

International Production and Distribution Networks in East Asia: Eighteen Facts, Mechanics, and Policy Implications*

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International production/distribution networks in East Asia developed in the 1990s and after have distinctive features in their significance, extensiveness, and sophistication. This paper first lists “18 facts” on production/distribution networks in East Asia that have been identified by a number of studies using international trade data, microdata of Japanese multinational enterprises, and casual observations. It then presents a concept of two-dimensional fragmentation as a starting point of theoretically formalizing the phenomena of fragmentation and agglomeration. It finally discusses the policy environment in which the formation of production/distribution networks has been accelerated and policy implications of the existence of such networks for economic integration in East Asia.

Key words foreign direct investment, fragmentation, intra-industry trade, outsourcing, regional integration

1. Introduction

International production/distribution networks in East Asia¹ are distinctive at this point in the following three aspects: their significance for countries in the region, their extensiveness in covering a large number of countries in the region, and their sophistication in the combination of intrafirm and interfirm (i.e. arm’s-length) transactions (Ando & Kimura, 2005a). Although we observe similar cross-border production sharing in the US–Mexico nexus and in the Western Europe (WE)–Central/Eastern Europe (CEE) corridor, they have not yet reached the level of development that East Asia has accomplished. East Asia has realized rapid economic growth for decades, but we should not miss an important qualitative change in economic structure and policy environment in the late 1980s and the early 1990s. East Asia is not an “East Asia” stylized by the World Bank’s *East Asian Miracle* anymore (World Bank, 1993). Old industrial policy arguments totally lose their relevance in East Asia. Active foreign direct investment (FDI), development of cross-border production sharing or fragmentation, sophisticated disintegration of production activities, and the formation of industrial agglomeration, particularly in machinery industries, have been prime features of the East Asian economy since the 1990s.

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This paper first summarizes what we know about the nature and characteristics of international production/distribution networks in East Asia by listing “18 facts” established by a number of empirical studies and observations. Then, the analytical framework of two-dimensional fragmentation is presented, and the mechanics of fragmentation and agglomeration in East Asia are investigated. Finally, the policy environment in which the formation of production/distribution networks has been accelerated is examined, and the policy implications of the existence of such networks for both developing and developed countries are discussed.

2. Facts on Production/Distribution Networks in East Asia

We cannot see the world without theory. The lack of a proper analytical framework has obviously delayed our recognition of international production/distribution networks in East Asia. We, however, have accumulated a substantial amount of empirical observations and now seem to be ready to develop a new analytical model to provide a view of how to look at the mechanics of international production/distribution networks.

“Facts” are categorized into three types: facts that are established by international trade data, facts that are confirmed by microdata for multinational enterprises, and facts that are found by case studies and casual observations.

2.1 Facts drawn from international trade data

International trade data have predominant advantages in their international comparability and the complete coverage of traded goods in detailed commodity classification. However, they do not directly describe economic activities inside national borders. We do not detect who is trading with whom, either. International trade data do not present the whole structure of international production/distribution networks, but they provide a lot of useful information. The first three facts are related to the overall pattern of international trade in East Asia.

Fact 1: *The international trade pattern of East Asian countries has rapidly shifted from one-way trade to intra-industry trade since the beginning of the 1990s.*

Until the 1980s, the international trade pattern in East Asia was dominated by a typical north–south trade pattern; that is, less developed countries exported natural-resource-based products and labor-intensive manufacturing products, whereas developed countries such as Japan exported the whole range of capital-intensive and human-capital-intensive manufacturing products. The idea of the “flying geese” development pattern and pro-trade FDI well explained the transition of industry-wise comparative advantage in this period (see, for example, Kojima, 2000). In the 1990s, less developed countries in East Asia started exporting manufacturing products, particularly machinery. Industry-wise trade patterns have become more and more similar across countries, and intra-industry trade (IIT) has increasingly become important. Figure 1 presents changes in the trade compositions for Thailand and Malaysia as an illustration that shows the convergence of the commodity composition between exports and imports.

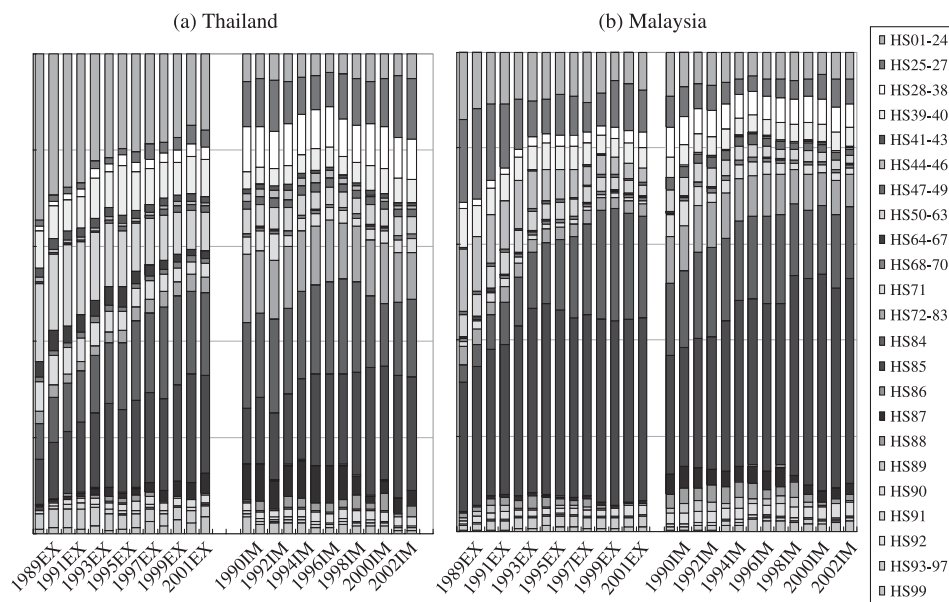


Figure 1 Commodity composition of exports and imports.

Source: Ando (2005).

Note: “EX” and “IM” stand for exports and imports.

Fact 2: *Most of the intra-industry trade of the East Asian countries is “vertical” rather than “horizontal.”*

The decomposition of IIT into “vertical” and “horizontal” based on unit prices of exports and imports at the detailed trade commodity classification level reveals the fact that most of the IIT of East Asian countries is vertical and the proportion of horizontal IIT is minimal (Fukao *et al.*, 2003; Ando, 2005). This observation presents a sharp contrast with the case of major European Union (EU) countries where horizontal IIT occupies a substantial portion of total trade (Fontagne & Freudenberg, 2002). Figure 2 presents the growth of exports and imports in machinery goods and machinery parts and components in 1990, 1996, and 2000, classified into one-way trade, horizontal IIT, and vertical IIT based on the six-digit Harmonized System (HS) trade data. Each commodity is classified into one-way trade when the export values and the import values differ by more than 10-fold, and IIT otherwise. IIT is further categorized as horizontal IIT when the unit export prices and the unit import prices differ by less than 25%, and vertical IIT otherwise.

Fact 3: *Vertical IIT of the East Asian countries does not necessarily follow the pattern suggested by vertical product differentiation models.*

Vertical IIT is often interpreted as the result of vertical product differentiation; that is, countries with high income export higher-quality, higher-priced products, whereas low-income countries export lower-quality, cheaper products. This “vertical product

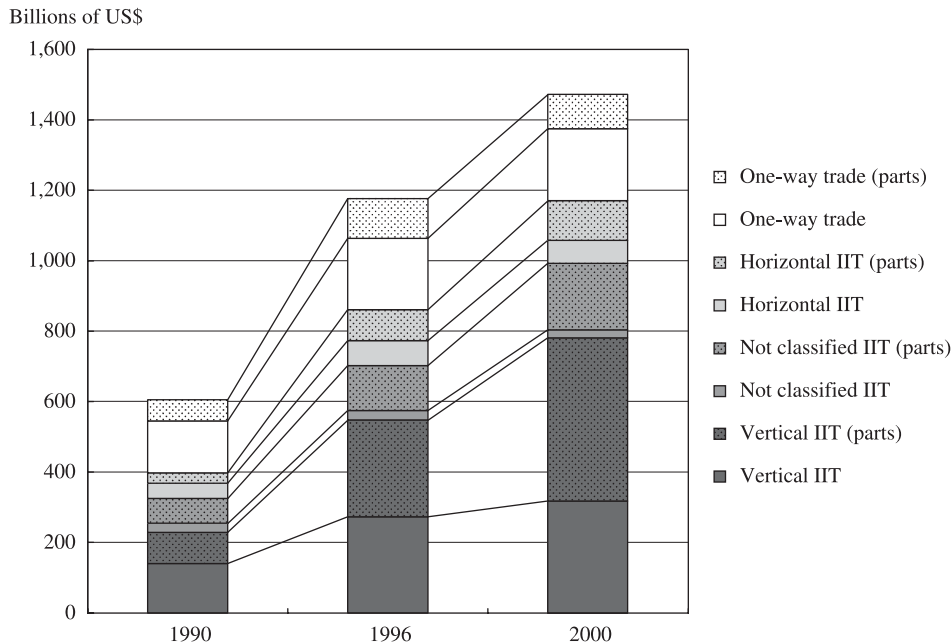


Figure 2 Rapid expansion of vertical IIT in machinery goods and machinery parts and components for East Asia's trade.

Source: Ando (2005).

differentiation model" does not explain the overall pattern of vertical IIT in East Asia. Income levels of exporting countries and unit prices of exported products vis-à-vis those of imported products do not necessarily present positive associations (Ando, 2005).

The next three facts are particularly related to the machinery sector including general machinery, electric machinery, transport equipment, and precision machinery. The formation of international production and distribution networks has not been limited to the machinery sector. Textiles and garment are another representative industry that develops extensive networks, and other industries including services sectors also are getting involved directly or indirectly in the operation of networks. However, the machinery industry is by far the most important player, both quantitatively and qualitatively, and extends the most sophisticated networks in East Asia and other regions.

Fact 4: *Shares of machinery and machinery parts and components in both total exports and total imports have become notably larger in East Asian countries.*

Figure 3 presents the shares of machinery products and machinery parts and components in the total exports and imports of the major countries in the world in 2003.² Notable significance in the trade in machinery goods, particularly machinery parts and components, is observed in a number of East Asia countries. Because Figure 3 presents these countries' trade patterns without connecting them with domestic production data, it does not necessarily reflect the overall pattern of industrialization or the stage of development.

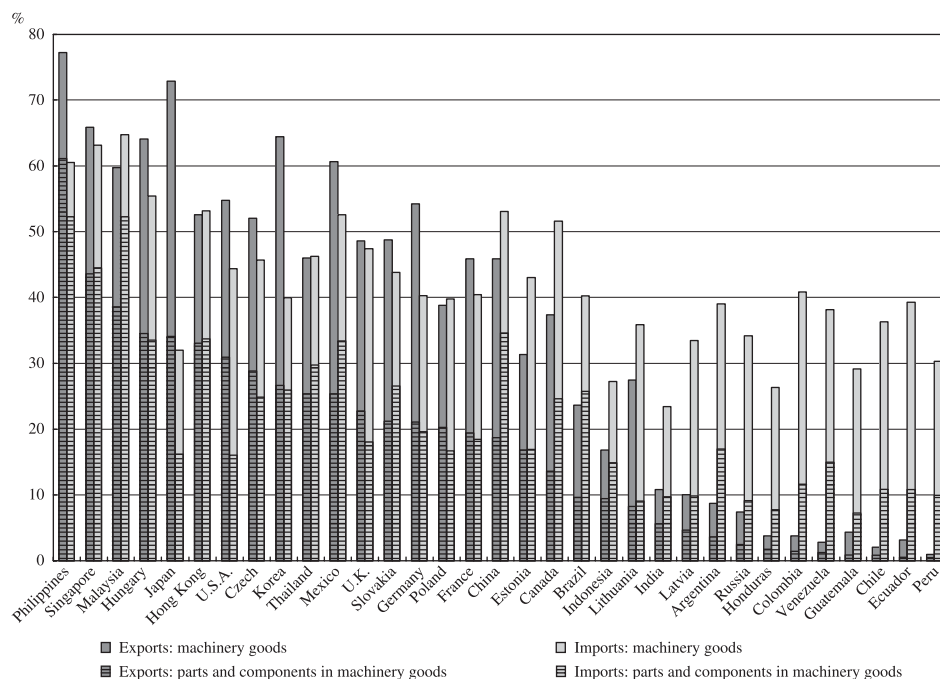


Figure 3 Machinery goods and machinery parts and components: shares in total exports and imports in 2003.

Source: Ando and Kimura (2005b).

However, it does at least reveal the importance of international production/distribution networks for these economies backed up by proper policy arrangements.

Fast 5: *Explosive increases in intra-East Asia trade, particularly in machinery parts and components, have been observed since the 1990s.*

The share of intra-East Asia exports of machinery parts and components out of total machinery parts and components exports went up from 39.6% in 1990 to 57.5% in 2003, while the share of intra-East Asia exports of all commodities changed from 38.5% in 1990 to 44.7% in 2003. In the period 1990–2003, intra-East Asia exports of machinery parts and components grew by 452%, which occupied a half of intraregional export growth (Ando & Kimura, 2005b).³ The strong “magnification effect” of trade volumes suggested by Yi (2003), because of the possible double or triple counting of parts and components trade, is observed in East Asia.

Fact 6: *Active back-and-forth transactions of machinery parts and components are observed among countries with different income levels.*

International production/distribution networks in East Asia cover a number of countries at different development stages and income levels. This presents a distinctive contrast with horizontal IIT among core EU countries that are largely at similar development stages and income levels. Diversity in East Asia is also much larger than the US–Mexico nexus

Table 1 Results of gravity equation estimation for machinery parts and components trade

	The whole sample		Intra-East Asia only		Intra-Europe only	
	1995	2003	1995	2003	1995	2003
Distance	-1.64** (0.11)	-1.36** (0.10)	-0.70** (0.15)	-0.64** (0.17)	-1.15** (0.10)	-1.27** (0.10)
Exporter_GDP	2.03** (0.05)	1.86** (0.05)	0.68** (0.09)	0.69** (0.09)	1.07** (0.05)	1.07** (0.05)
Importer_GDP	1.18** (0.05)	1.19** (0.05)	0.18 (0.10)	0.42** (0.11)	0.89** (0.05)	0.92** (0.06)
Exporter_per capita GDP	0.87** (0.06)	0.72** (0.05)	0.56** (0.07)	0.10 (0.08)	0.44** (0.07)	-0.22* (0.10)
Importer_per capita GDP	0.59** (0.06)	0.37** (0.06)	0.57** (0.07)	0.24* (0.09)	-0.04 (0.09)	-0.27* (0.10)
Intra-East Asia Dummy	3.04** (0.29)	3.11** (0.29)				
Intra-Europe Dummy	-1.42** (0.25)	-1.05** (0.24)				
Language	2.00** (0.21)	1.58** (0.19)	1.16** (0.29)	1.63** (0.25)	-0.36 (0.20)	-0.36 (0.20)
Constant	-67.44** (1.91)	-62.35** (1.75)	-6.86 (3.99)	-6.73 (3.75)	-28.94** (2.13)	-19.54** (2.47)
Observations	3,080	3,080	72	72	306	306
Adjusted R ²	0.635	0.637	0.743	0.553	0.802	0.720

Notes: The dependent variable is trade values of machinery parts and components.

Heteroskedasticity-consistent standard errors (White) are in parentheses.

** and * denote significance at the 1% and 5% levels, respectively.

Source: Kimura et al. (2005).

or the WE-CEE corridor. We also observe that even transactions among less developed countries are active in East Asia, whereas those among CEE countries are minimal at least at this point (Ando & Kimura, 2005c).

The next two facts report major results in a gravity equation exercise with bilateral trade data in machinery goods and machinery parts and components.

Fact 7: *In the standard gravity equation for machinery parts and components trade, the intra-East Asia dummy has a significantly positive coefficient, whereas the intra-Europe dummy has a significantly negative coefficient.*

Columns 1 and 2 in Table 1 present the contrast between the intra-East Asia dummy and the intra-Europe dummy in machinery parts and components trade in the gravity equation estimation with the worldwide bilateral trade data in 1995 and 2003. It

means that after controlling for distance (Distance), economic size (Exporter_GDP and Importer_GDP), income level (Exporter_per capita GDP and Importer_per capita GDP), and others, East Asia has more trade in machinery parts and components than the world “average,” while Europe has less (Kimura *et al.*, 2005). Differences in the coefficients between the intra-East Asia and intra-Europe dummies are actually notably larger in the case of machinery parts and components trade than total machinery trade, total manufactures trade, or total trade. Japan and China are of course important players in the networks, but even without Japan and China, the networks are extraordinary; for example, the Association of South-East Asian Nations (ASEAN) Free Trade Area (AFTA) dummy for intra-AFTA trade has a strongly significant positive coefficient. This indicates that trade in machinery parts and components in East Asia is something distinctive.

Fact 8: *In the gravity equation for machinery parts and components trade estimated using separate samples for intra-East Asia trade and intra-Europe trade, the absolute magnitude of the coefficient for distance for intra-East Asia trade is much smaller than that for intra-Europe trade.*

Contrasting columns 3 and 4 in Table 1 with columns 5 and 6, we observe that machinery parts and components trade in East Asia is not as sensitive to the geographic distance between exporting and importing countries. Distance of course has a negative effect on trade even in East Asia, but to a lesser degree than in Europe. It may mean that service link cost to overcome distance would be low and/or differences in location advantages would be so large that distance does not matter much (Kimura *et al.*, 2005).

2.2 Facts drawn from microdata for multinational enterprises (MNEs)

Because transactions in international production/distribution networks are often relationship-specific, we would like to know about individual firms’ activities and their relationships with other firms in order to investigate the mechanics of the networks. However, it is extremely difficult to capture firm-wise information in formal statistics. A partial remedy is to examine the microdata for the foreign affiliates of Japanese firms. Empirical studies using the *Kikatsu Chosa* data and the *Kaiji Chosa* data reveal the following three facts:⁴

Fact 9: *FDI in East Asia by Japanese firms has concentrated on manufacturing. In addition, small and medium enterprises have also been major FDI players in East Asia.*

Compared with Japanese FDI in North America and Europe, FDI in East Asia presents a distinctive concentration in manufacturing activities, in particular, in machinery manufacturing activities. This contrasts with the fact that FDI among developed countries is, in general, dominated by FDI in services. Another notable fact is that a lot of Japanese small and medium enterprises invest in East Asia, and work as key players in international production networks and agglomeration (Kimura & Ando, 2005a).

Fact 10: *Affiliates of Japanese firms in East Asia have actively traded with countries in East Asia other than Japan.*

Manufacturing affiliates of Japanese firms in East Asia actively trade with other East Asian countries. The proportion of their sales to East Asian countries (other than the host

country and Japan) and the proportion of their purchases from East Asian countries both amount to 19% in 2001. These figures are much larger than those for the manufacturing affiliates of Japanese firms in Mexico or CEE (Ando & Kimura, 2005b,c).

Fact 11: *Intrafirm transactions are relatively large in sales to and purchases from Japan, while interfirm (arm's-length) transactions are relatively large in local sales and purchases.*

For the manufacturing affiliates of Japanese firms in East Asia in 2001, intrafirm transactions are 77% (66%) of sales to (purchases from) Japan, 44% (43%) of sales to (purchases from) other East Asian countries, and 11% (10%) of sales to (purchases from) local markets. The shorter the distance of the transactions, the more actively they conduct arm's-length transactions (Ando & Kimura, 2005b).

How far we can generalize the results from the data of Japanese firms is a topic for future research. However, the US Bureau of Economic Analysis data suggest that East Asian affiliates of US firms also behave in a consistent manner with Facts 9, 10, and 11 (Kimura & Ando, 2005b).

2.3 Facts drawn from case studies and casual observations

Official statistics unfortunately do not reveal the whole picture of international production/distribution networks. The following lists notable facts derived from case studies and casual observations. The generalization requires a lot of care, but the importance of these facts seems to be evident. The next three facts are related to location advantages.

Fact 12: *A low wage level is still an important motivation for MNEs to invest in developing East Asia, but many other elements of location advantages seem to be increasingly important in direct investment decisions.*

A series of studies on the investment climate by the World Bank (<http://rru.worldbank.org/InvestmentClimate/>), the Organisation for Economic Cooperation and Development initiative on the policy framework for investment (OECD, 2006), questionnaire surveys by Japan External Trade Organization (<http://www.jetro.go.jp>), Japan Bank for International Cooperation (<http://www.jbic.go.jp/english/research/report/review/index.php>), Japan Business Council for Trade and Investment Facilitation (<http://www.jmcti.org/mondai/top.html>), and others strongly suggest that MNEs consider a number of elements of location advantages when they make investment decisions.

Fact 13: *An explosive proliferation of industrial estates or industrial parks has been observed in East Asia, run by central/local governments or private developers including general trading companies, where substantial investment facilitation and basic infrastructure services are provided.*

Investment facilitation has substantially advanced as industrial park services have developed. Competition over inviting investment among industrial estates has become extremely harsh, which has further improved their services. Intimate services of park offices, stable procurement of energy and infrastructure services, facilitation of customs

clearance and logistics, rental factory/floor, and others are major features that competitive industrial estates have pursued.

Fact 14: *Agglomeration or industrial clusters have begun to be formulated in East Asia. Agglomeration has typically started with the accumulation of manufacturing plants of MNEs and has then developed as a mixture of MNEs and local firms.*

Partially supported by the host country's development strategies and infrastructure development, substantial agglomeration or industrial clusters have started to be developed in East Asia; examples include the Shanghai–Jiangsu corridor and Guangzhou and its vicinity in China, Samut Prakan and the Eastern Seaboard in Thailand, and Penang and Shah Alam in Malaysia. In well-developed agglomeration, not only factories run by MNEs but also a substantial number of local firms gather together.

The next two facts relate to service link costs.

Fact 15: *“Service link costs” for connecting remotely located production blocks seem to have fallen or at least stabilized over time with the explosive quantitative expansion in transactions in East Asia.*

An increasingly large volume of cargo is now transported in forty-foot containers. Explosive increases in air cargo have been observed in the transportation of electronic parts and components. Trade facilitation including customs clearance has improved astoundingly in terms of the incurred costs as well as required time. An explosive development of the logistic industry run by both MNEs and local firms has been observed.

Fact 16: *Notable dissemination of ideas related to efficient production/distribution networks has recently been observed in East Asia such as the just-in-time (JIT) production system, supply chain management (SCM) or value chain management (VCM), lead time, vendor managed inventory (VMI), electronic data interchange (EDI), and milk run.*

Inspired by the Toyota production system and Dell Computer SCM, studying and introducing JIT and SCM are booming among firms in East Asia. Firm managers are now acutely conscious of time costs, slim inventories, and efficient management of the whole value chain.

The last two facts are related to the disintegration or outsourcing of activities and the development of local firms.

Fact 17: *The disintegration or detachment of activities beyond firm boundaries has increasingly been observed in East Asia. Various forms of outsourcing have been developed, which include original equipment manufacturing or original design manufacturing, electronics manufacturing system firms, and Internet auctions.*

Considerations of the nature of activities, the capability and credibility of business partners, and the legal and economic environment affect the decision to outsource. Geographic distance also matters a lot for interfirm (arm's-length) transactions. Designing the whole network while considering the “modulation versus total integration” choice becomes a prime interest for firms managing vertical production chains.

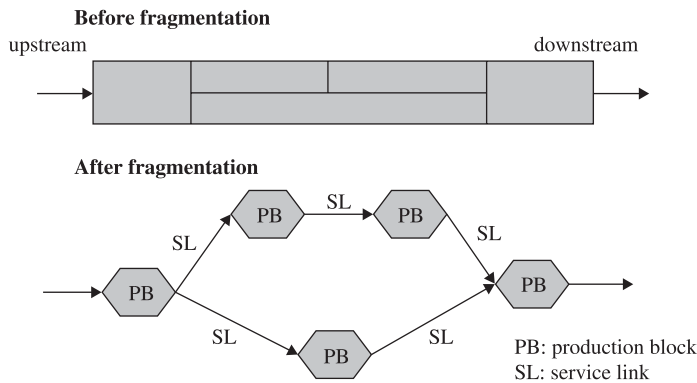


Figure 4 Fragmentation and service link costs.

Fact 18: *Particularly in China, Malaysia, and Thailand, a notable penetration of local firms into production networks has recently been observed.*

Particularly for product lines with fierce price competition, local vendors have started penetrating into production networks initially constructed by MNEs. Semiconductor-related supporting services in Penang and ink-jet printer manufacturing in Thailand are examples.

3. Mechanics of Two-Dimensional Fragmentation and Agglomeration

The trade and investment pattern of East Asia after the 1990s obviously requires a new analytical framework. The traditional international trade theories based on industry-wise comparative advantage do not seem to capture the essence of international production/distribution networks in East Asia. In addition, the horizontal product differentiation model and agglomeration theory, which have primarily been developed in the context of core EU, cannot directly be applied to East Asia. The starting point to investigate the mechanics of international production/distribution networks must be fragmentation theory.

Fragmentation theory started from the seminal work of Jones and Kierzkowski (1990), and now both theoretical and empirical studies using the concept of fragmentation have been produced.⁵ Traditional international trade theory primarily explains location patterns across industries. However, in the currently observed production/distribution networks, location patterns are extensively determined at the production process level. Suppose that a large factory producing electronic products initially exists in a developed country and covers a long value chain from upstream to downstream (see Figure 4). A closer look at the detailed nature of the production processes might suggest that some operations require intensive watching by technicians while others may simply be unskilled-labor-intensive. Fragmentation, that is, locating fragmented production blocks in different locations, becomes cost-saving when the production cost per se drastically falls

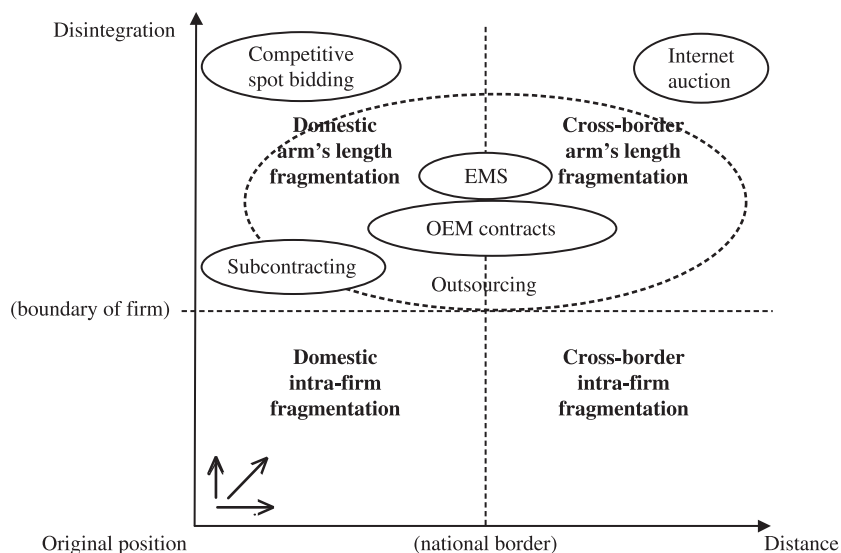


Figure 5 Fragmentation in a two-dimensional space.

Source: Kimura and Ando (2005a).

and the cost of service links for connecting production blocks is low enough. This is the original idea of fragmentation.

To analyze the behavior of corporate firms in the East Asian economy, we need some modification of the analytical framework. In contrast with the current fragmentation form in the US–Mexico nexus and the WE–CEE corridor, international production/distribution networks in East Asia include sophisticated combinations of intrafirm and arm’s-length transactions. Kimura and Ando (2005a) claim that the concept of fragmentation must be expanded to two dimensions (see Figure 5). In Figure 5, the horizontal axis denotes geographic distance. From the original position, a production block can be detached and placed in geographic distance. The dotted line in the middle is a national border, which distinguishes cross-border fragmentation from domestic fragmentation. On the other hand, the vertical axis represents the organization (integration and disintegration) of corporate activities. Fragmented production may be conducted by either intrafirm establishments or unrelated firms. The dotted line is the boundary of the firm, distinguishing arm’s-length (interfirm) fragmentation from intrafirm fragmentation.⁶

A firm’s decision on whether to fragment or not again depends on cost savings in production per se in production blocks and the size of service link costs. Both are now two-dimensional. Cost savings in production per se come from differences in location advantages along the horizontal axis and “de-internalization” advantages or counterpart’s ownership advantages along the vertical axis. Service link costs are costs due to the geographic distance along the horizontal axis and due to weaker controllability or “transaction costs” in Oliver Williamson’s sense, and are measured along the vertical axis. These are the trade-offs that each firm faces in the fragmentation decision.

In East Asia, geographic fragmentation and agglomeration go hand in hand. In contrast with market-oriented agglomeration in Europe, agglomeration in East Asia is often motivated by production-side logic. The forces of fragmentation and agglomeration are countervailing at the firm level. However, at the industry/aggregate level, fragmentation and agglomeration may go together.

The concentration of fragmented production blocks occurs through the following two channels. First, local minimal points of service link costs tend to attract a large number of fragmented production blocks. Moreover, service links are often accompanied by strong economies of scale. Therefore, when a country successfully reduces two kinds of service link costs by proper policies, fragmented production blocks may rush in, and then service link costs would be pushed down further.

Second, the concentration of production blocks might be enhanced because of the close relationship between the service link costs along the disintegration axis and geographic proximity. Service link costs in arm's-length fragmentation are extremely sensitive to geographic distance. The closer the distance to one's business partners, the smaller the service link cost in searching for potential business partners, consulting detailed specs of products, controlling product quality and delivery timing, solving disputes over contracts, and monitoring business partners. The concentration of production blocks would reduce the service link costs, and the lower service link costs would further attract production blocks; the arrows of causality would go in both directions.

This is a concise explanation of two-dimensional fragmentation framework. This, of course, primarily deals with an individual firm's decisions on fragmentation and is not directly applicable to a discussion at the industry or aggregate level. We need more theoretical sophistication in order to analyze the overall economic effects of international production/distribution networks.

4. Policy Environment for International Production/Distribution Networks

4.1 Policy background for network development

Why has East Asia steadily established international production/distribution networks, while other developing areas such as Latin America except Mexico have enjoyed minimal success? Why are production/distribution networks in East Asia more sophisticated than the US–Mexico nexus or the WE–CEE corridor at this point? The development of international production/distribution networks has actually been backed up by a great transformation of the development strategies in the East Asian countries.⁷

From the 1970s, ASEAN forerunners applied the so-called dual track approach, trying to foster both import-substituting and export-oriented industries at the same time. One crucial departure from the development strategies applied by Japan and Korea in the 1950s and 1960s was active utilization of incoming FDI, which obviously accelerated their industrialization despite the lack of technological capability and entrepreneurship. However, until the mid-1980s, the attitude toward foreign companies was rather cautious, and governments tried to place them under tight control. In the case of import-substituting FDI, the forms of entry and after-entry activities of foreign companies were strictly regulated,

and various types of performance requirements were imposed in exchange for trade protection and investment incentives. Even in cases of export-oriented FDI, activities were often geographically segregated in export-processing zones, and competition as well as interactions with local firms was deliberately avoided. Such development strategies are still more or less applied by less developed countries in other parts of the world.

The policy transformation began in the ASEAN forerunners and China in the later half of the 1980s or the early 1990s, and they started applying the “accept everybody” policy for incoming FDI, while leaving some sectors as exceptions. The initial intention was not perhaps a well-organized policy designed for the formation of international production/distribution networks. Rather, policy-makers of ASEAN forerunners simply admitted the active role of MNEs in their development and began to listen to small requests raised by MNEs in order to host as much FDI as possible. Such policy changes were accelerated in response to the emergence of China as a great FDI attractor after Deng Xiaoping’s visit to the Southern regions of China in 1992.

While keeping import-substituting strategies for some industries such as automobiles, domestic electric appliances, iron and steel, and petrochemicals, countries were stepping into an aggressive utilization of globalizing forces. To host export-oriented or network-forming industries, governments must enhance location advantages by using not only tariff-related trade policies, but also various measures through multiple policy channels. Foreign companies will invest only when the country provides the best (or just next to the best in the case of risk hedging purposes) locational advantages in the world. This means that the rules of the game have become completely different from the old ones. Competition over hosting FDI has become fierce among the East Asian countries, among local governments, and among industrial estates.

The two-dimensional fragmentation theory draws a list of policy measures required for the development of the international production/distribution networks (Table 2). Most of these policies were not explicitly emphasized in traditional development strategies, but policy-makers in East Asian countries instinctively realized their importance in their efforts to host FDI. The first task that policy-makers confront is to attract fragmented production blocks. In addition to the traditional emphasis on location advantages for production, reductions in service link costs to overcome geographic distance become crucially important. Then, the second task is to form a seed of agglomeration by hosting as many MNEs as possible. Once agglomeration generates opportunities for vertical links through arm’s-length transactions, the benefits of agglomeration become one of the location advantages and stabilize the industrial structure. The third task is to foster indigenous firms and make them penetrate into the production/distribution networks initially formed by MNEs. Fragmentation generates new channels for introducing capital and technology. Once local firms successfully grow, the link with international production/distribution networks is further strengthened.

The start-up of AFTA in 1993 was one of the epoch-making moves by ASEAN member countries. AFTA convincingly asserted a collective political will for improving the investment climate so as to attract FDI. Although actual tariff reduction/removal did not start immediately, the AFTA tariff reduction scheme presented a plan to get out of

Table 2 Two-dimensional fragmentation and required policy measures

	Service link cost to connect production blocks	Production cost per se in production blocks
Fragmentation along the distance axis	Reduction in costs for overcoming geographic distance Related policies: transport and telecommunication infrastructure development, fostering efficient distribution sector, trade facilitation, reduction in coordination cost, and so on.	Enhancing location advantages Related policies: realizing economic environment so as to effectively utilize strengths in wage levels and access to resources, reduction in costs for infrastructure services such as electricity and other energy and industrial estate services, capacity enhancement for technological transfers, and so on.
Fragmentation along the disintegration axis	Reduction in costs due to losing control or “transaction cost” Related policies: reduction in searching potential business partners, reduction in costs for monitoring business partners, enhancing fairness and stability of contracts, strengthening dispute settlements mechanism, building strong legal system and economic institutions, and so on.	Promoting the utilization of “dis”internalization advantages Related policies: keeping various sorts of potential business partners by inviting foreign companies as well as fostering local firms, strengthening supporting industries, establishing flexible legal system that allows various forms of contracts, overcoming incomplete information problems, and so on.

import-substituting industrialization strategies and worked as a roadmap for MNEs to reorganize their location choices and value chains. There has been a popular sarcastic view of AFTA pointing out its weak implementation scheme and loose legal status; however, the AFTA tariff reduction scheme has started working effectively in the past 1 or 2 years. Although the scheme moves forward pretty slowly, AFTA now perhaps ends up with one of the cleanest and most effective regional trade arrangements in the world in the sense that the liberalization scheme covers almost all commodities, the rules of origin are simple and unrestrictive, and a large portion of intraregional trade is already under free trade.

4.2 Policy agenda for developing East Asia

By trial and error, East Asian countries have gradually established new development strategies. However, the industrialization process in ASEAN member countries and China

has not been completed yet. There are two issues that policy-makers must pursue, for which international commercial policy plays an important role.

The first is to clean up inefficient import-substituting industries. Import-substitution-type industrial promotion policy requires a complicated combination of trade protection, regulation, and incentives, and we have experienced numerous failures. How to clean up such policy distortions and to make import-substituting industries competitive is one of the most important policy issues for the ASEAN forerunners and China. Such restructuring is also important to solve the policy contradictions in promoting international networking. Tariff removal in the scheme of regional integration is a powerful policy tool for accelerating the restructuring processes with international commitments. Local supporting industries attached to import-substituting industries are not necessarily hopeless, so a proper soft-landing scenario can perhaps be documented for some sectors in East Asia.

In the liberalizing process of AFTA as well as the conclusion of an ASEAN–China FTA and bilateral economic partnership agreements with Japan, the reorganization of import-substituting industries has already begun. Tariff removal in domestic electric appliances is inducing a reorganization of production sites beyond national borders. Trade liberalization in automobiles has experienced some delays, but an efficiency-enhancing concentration of assembly lines will surely be realized. Because the production technology in the automobile industry is of the total integration type, agglomeration forces seem to be strong now. But, at the same time, some sorts of automobile parts and components will further utilize reduced service line costs.

The second policy issue is to further activate international production/distribution networks. Because of the trade liberalization of semiconductor-related parts and components in the 1990s as well as the extensive use of the duty drawback system, network-forming firms barely pay tariffs anymore. But international transactions are still far from friction-free; national border effects as well as the transaction costs in Oliver Williamson's sense are still substantially high. East Asian trade effectively utilizes the logic of fragmentation, but there is a lot of room for reducing service link costs and reducing production costs. In particular, the strength of the East Asian economy is to serve sophisticated markets with flexible small-lot/wide-variety supplies. Therefore, lowering service link costs and speeding up feedbacks between upstream and downstream are fundamental issues.

Economic integration in East Asia thus requires a proper design. In addition to tariff removal, FTAs should include (i) trade and FDI facilitation; (ii) institutional building for investment rules, intellectual property rights, and others; (iii) trouble-shooting mechanisms between private and governments; and (iv) links with other policies such as economic/technical cooperation, international finance, energy and environment.

5. Possible Uneven Developments in the Region

Forces of fragmentation and agglomeration may result in uneven developments across countries and regions, and generate winners and losers. Compared with the world of

traditional comparative advantage, geographic concentrations of economic activities and income disparities are more likely to occur in the globalization era. Following the fragmentation theory, there are several potential reasons why. First, capital, human capital, and technology are mostly internationally mobile with FDI, so that the old comfortable story of traditional comparative advantage will not work; a concentration of FDI on some specific countries/regions is possible. Second, service links are often accompanied by economies of scale so that fragmented production blocks may concentrate in a limited number of places. Third, once agglomeration is formed, spatial economies of scale may work so that more economic activities are attracted. When restructuring of import-substituting industries proceeds and market forces become dominant, proper government policies become even more important than before for both the forerunners and latecomers.

However, the growth of agglomeration eventually generates congestion effects in the form of wage hikes, labor/human resource shortages, and congestion in transport services. Agglomeration yields both positive and negative spatial economies of scale, and some of the economic activities might move away from agglomeration. It means that neighboring countries/regions that have lagged behind would have a chance to enjoy trickle-down effects from agglomeration. To take advantage of such benefits, however, countries/regions must be attractive enough in service links and production conditions.

We should not underestimate the risk of globalizing forces. At the same time, traditional import substitution strategies cannot be the choice anymore unless the country has a huge domestic market. Then, a set of conditions that utilize globalization waves must be met. Countries such as Indonesia, Vietnam, and other ASEAN latecomers are now at a crucial point for policy reform. Particularly in the case of latecomers, effective usage of economic and technical cooperation by developed countries is necessary in order to catch the globalizing waves.

6. Issues for Developed Countries

Developed countries such as Japan face a policy dilemma when the forces of fragmentation and agglomeration dominate. Strong firms take advantage of globalizing forces and extend their activities beyond national borders. To keep and enhance the competitiveness of these firms, a favorable environment for international production/distribution networks must be realized in, for example, East Asia. On the other hand, as cross-border fragmentation is accelerated, more and more economic activities go abroad, and the domestic economy will be “hollowed-out.”

In the USA and EU, it is often emphasized that cross-border outsourcing would reduce domestic employment and, consequently, weaken the basis of domestic industrial structure. However, we must note that fragmentation is conducted based on firms’ decisions so as to enhance their competitiveness and thus is also likely to push up overall efficiency and productivity. Losing the benefits from economies of scale and positive agglomeration effects would hurt developed countries, but at the same time, a more efficient resource allocation, static and dynamic, would be realized. Globalization of corporate activities and

a national goal of enhancing national income are not necessarily contradictory. Rather, we should design policy frameworks so as to attain the two targets at the same time.

In Japan, there is no strong objection so far to globalizing corporate activities because Japanese realize that international production/distribution networks are one of the major sources of competitiveness of Japanese firms. In considering the stage of development in China and ASEAN forerunners where local firms and entrepreneurs have started penetrating into production networks, positive thinking in Japan is certainly a fortunate thing. However, together with supporting the overseas activities of Japanese firms and trying to improve the investment climate in East Asia, the Japanese government should seriously re-evaluate the strengths and weaknesses of Japan and set up a comprehensive policy package to improve its own investment climate as a competing industrial location. It is too optimistic to expect that some economic activities such as upstream research and development, pilot plants, and headquarters function will be automatically located in Japan. In the context of fragmentation, the governments, both central and local, must strategically reduce service link costs and enhance location advantages so as to keep at least some economic activities inside Japan.

7. Concluding Remarks

This paper provides an overall picture of the international production/distribution networks in East Asia, presents a conceptual framework to explain the mechanics of the forms of fragmentation decisions, and discusses their policy implications from various angles. Although our understanding of the mechanics of networks has substantially improved, we still need to formalize our theoretical thought as well as accumulate further empirical evidence. Policy is crucially important in utilizing beneficial globalizing forces. The required set of policies is completely different from the traditional thought explained in development economics textbooks. In this regard, positive analysis and normative analysis must have a closer link in future research.

Notes

- 1 In this paper, "East Asia" primarily means ASEAN-10 Plus Three (Japan, South Korea, and China), including Chinese Taipei.
- 2 A definition of machinery parts and components in the HS 6-digit classification is available in Ando and Kimura (2005a).
- 3 In Ando and Kimura's (2005b) dataset, "East Asia" includes China, ASEAN-4 (Malaysia, Thailand, the Philippines, and Indonesia), NIEs-3 (South Korea, Hong Kong, and Singapore), and Japan. Trade statistics clearly reveal that India, Australia, and New Zealand have not been included in the East Asian production networks to date.
- 4 The Japanese Ministry of Economy, Trade, and Industry (METI) annually conducts the *Kikatsu Chosa* (Basic Survey of Business Structure and Activity) and the *Kaiji Chosa* (Survey of Overseas Business Activities of Japanese Companies). Details of the datasets are contained in Ando and Kimura (2005a).
- 5 For the fragmentation theory, see Arndt and Kierzkowski (2001), Cheng and Kierzkowski (2001), and Deardorff (2001).

- 6 Disintegration and accompanying transaction costs have been long analyzed in the industrial organization literature of vertical integration. We have recently observed a renewed interest in this issue in the international trade literature. See, for example, Grossman and Helpman (2002, 2003, 2004, 2005) and Grossman *et al.* (2004, 2005).
- 7 Kimura (2004) provides detailed discussion of the transformation of development strategies in South-East Asian countries.

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