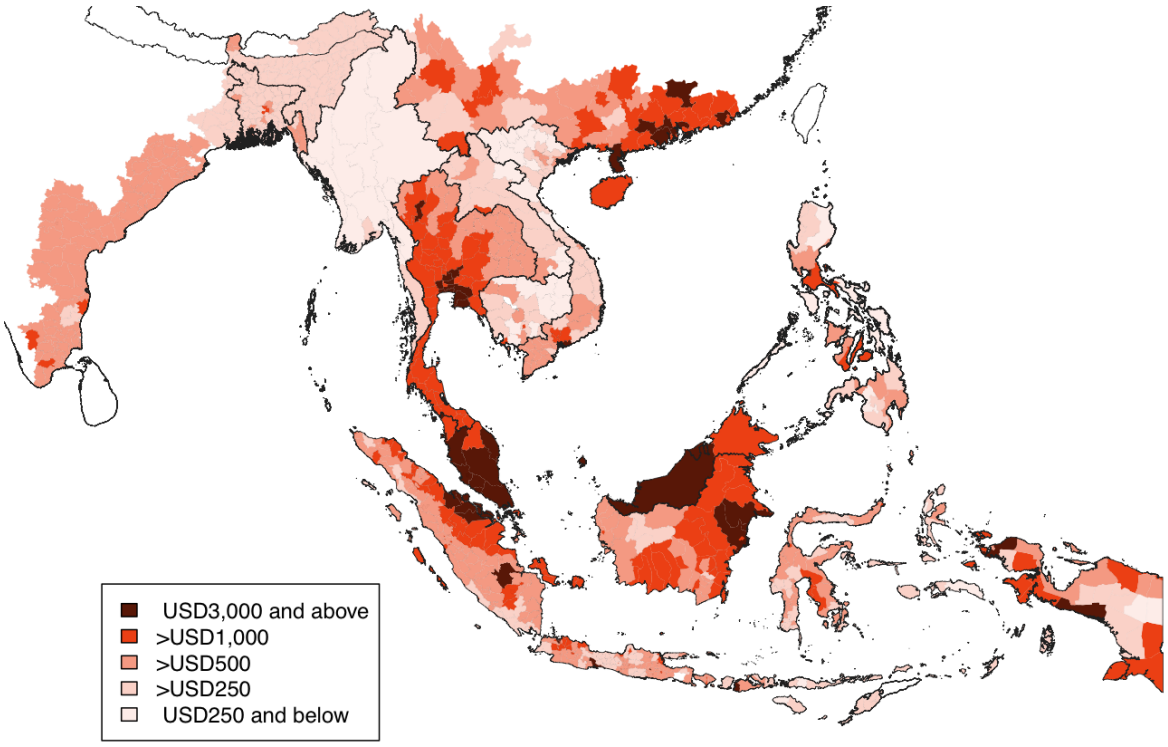


Source: Kumagai, *et al.* (2010).

Figure 2-12 shows the locations of manufacturing sub-sectors in ASEAN, and parts of some other East Asian countries. At provincial level, we first check whether manufacturing value added occupies 10% or more in its GDP. When the manufacturing share is 10% or more, we then identify the largest sub-sector among automotive, electrical and electronic, textiles and garment, food processing, and other manufacturing. The figure shows that only a small number of provinces participate in the quick and high-frequency type of production networks, in the automotive and electric/electronic machinery sectors. Outside such areas, some provinces have textiles and garment as well as food processing. Although these activities are sometimes connected with the world market, production networks are typically slow and low-frequency. Further from these provinces, little manufacturing activity is found.

Figure 2-13 presents the level of per capita GDP by province in these countries. Income levels differ widely, not only across countries but also across regions within each country. This means that differences in development stage are not fully utilized in extending production networks. The mechanics of fragmentation and agglomeration should be more aggressively explored in order to pursue both deeper economic integration and narrowing development gaps in these areas.

Figure 2-13. Nominal GDP per-capita (2005)



Source: Kumagai, *et al.* (2010).

2-5-2. Why are production networks skewed?

One of the important properties of international production networks is the existence of a substantial threshold in participation. In order to enter into production networks, countries or regions must meet a certain set of criteria. The reasons for the existence of such qualification criteria are threefold.

First, when MNEs design the geographical structure of production networks, both location advantages for production blocks and service link costs are thoroughly assessed. Not all countries/regions can pass this strict test.[11] Second, location advantages for production blocks, and service links to connect production blocks, are accompanied by a kind of dynamic economy of scale at an industry or macro level. Once a country or a region enters production networks, and the number of firms participating in them increases, various information and know-how on both firms and host countries starts accumulating, which accelerates further improvement of location advantages and service links. Third, there exist substantial costs for a firm to establish

[11] Hayakawa and Kimura (2009) conduct a gravity equation exercise on bilateral trade of machinery parts and components trade, in order to identify a list of qualifications for participating in international production networks. They find that low country risks and small bilateral exchange rate fluctuation are important elements for participating in the networks.

relation-specific transaction channels and construct production networks.

The latter two will work as a kind of sunk cost that generates the path-dependent nature of network participation. These can also be interpreted as the other side of the coin of the durability and resiliency of production networks.

2-5-3. How can we expand the frontier of production networks?

Large disparity in development stages and income levels suggests differences in location advantages, which can potentially be exploited in the fragmentation of production. On the other hand, there exists the path-dependent nature of network participation that generates a high threshold for participating in production networks. In order to accomplish one of our missions, namely "narrowing development gaps," we should examine how and to what extent we can expand the geographical coverage of production networks.

Because of the nature of dynamic economies of scale, some kind of "big push" may be needed in order to break out of an isolated situation. In addition, not all counties and regions may enter into production networks, particularly in cases of quick and high-frequency production networks in the machinery industries. A certain level of population size would be required for acquiring a critical mass of production blocks.

There are, however, a number of countries and regions in East Asia where good potential for participating in production networks exists. Some areas are fairly close to an industrial agglomeration, so that some dispersion effect may provide a chance to attract production blocks. Others are already working in slow and low-frequency production networks, such as in garment and footwear, and a marginal improvement of the investment climate may trigger full participation in production networks. Some cities are far behind in industrialization, but their population size suggests possibilities for entry into production networks. The CADP designates these countries/regions as "Tier 2". In order to find and remedy crucial bottlenecks to the initiation of industrialization, extended fragmentation theory and new economic geography will provide workable checklists for constructing development strategies.

There also exist countries and regions where their participation in quick and high-frequency production networks seems difficult in the short run. They are typically geographically isolated, are located far from existing industrial agglomerations, have small population size, and lack linkages with the world market. The CADP designates these areas as "Tier 3". These areas have often been regarded as inevitably retarded areas, and the only scenario for development has often been the modest promotion of the primary sector following the principles of static comparative advantage. However, if reliable middle to long distance logistics infrastructure were

constructed, and the areas were connected with urban centers and the world market, completely different scenarios for development could be designed. The extended fragmentation theory and new economic geography will work even in cases of slow and low-frequency production networks, .

2-6. Industrial agglomeration, technology transfers, and innovation

2-6-1. Unprecedented formation of industrial agglomerations

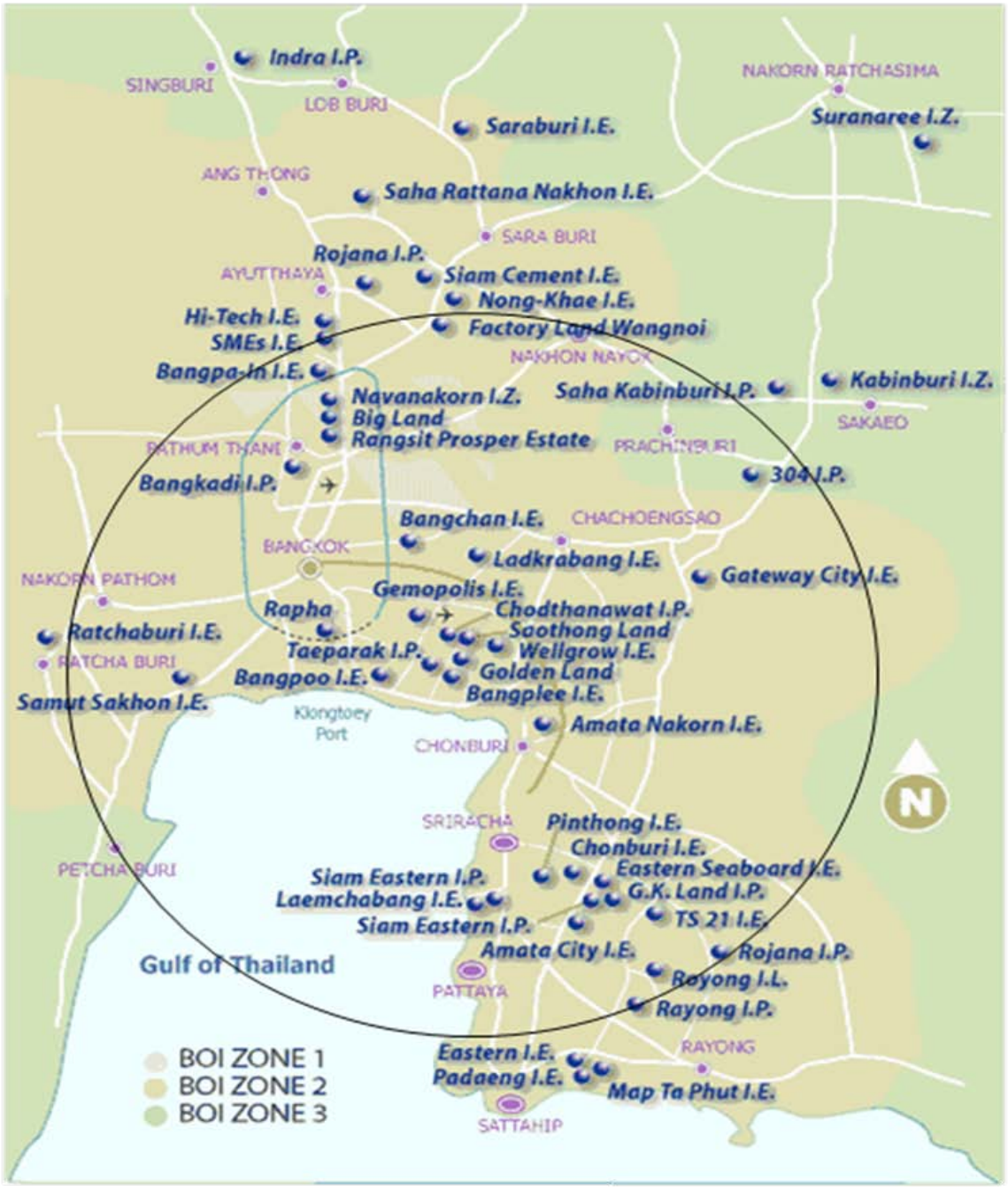
Developing East Asia is the only region where industrialization has reached the stage of forming industrial agglomerations in an open setting.

These industrial agglomerations differ from what we have observed in other parts of the developing world. They are not simply agglomerations of population. They are quite different from import-substituting industrial agglomerations with trade protection. Rather, they have evolved from unorganized clusters of production blocks to a tight arm's length division of labor in extensive trade liberalization and facilitation. The CADP calls these regions "Tier 1".

How far industrial agglomerations have reached depends on stages of development. In Singapore, Selangor, and the Bangkok Metropolitan Area, we observe the accumulation of a critical mass of production blocks with active arm's length fragmentation in just-in-time arrangements. Figure 2-14 is a map of the Bangkok Metropolitan Area indicating the location of major industrial estates. Within a 100km diameter zone, highway networks in suburban areas and the ample supply of electricity and other economic infrastructure are sufficient to cater for a critical mass of industrial activities. Firms can extend their just-in-time supply chains mostly within 2.5 hours and with multiple transactions per day. Industrial estates and factories are fairly dispersed in order to avoid excessive concentration of residential areas for labor, yet white collar workers are still able to commute from city centers. Massive logistics infrastructure supports efficient connections with other industrial agglomerations.

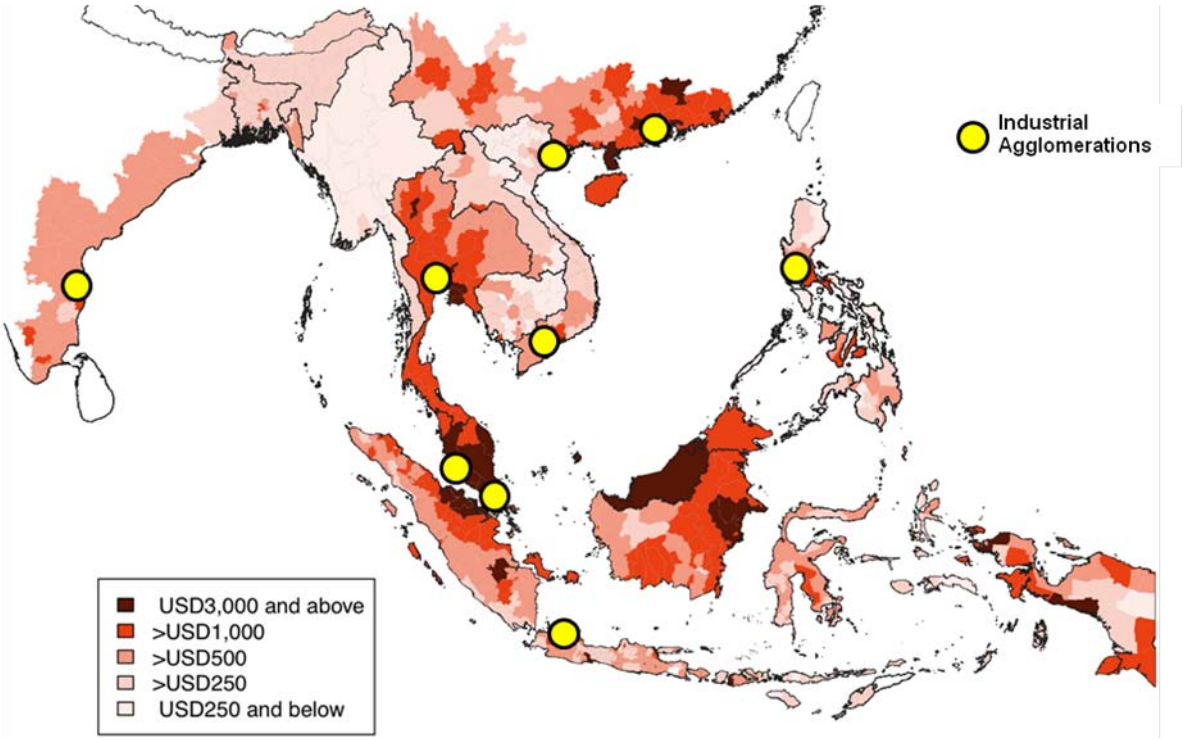
Some industrial agglomerations such as Manila and Jakarta have not yet reached the stage that Bangkok and others have achieved. A certain number of production blocks are already there, but dense arm's length fragmentation has not yet developed. Ho Chi Minh City and Hanoi are emerging but are still small in the accumulation of production blocks, while showing some obvious bottlenecks. In ASEAN and surrounding East Asia, a number of cities exist which have good potential for becoming significant industrial agglomerations (see Table 2-15).

Figure 2-14. Industrial Agglomeration in Bangkok



Note: The circle of 100 km has been added by the author.
Original Source: Board of Investment, Thailand
Source: Kimura (2009).

Figure 2-15. Industrial agglomerations (Tier 1) in East Asia



Source: ERIA/IDE-JETRO GSM Team

2-6-2. Perspectives for further economic development

The great challenge is how to step up from middle-income to fully developed economies

Development economics has long investigated development strategies on how to initiate industrialization, alleviate poverty, and reach a middle-income level. Whether the East Asian model that we are presenting is accepted or not will surely make certain differences in the direction of travel, but our discussions among development economists are already mature enough to share a large scope of common elements.

Development steps beyond middle-income level, however, are uncharted territory. Our casual observation suggests a number of difficulties that countries would face at the middle-income level. Losing competitiveness in labor-intensive industries forces them to restructure their industrial base, but it is not easy to find new industries. Although globalization obviously accelerates economic growth, industrialization tends to depend heavily on MNEs, and local firms and entrepreneurs are not well developed. Absolute poverty may not be a major issue anymore, but political and social conflict between relative winners and losers in globalization tends to become intense. Mismatch between supply of and demand for human capital often ends up with the serious frustration of middle-income people. Perspectives for an innovative society are not

easily drawn. A number of middle-income countries have stacked up with middle-income symptoms, have failed to sustain economic growth, and have suffered from political turmoil.

In the case of ASEAN and East Asia, robust sustained growth of productive sectors is fostering the development of a middle class, and social conflict between those who own resources and those who do not is relatively mild. Steady reduction in the proportion of population below the poverty line and the expansion of middle-income population are clear successes. MNEs in general are operating in a competitive setting, and their market power does not seem to dominate in most cases. However, the dependence on MNEs for industrialization is heavy, and local players may not feel ownership of their own economic growth.

To take advantage of the characteristics of East Asian economies, the availability of effective industrial links in industrial agglomerations is the key. One of the elements for making breakthroughs is the penetration of local firms into production networks, which provides them with opportunities for technology spillover or even technology transfer. The core of an innovative society should be based on its productive sectors. The development of human capital is definitely required in the middle and long run, and the supply of human capital should be consistent with the actual level of industrial development.