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International Production and Distribution Networks in East Asia:
18Facts, Mechanics, and Policy Implication

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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, micro data 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 lastly discusses policy environment in which the formation of production/distribution networks has been accelerated and policy implication of the existence of such networks for economic integration in East Asia.

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Abstract

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, micro data 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 lastly discusses policy environment in which the formation of production/distribution networks has been accelerated and policy implication 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 time 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 intra-firm and arm's-length (i.e., inter-firm) 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 been the region that 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 argument of industrial policy totally loses its 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.

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. Lastly, policy environment in which the formation of production/distribution networks has been accelerated is examined, and policy implication of the existence of such networks for both developing and developed countries is discussed.

2. Facts on production/distribution networks in East Asia

We cannot see the world without theory. The lack of proper analytical framework has obviously delayed our recognition of international production/distribution networks in East Asia. We however have accumulated 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: the facts that are established by international trade data, the facts that are confirmed by micro data of multinational enterprises, and the facts that are found by case studies and casual observations. We will list these facts in the following.

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. Instead, 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 provide a lot of useful information.

The first three facts are related to the overall pattern of international trade in East Asia.

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

Until the 1980s, international trade pattern in East Asia was dominated by a typical North-South trade pattern; i.e., less developed countries (LDCs) exported natural-resource-based products and labor-intensive manufacturing products while developed countries (DCs) such as Japan exported the whole range of capital-intensive and human-capital-intensive manufacturing products. The idea of “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, LDCs in East Asia started exporting manufacturing products, particularly machineries. Industry-wise trade pattern has become more and more similar across countries, and intra-industry trade has increasingly been important. Figure 1 presents changes in trade composition in Thailand and Malaysia as an illustration that shows a convergence of commodity composition between exports and imports.

== Figure 1 ==

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

The decomposition exercise of intra-industry trade (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 EU countries where horizontal IIT occupies a substantial portion in total trade (Fontagne and 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 6-digit HS trade data. Each commodity is classified into one-way trade when the export values and the import values differ by more than 10 times, 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.

== Figure 2 ==

Fact 3: *Vertical intra-industry trade 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; i.e., countries with high income export higher-quality, higher-priced products while low income countries export lower-quality, cheaper products. This “vertical product 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 on 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 machinery sector. Textiles and garment are another representative industry that develops extensive networks, and other industries including services sectors also get involved directly or indirectly in the operation of networks. However, 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 & components in both total exports and imports have become notably large in East Asian countries.*

Figure 3 presents shares of machinery products and machinery parts & components in total exports and imports in major countries in the world in 2003.² Notable significance in trade in machinery goods, particularly machinery parts & components, is observed in a number of East Asia countries. Because the figure 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. However, it does at least reveal the importance of international production/distribution networks for these economies backed up by proper policy arrangement.

== Figure 3 ==

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

The share of intra-East-Asia exports of machinery parts & components out of total machinery parts & 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 of 1990-2003, intra-East-Asia exports of machinery parts & components grew by 452%, which occupied a half of intra-regional export growth (Ando & Kimura 2005b).³ Strong "magnification effect" on trade volume suggested by Yi (2003), due to possible double or triple counting of parts & components trade, is observed in East Asia.

Fact 6: *Active back-and-forth transactions of machinery parts & 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 or the WE-CEE corridor. We also observe that even transactions among LDCS are active in East Asia while those among CEE countries are minimal at least at this point in time (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 & components.

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

The columns (1) and (2) in Table 1 present the contrast between the intra-East-Asia dummy and the intra-Europe dummy in machinery parts & components trade in the gravity equation estimation with the world-wide 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 machinery parts & components trade more than the world “average” while Europe has it 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 & 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, networks are extraordinary; for example, the AFTA dummy for intra ASEAN Free Trade Area (AFTA) trade has a strongly significant positive coefficient. These indicate that trade in machinery parts & components in East Asia is something distinctive.

== Table 1 ==

Fact 8: *In the gravity equation estimation for machinery parts & components trade with separate samples of 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) with columns (5) and (6), we observe that machinery parts & components trade in East Asia does not care geographical 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).

Facts drawn from microdata of MNEs

Because transactions in international production/distribution networks are often relation-specific, we would like to know individual firms' activities and 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 micro data of foreign affiliates of Japanese firms. Empirical studies with 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 (SMEs) have also been major players of FDI in East Asia.*

Compared with Japanese FDI in North America and Europe, FDI in East Asia presents distinctive concentration on manufacturing activities, in particular on machinery manufacturing activities. This contrasts from the fact that FDI among developed countries is in general dominated by FDI in services. Another notable fact is that a lot of Japanese SMEs invest in East Asia, which 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 manufacturing affiliates of Japanese firms in Mexico or CEE (Ando & Kimura 2005b, 2005c).

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

As for manufacturing affiliates of Japanese firms in East Asia in 2001, intra-firm transaction ratios are 77%/66% in sales to / purchases from Japan, 44%/43% in sales to / purchases from other East Asian countries, and 11%/10% in sales to / purchases from local markets. The shorter the distance of 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 future research topic. However, the US Bureau of Economic Analysis (BEA) data suggests that East Asian affiliates of US firms also behave in a consistent manner with Facts 9, 10, and 11 (Kimura & Ando 2005b).

Facts drawn from case studies and casual observations

Official statistics do not unfortunately 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 following three are related to location advantages:

Fact 12: *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 investment climate by the World Bank (<http://rru.worldbank.org/InvestmentClimate/>), the OECD initiative on the policy framework for investment (OECD 2006), questionnaire surveys by Japan External Trade Organization (JETRO) (<http://www.jetro.go.jp>), Japan Bank for International Cooperation (JBIC) (<http://www.jbic.go.jp/english/research/report/review/index.php>), Japan Business Council for Trade and Investment Facilitation (JBCTIF) (<http://www.jmcti.org/mondai/top.html>) and others strongly suggest that MNEs use a list of a number of elements of location advantages when they make investment decisions.

Fact 13: *We have observed explosive proliferation of industrial estates or industrial parks 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 has 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; the Shanghai-Jiangsu corridor and Guangzhou and its vicinity

in China, Samut Prakan and the Eastern Seaboard in Thailand, Penang and Shah Alam in Malaysia, and others are the examples. In well-developed agglomeration, not only factories run by MNEs but also a substantial number of local firms gather together.

The next two facts are on service link cost.

Fact 15: *“Service link cost” for connecting remotely located production blocks seems to be lowered or at least stable over time with explosive quantitative expansion in transactions in East Asia.*

Increasingly large volume of cargos has been transported in 40-foot containers. Explosive increases in air cargo have been observed in the transportation of electronic parts and components. Trade facilitation including customs clearance has astoundingly improved in terms of incurred cost as well as required time. Explosive development of logistic industry run by both MNEs and local firms has been observed.

Fact 16: *We have recently observed notable dissemination of ideas related to efficient production/distribution networks such as 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), milk run, and others in East Asia.*

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

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

Fact 17: *Disintegration or detachment of activities beyond the boundary of firm has increasingly been observed in East Asia. Various forms of outsourcing have been developed, which include original equipment manufacturing (OEM) or original design manufacturing (ODM), electronics manufacturing system (EMS) firms, internet auction, and others.*

Consideration on the nature of activities, the capability and credibility of business partners, and legal/economic environment affects the decision of outsourcing. Geographical distance also matters a lot for arm's-length (inter-firm) transactions. Designing of the whole network with considering "modulation versus total integration" choice becomes a prime interest for firms managing vertical production chains.

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

Particularly for product lines under harsh price competition, local vendors start penetrating into production networks initially constructed by MNEs. Semiconductor-related supporting services in Penang and ink-jet printer manufacturing in Thailand are the 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. The horizontal product differentiation model and the agglomeration theory, which have primarily been developed in the context of core EU, cannot directly be applied to East Asia, either. The starting point to investigate the mechanics of international production/distribution networks must be the fragmentation theory.

The fragmentation theory started from a seminal work by Jones and Kierzkowski (1990), and both theoretical and empirical studies using the concept of fragmentation have been accumulated.⁵ The 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 production processes may suggest that some operations require intensive watching by

technicians while other may simply be unskilled-labor-intensive. Fragmentation, i.e., locating fragmented production blocks in different locations, becomes cost-saving when the production cost *per se* drastically reduces and the cost of service links for connecting production blocks is low enough. This is the original idea of fragmentation.

== Figure 4 ==

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 combination of intra-firm and arm's-length transactions. Kimura and Ando (2005a) claim that the concept of fragmentation must be expended to two dimensions (see Figure 5). The horizontal axis denotes geographical distance. From the original position, a production block can be detached and placed in geographical distance. A 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. A fragmented production may be conducted by either intra-firm establishments or unrelated firms. The dotted line is a boundary of firm, distinguishing arm's-length (inter-firm) fragmentation from intra-firm fragmentation.⁶

== Figure 5 ==

A firm's decision on whether to fragment or not again depends on cost saving in production *per se* in production blocks and the height of service link cost. Both are now two-dimensional. Cost saving in production *per se* comes from differences in location advantages along the horizontal axis and "de-internalization" advantages or counterpart's ownership advantages along the vertical axis. Service link cost is a cost due to geographical distance along the horizontal axis and due to weaker controllability or "transaction cost" in Oliver Williamson's sense along the vertical axis. These are the tradeoffs that each firm faces in the fragmentation decision.

In East Asia, geographical fragmentation and agglomeration go hand in hand.

In contrast with market-oriented agglomeration in Europe, agglomeration in East Asia is often motivated by the 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 cost tend to attract a large number of fragmented production blocks. Moreover, service link is often accompanied with strong economies of scale. Therefore, when a country successfully reduces two kinds of service link cost by proper policies, fragmented production blocks may rush in, and then service link cost would be pushed down further.

Second, the concentration of production blocks may be enhanced due to the close relationship between the service link cost along the disintegration axis and geographical proximity. The service link cost in arm's-length fragmentation is extremely sensitive to geographical distance. The closer the distance with business partners, the smaller the service link cost in searching 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 cost, and the low service link cost would further attract production blocks; the arrows of causality would go in both directions.

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

4. Policy environment for international production/distribution networks

Policy background for network development

Why have 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 in time?

The development of international production/distribution networks has actually been backed up by great transformation of development strategies in the East Asian countries.⁷

From the 1970s, ASEAN forerunners applied so-called dual track approach, trying to foster both import-substituting and export-oriented industries at the same time. One crucial departure from 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, attitude toward foreign companies was rather cautious, and the governments tried to place them under tight control. In cases of import-substituting FDI, the form of entry and after-entry activities of foreign companies were strictly regulated, and various types of performance requirements were imposed in exchange of 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 LDCs in other parts of the world.

The policy transformation began in ASEAN forerunners and China in the latter half of the 1980s or the early 1990s, and they started applying the “accept everybody” policy for incoming FDI, with leaving some sectors as exceptions. The initial intention was not perhaps a well-organized policy designing for the formation of international production/distribution networks. Rather, policymakers 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 large 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 South 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 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 case of risk hedging purposes) location advantages in the world.

This means that the rule of the game became completely different from the old ones. Competition over hosting FDI has become harsh 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 international production/distribution networks as Table 2. Most of these policies were not explicitly emphasized in traditional development strategies, but policymakers in East Asian countries instinctively realized their importance in the effort of hosting FDI. The first task that policymakers confront is to attract fragmented production blocks. In addition to traditional emphasis on location advantages for production, reduction in service link cost to overcome geographical distance becomes crucially important. Then the second task is to form a seed of agglomeration by hosting MNEs as many as possible. Once agglomeration generates opportunities for vertical links through arm's-length transactions, 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 production/distribution networks initially formed by MNEs. Fragmentation generates new channels of introducing capital and technology. Once local firms successfully grow, the link with international production/distribution networks is further strengthened.

== Table 2 ==

The start-up of AFTA in 1993 was one of the epoch-making moves for ASEAN member countries. AFTA convincingly asserted a collective political will for improving investment climate so as to attract FDI. Although actual tariff reduction/removal did not immediately start, the AFTA tariff reduction scheme presented a plan to get out of import-substituting industrialization strategies and worked a roadmap for MNEs to reorganize location choices and value chains. There has been a popular sarcastic view on AFTA pointing out its weak implementation scheme and loose legal status, but quite contrarily, AFTA tariff reduction scheme started working effectively in the recent one or two 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 liberalization scheme covers almost all

commodities, the role of origin is simple and unrestrictive, and a large portion of intra-regional trade is already under free trade.

Policy agenda for developing East Asia

With trials and errors, the 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 policy issues that policymakers 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 complicated combination of trade protection, regulation, and incentives, and we 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 ASEAN forerunners and China. Such restructuring is also important to solve policy contradiction in promoting international networking. Tariff removal in the scheme of regional integration is a powerful policy tool for accelerating restructuring processes with international commitments. Local supporting industries attached to import-substituting industries are not necessarily hopeless so that 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 ASEAN-China FTA (ACFTA) and bilateral economic partnership agreements (EPAs) with Japan, reorganization of import-substituting industries has already begun. Tariff removal in domestic electric appliances is inducing reorganization of production sites beyond national borders. Trade liberalization in automobiles experiences some delays, but efficiency-enhancing concentration of assembly lines will surely be realized. Because production technology in automobile industry is rather the type of total integration, agglomeration forces seem to be strong now. But, at the same time, some sorts of automobile parts & components would further utilize reduced service line costs.

The second is to further activate international production/distribution networks. Due to trade liberalization for semi-conductor-related parts and components in the 1990s as well as the extensive use of 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 cost in Oliver Williamson's sense are still substantially high. The East Asian trade effectively utilizes the logic of fragmentation, but there is a lot of room for reducing service link cost and reducing production cost. In particular, the strength of East Asian economy is to serve for sophisticated markets with flexible small-lot/wide-variety supplies. Therefore, lowering service link cost and speeding up feedbacks between upstream and downstream are fundamental issues.

Economic integration in East Asia thus requires proper designs. In addition to tariff removal, FTAs would include (i) trade and FDI facilitation, (ii) institutional building for investment rule, intellectual property rights, and others, (iii) trouble-shooting mechanism between private and governments, and (iv) the link with other policies such as economic/technical cooperation policy, international finance policy, energy and environmental policy, and others.

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

On the other hand, the growth of agglomeration eventually generates congestion effects in the form of wage hikes, labor/human resource shortage, congestion in transport services, and others. Agglomeration yields both positive and negative spatial economies of scale, and some of the economic activities start thinking of moving

away from agglomeration. It means that lagged-behind neighboring countries/regions 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 understate the risk of globalizing forces. And, 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 so as to 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 cases of latecomers, effective usage of economic and technical cooperation by developed countries is one of the keys in order to catch globalizing waves.

Issues for developed countries

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

In the US 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 the overall efficiency and productivity. Losing benefits from economics of scale and positive agglomeration effects would hurt DCs, but at the same time, more efficient resource allocation, static and dynamic, would be realized. Globalization of corporate activities and national goal of enhancing national income are not necessarily contradictory. Rather, we should design policy frameworks so as to attain 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 overseas activities of Japanese firms and trying to improve investment climate in East Asia, the Japanese Government should seriously reevaluate strengths and weaknesses of Japan and set up a comprehensive policy package to improve its own investment climate as competing industrial location. It is too optimistic to expect that some economic activities such as upstream R&D, pilot plants, and headquarters function are automatically located in Japan. In the context of fragmentation, the governments, both central and local, must strategically reduce service link cost and enhance location advantages so as to keep at least some economic activities inside Japan.

5. Concluding remarks

This paper provides an overall picture of international production/distribution networks in East Asia, presents a conceptual framework to explain the mechanics of firms' fragmentation decisions, and discuss their policy implication from various angles. Although our understanding on the mechanics of networks has substantially improved these days, we still need to formalize our theoretical thought as well as accumulating empirical facts. We find that policy is crucially important in utilizing beneficial globalizing forces. Required set of policy 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.

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Endnotes

1. In this paper, “East Asia” primarily means ASEAN10 + 3 (Japan, Korea, and China), including Chinese Taipei.
2. For the definition of machinery parts & components in the HS 6-digit classification is available in Ando and Kimura (2005a).
3. In the data set of Ando and Kimura (2005b), “East Asia” includes China, ASEAN4, NIEs3, and Japan. Trade statistics clearly reveals that India, Australia, and New Zealand have not been included in East Asian production networks yet.
4. The Ministry of Economy, Trade, and Industry (METI), Government of Japan annually conducts the *Kikatsu Chosa* or *Basic Survey of Business Structure and Activity* and The *Kaiji Chosa* or *Survey of Overseas Business Activities of Japanese Companies*. For details of the data sets, see Ando and Kimura (2005a).
5. For the fragmentation theory, see Arndt and Kierzkowski (2001), Cheng and Kierzkowski (2001), and Deardorff (2001).
6. Disintegration and accompanied transaction cost have been long analyzed in the industrial organization literature of vertical integration. We have recently observed a renewed interest on this issue in the literature of international trade literature. See, for example, Grossman and Helpman (2002, 2003, 2004, 2005) and Grossman, et al. (2004, 2005).
7. As for the transformation of development strategies in the Southeast Asian countries, Kimura (2004) provides detailed discussion.

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

	The whole sample		Intra-East-Asia only		Intra-Europe only	
	1995	2003	1995	2003	1995	2003
	(1)	(2)	(3)	(4)	(5)	(6)
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
Adj. R-squared	0.635	0.637	0.743	0.553	0.802	0.720

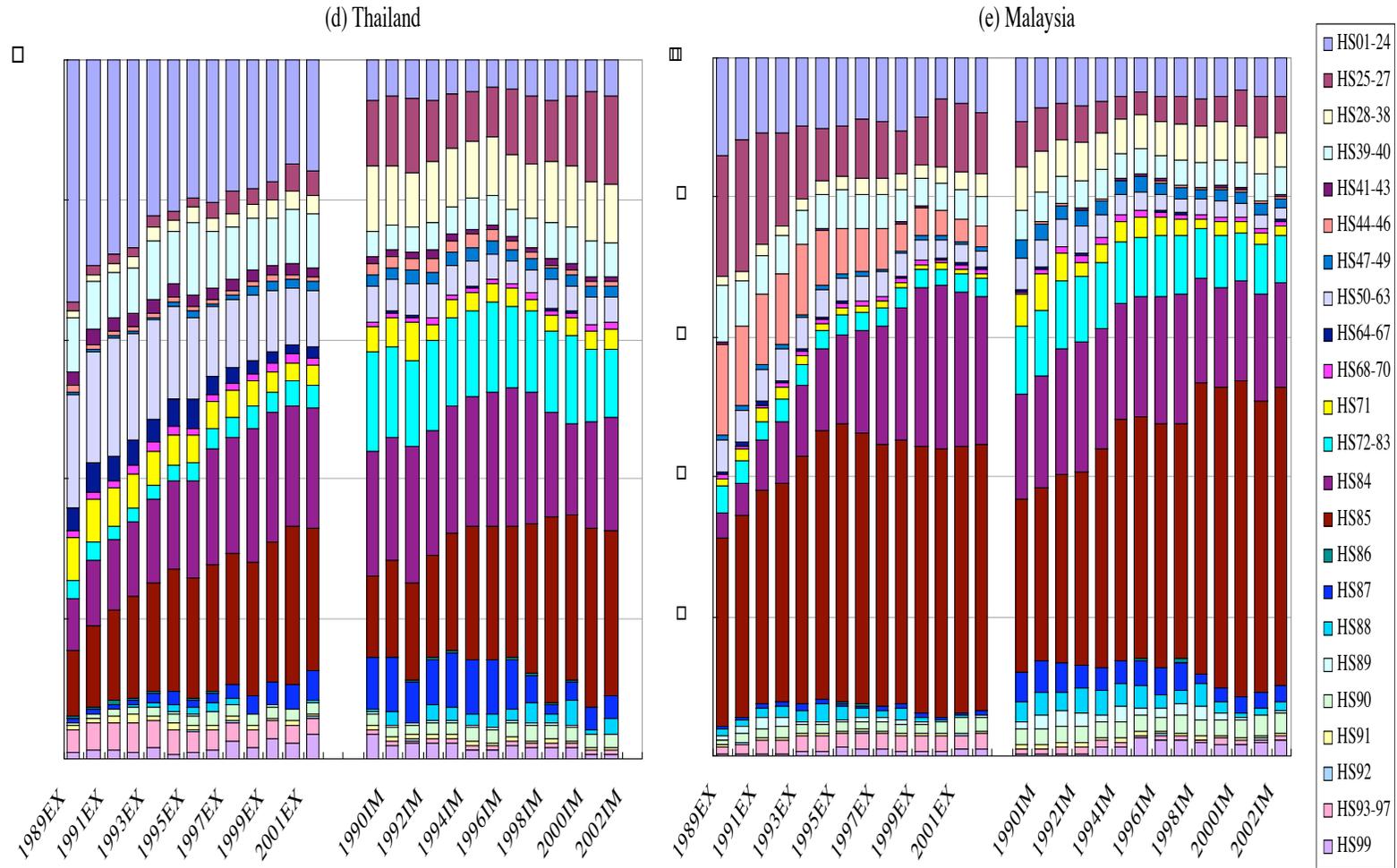
Notes: The dependent variable is trade values of machinery parts & components. Heteroskedasticity-consistent standard errors (White) are in parentheses. ** and * show 1% and 5% significance, respectively.

Source: Kimura, Takahashi, and Hayakawa (2005).

Table 2 Two-dimensional fragmentation and required policy measures

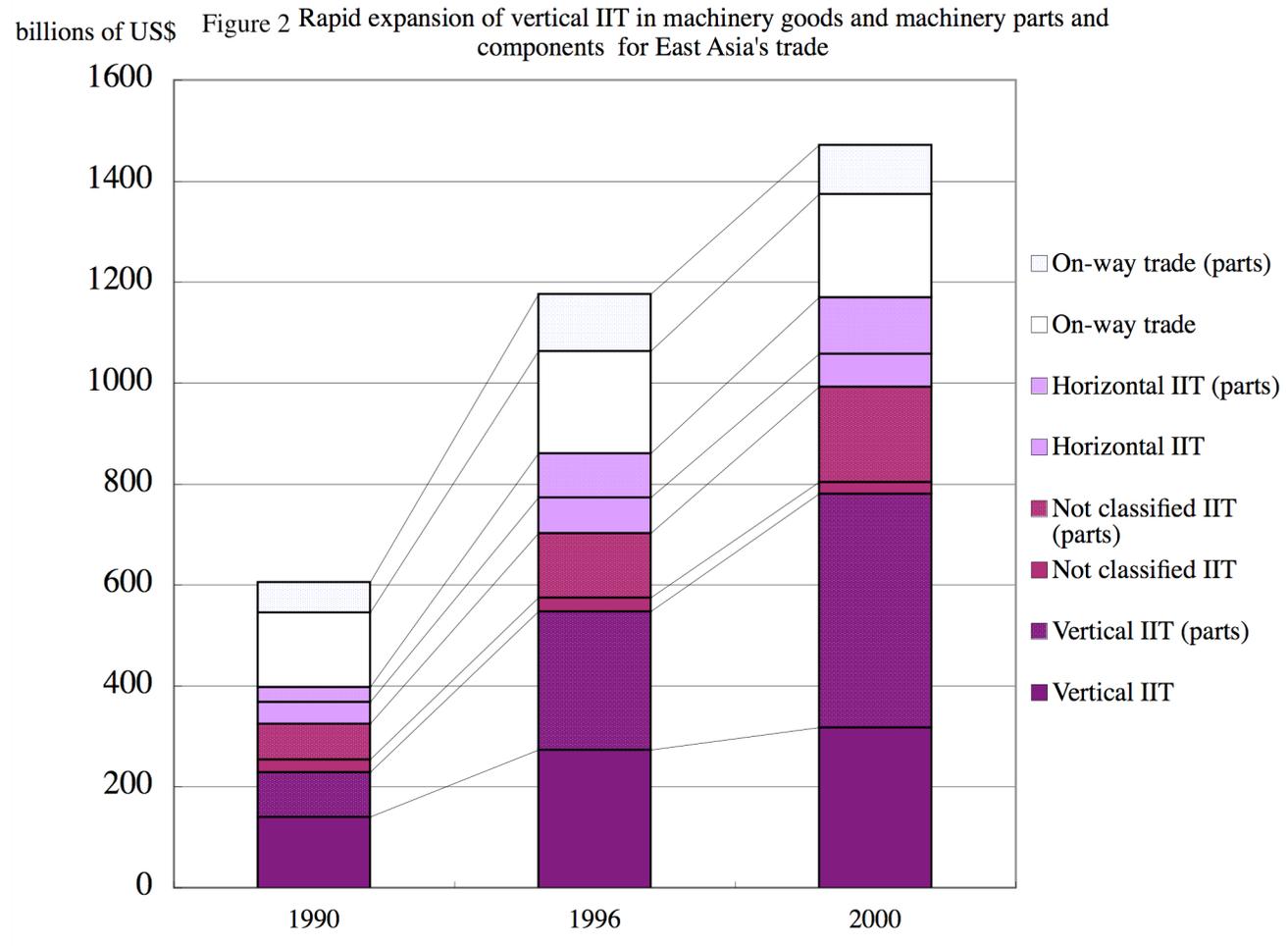
	Service link cost to connect production blocks	Production cost per se in production blocks
Fragmentation along the distance axis	Reduction in costs for overcoming geographical distance	Enhancing location advantages
	Related policies: transport and telecommunication infrastructure development, fostering efficient distribution sector, trade facilitation, reduction in coordination cost, and so on.	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"	Promoting the utilization of "dis"internalization advantages
	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.	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.

Figure 1 Commodity composition of exports and imports

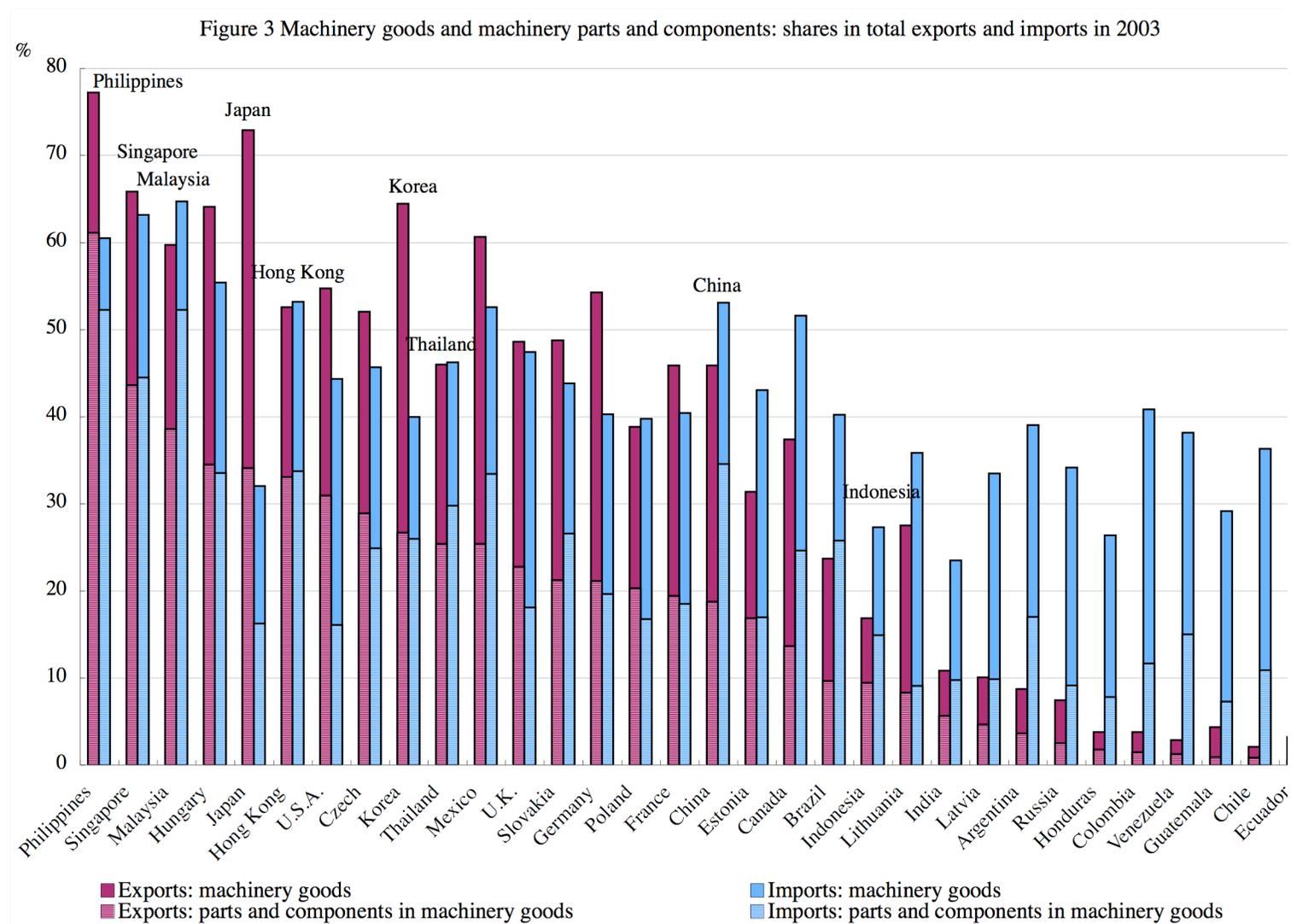


Source: Ando (2005).

Note: "EX" and "IM" stand for exports and imports.



Source: Ando (2005).



Source: Ando and Kimura (2005b).

Figure 4 Fragmentation and service link costs

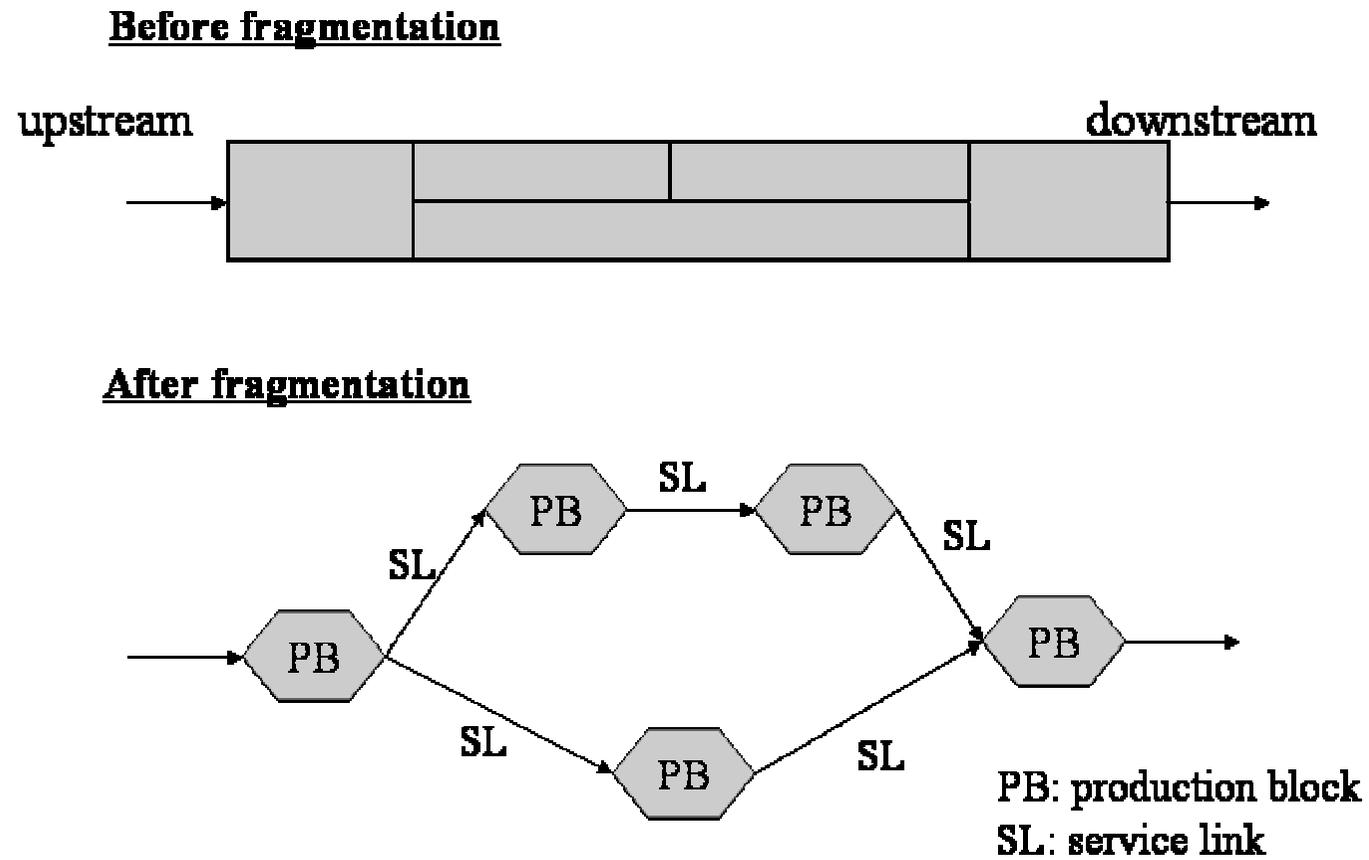
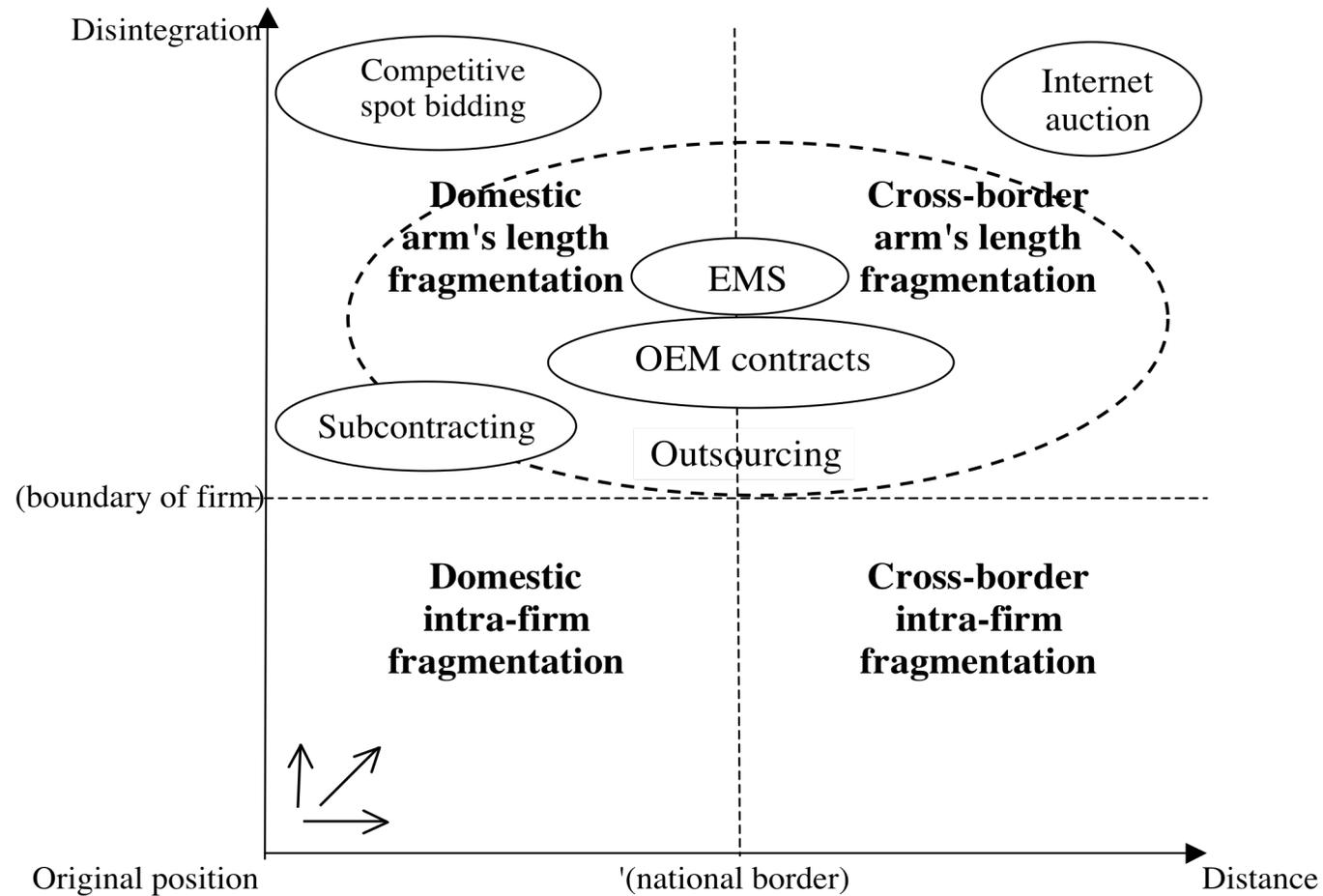


Figure 5 Fragmentation in a two-dimensional space



Source: Kimura and Ando (2005a).