

This PDF is a selection from a published volume from the
National Bureau of Economic Research

Volume Title: International Trade in East Asia, NBER-East
Asia Seminar on Economics, Volume 14

Volume Author/Editor: Takatoshi Ito and Andrew K. Rose,
editors

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-37896-9

Volume URL: http://www.nber.org/books/ito_05-1

Conference Date: September 5-7, 2003

Publication Date: August 2005

Title: The Formation of International Production and Distribution
Networks in East Asia

Author: Mitsuyo Ando, Fukunari Kimura

URL: <http://www.nber.org/chapters/c0194>

The Formation of International Production and Distribution Networks in East Asia

Mitsuyo Ando and Fukunari Kimura

6.1 Introduction

In our half-a-century experience in development studies, we learn that accomplishing long-sustained growth and continuous poverty reduction is not an easy task at all. In this regard, it is worth noting that the East Asian region has continued to serve as the world's growth center for decades. It is thus natural for researchers to investigate secrets of the East Asian performance and seek its relevance to less-developed countries (LDCs) in other parts of the world. In the study on the "East Asian Miracle" conducted in the early 1990s, the World Bank (1993) emphasized the existence of well-managed macroeconomic fundamentals and wisely designed microeconomic policies. On the top of it, the East Asian economies obtained another virtue in the last decade, that is, the formation of international production/distribution networks.

The international production/distribution networks consist of vertical production chains extended across the countries in the region as well as distribution networks throughout the world. The major players are corporate firms belonging to the machinery industries, including general machinery, electrical machinery, transport equipment, and precision machinery though some firms in other industries, such as textiles and garment, also develop the

Mitsuyo Ando is assistant professor of economics at Hitotsubashi University, and Fukunari Kimura is professor of economics at Keio University.

We thank all the conference participants for useful comments and great encouragement. The MITI (METI) database was prepared and analyzed in cooperation with the Applied Research Institute, Inc. and the Research and Statistics Department, the Minister's Secretariat, the Ministry of International Trade and Industry (currently the Ministry of Economy, Trade, and Industry), and the Government of Japan. The opinions expressed in this paper, though, are those of the authors.

networks. While the formation of similar production networks is observed between the United States and Mexico and between Germany and Hungary/Czech Republic, the networks in East Asia are distinctive at least at this moment in time in the following characteristics: first, they have already become a substantial component of each country's economy in the region. Each country's manufacturing activities and international trade cannot be discussed without the networks anymore. Second, the networks involve a large number of countries at different income levels. Cross-country differences in factor prices and other location advantages seem to be effectively utilized in the formation of vertical production chains. Third, the networks include both intrafirm and arm's-length relationships, partially across different firm nationalities. Multinational enterprises (MNEs) as well as indigenous firms in each country are forming sophisticated interfirm relationships.

The formation of international production and distribution networks in East Asia was initiated by drastic changes in development strategies of each country. In the mid-1980s and the early 1990s, the East Asian developing economies started applying new development strategies in which the benefit from hosting foreign direct investment (FDI) is aggressively explored. The new development strategies do emphasize the utilization of market forces, but they are not simple *laissez-faire* policies; rather, they pursue new roles of government involvement in the process of development. East Asia is presenting a model of new development strategies in the globalization era.

The development of international production and distribution networks in East Asia has also provided substantial impact on our academic thought on trade and FDI patterns. The traditional comparative advantage theory still has a certain explanatory power in the interpretation of across-industry location choices, based on international differences in technological level and factor prices. The enhanced importance of the trade in intermediate goods as well as the industrial clustering, however, has stimulated the development of new theoretical thoughts in international trade theory, particularly in the literature of fragmentation theory and agglomeration theory. In addition, the sophisticated pattern of intrafirm corporate structure and interfirm relationship developed in East Asia has inspired research to incorporate the analysis of corporate behavior into international trade theory beyond the traditional approach of trade and FDI.

The purpose of this paper is to prove the importance of international production and distribution networks in East Asia and confirm their distinctive characteristics. Although it is difficult to directly observe the detailed mechanics of the networks with comprehensive statistics, there exist various side-evidences as well as theoretical discussions reinforcing the argument. The next section briefly reviews drastic changes in policy framework, which is a necessary condition for the formational of international production and distribution networks, observed in the Southeast Asian

countries and China in the latter half of the 1980s and the early 1990s. Section 6.3 sketches the current status of theoretical thoughts explaining the mechanics of international production and distribution networks. Then, the paper turns to statistical analysis on the characteristics of the networks in East Asia. Section 6.4 presents overall trade patterns of major East Asian countries and argues the significance of trade in machinery goods, particularly machinery parts and components, on both the export and import sides. Section 6.5 utilizes the microdata of Japanese corporate firms and takes a closer look at the nature of networks in East Asia through the pattern of FDI. Section 6.6 quantifies the magnitude of economic activities of Japanese firms in different channels of transactions in terms of value added contents, based on the firm nationality approach proposed by Baldwin and Kimura (1998). Section 6.7 discusses policy implication of the networks, particularly in the context of formulating free trade agreements (FTAs), and the last section concludes the paper.

6.2 Drastic Changes in Development Strategies

Why has an extensive international production and distribution network been formulated in East Asia and not in other regions such as Latin America? One of the crucial factors is the set of policies implemented by the East Asian developing economies from the mid-1980s and the early 1990s.¹

Most of the East Asian economies have traditionally applied a dual-track approach, that is, an approach trying to foster both import-substituting industries and export-oriented industries at the same time. There was, however, an important difference between forerunners (i.e., Japan, Korea, and Taiwan) and latecomers (i.e., the Southeast Asian countries and China); the latter actively utilized incoming FDI not only in export-oriented industries but also in some major import-substituting industries, such as automobiles, domestic electric appliances, pharmaceuticals, food processing, and others.

While the latecomer countries have maintained the dual-track approach throughout their path of industrialization, they have changed the weights between import-substituting industries and export-oriented industries over time. From the 1970s to the mid-1980s, these countries introduced selective FDI primarily in import-substituting industries. At that time, potentially competing domestic industries were insulated by policies that limit the activities of foreign companies only in geographically segregated places such as export-processing zones though FDI for export promotion was indeed invited. From the mid-1980s in Malaysia and Thailand and

1. Kimura (2003) discusses new development strategies applied by the East Asian economies more in detail. Pangestu (2003) provides the summarized information on evolution in industrial policies in East Asia in the 1950s–1990s as well as policies and measures for promoting exports in Asia.

from the early 1990s in the Philippines, Indonesia, and China, however, they began to switch their FDI hosting policy from a selective-acceptance policy to a basically accept-everybody policy. They started trying to host as many foreign companies as possible and formulate industrial clusters while still keeping trade protection for import-substituting industries.

The dual-trade approach requires a complicated policy package. What a country has to do to invite export-oriented foreign companies is simple though difficult to carry out; it must provide the world's-best or second-best location advantages for incoming investors. Trade protection, of course, negatively affects location advantages. So as to partially neutralize negative effects of import-substituting industry protection, the Southeast Asian countries have introduced a duty-drawback system, that is, the system of refunds of duties and indirect taxes on imported inputs in export production. Besides, various types of FDI facilitation measures are crucial to attract foreign companies. In particular, aggressive policy of inviting foreign small and medium enterprises (SMEs) effectively works in the formation of industrial clusters. These countries have concentrated their public resources on the development of economic infrastructure, including roads, ports, electricity and water supply, telecommunications, and industrial estate services. At the same time, they have improved the services of FDI-hosting agencies, ending up with yielding considerable facilitation.

It does not mean that these countries give up fostering local indigenous firms. Instead of hastily providing protection for immature local entrepreneurs, they set a short-term priority on quickly building up a critical mass of agglomeration and hooking their economies up to international production and distribution networks by aggressively inviting foreign companies. The focus of local industry promotion is shifted to enhancing capability to penetrate into vertical production chains. Although inefficient import-substituting industries being left have to be cleaned up, new development strategies with aggressively utilizing incoming FDI bear fruit in the Southeast Asian countries and China. This sets a sharp contrast with LDCs in other parts of the world.

6.3 Supporting Economic Logic

What sort of economic logic explains the mechanics of international production and distribution networks? In the discussion on the international division of labor, the theory of comparative advantage based on the relative cost of production in autarky is still valid in a number of circumstances; technological gap and factor price differences explain location patterns of industries to some extent. In interpreting the mechanics of international production and distribution networks, however, at least three new lines of thought must be incorporated into our analytical framework.

The first line of thought is the fragmentation theory. It is a powerful tool when we analyze patterns of vertical FDI going to LDCs to formulate verti-

cal production links or cross-border production sharing systems.² The traditional international trade theory primarily explains industry-wise location patterns. The patterns often observed in East Asia besides industry-wise location patterns, however, are the production-process-wise location patterns. A typical example of production-process-wise location patterns is found in semiconductor-related electronics industry. This industry as a whole is obviously capital-intensive or human capital-intensive, but its production activities are finely segmented and located in various places. The fragmentation theory neatly presents the logic behind such a location pattern.

Deardorff (2001b, 121) defines fragmentation as “the splitting of a production process into two or more steps that can be undertaken in different locations but that lead to the same final product.” Suppose that there is initially a big factory located in Japan taking care of all the production activities from upstream to downstream. If we carefully look at individual production blocks, however, we may find that some production blocks require close attention by technicians while others are purely labor-intensive. If we can separately locate each of the production blocks in an appropriate place, for instance, in Japan, Malaysia, and China, considering vertical production chains, we may save the total production cost, compared to the cost with production blocs put altogether in one place. Because the East Asian countries still have substantial differentials in labor costs, the concept of fragmentation across different cones formalized by Deardorff (2001a) seems to be particularly useful in understanding the nature of vertical production chains.

Fragmentation becomes economical when the cost of service links (SL) connecting production blocks (PB) is low enough. The SL cost includes transport costs, telecommunication costs, and various coordination costs between PBs. SL cost heavily depends on the nature of technology in each industry. Globalization, however, reduces SL cost in general and enables firms in many industries to fragment their PBs further to reduce the total production cost. Because SL cost tends to carry strong external economies of scale, the concentration of fragmented PBs is often observed. The forces of fragmentation and agglomeration sometimes work in the opposite direction, but globalization actually accelerates both at the same time, which results in a situation where some countries significantly enjoy the fruit of globalization while others do not.³

The second line of thought is the agglomeration theory. This is an extension of international trade theory with external economies of scale

2. As for the fragmentation theory, see Jones and Kierzkowski (1990), Arndt and Kierzkowski (2001), Deardorff (2001b), and Cheng and Kierzkowski (2001).

3. Where to locate fragmented production blocs also depends on the nature of the products. For instance, when parts and components are considerably standardized and the delivery timing is not too delicate, firms try to find suppliers of the cheapest products in the world. On the other hand, when parts and components are highly customized, and closer communication with suppliers is important, they would like to form industrial clusters.

while introducing the concept of “space” from city planning and other academic fields.⁴ Although the microfoundation of spatial agglomeration has not been fully explored, the importance of agglomeration or industry clusters as a source of location advantage is increasingly recognized in both theoretical and empirical literature. Economies of scale or agglomeration effects do not necessarily depend on the initial condition under autarky; in an extreme case, a country may start having agglomeration purely by chance. In this sense, the source of gains of trade in the “new” international trade theory is logically different from those in the traditional theory of comparative advantage, and such nature of the “new” theory addresses the possibility of the new role of government. Among the factors that generate location advantages for MNEs to invest, agglomeration is one of the crucial elements, particularly in LDCs. Governments in East Asia are obviously conscious of the potential role of government in formulating agglomeration or industrial clusters.

The third line of thought is the internalization theory of corporate firms. A firm typically does not conduct everything from upstream to downstream. It sets its upstream-side boundary by purchasing materials or parts from other firms and determines its downstream-side boundary by selling their products to other firms or consumers. Such a boundary setting decision is here called an “internalization decision.” In addition, a firm cuts its internalized activities into thin slices and places these slices at appropriate places. This is called a “location decision.” A firm makes an internalization decision and a location decision at the same time, considering its own firm-specific assets such as technology and managerial know-how. Internalization may have different dimensions. For example, an internalization decision would be made across different functional activities such as financial management, personnel management, research and development (R&D) activities, parts procurement, sales activities, and others.

In East Asia, particularly in China, various kinds of internalization patterns with innovative interfirm relationships emerge in the effort of concentrating on core competences. Original equipment manufacturing (OEM) contracts, electronics manufacturing service (EMS) firms, and contractual/ordinary processing are such examples. Such sophistication is particularly salient in machinery industries. Technological progress in the line of developing “modules” accelerates the formation of sophisticated interfirm relationship. The international trade theory has not yet fully digested elements of ownership advantages and internalization advantages that Dunning’s ownership, location, and internalization (OLI) theory presents.⁵ However, the importance of internalization choices cannot be neg-

4. As for the agglomeration theory, see Krugman (1991, 1995) and Fujita, Krugman, and Venables (1999).

5. As for the OLI theory, see Dunning (1993). Kimura (2000, 2001) analyzes the microdata of Japanese manufacturing firms and claims that corporate structure and interfirm relationship are jointly chosen with the location of activities.

lected when the international division of labor is at issue. Fragmentation theory and agglomeration theory must be combined with the internalization theory of corporate firms.

6.4 Recent Trade Flows in East Asia

Now let us review the trade pattern of East Asia. It is a well-known fact that the East Asian economies have rapidly developed intraregional trade relationships since the early 1980s. The Ministry of Economy, Trade and Industry (METI; 2003) presents some basic figures. Intraregional trade of East Asia grew from US\$104.3 billion in 1981 to US\$333.1 billion in 1991 and then US\$702.8 billion in 2001; that is, it increased by 3.2 times in 1981–1991 and 2.1 times in 1991–2001. Trade intensity indices among the East Asian economies also had an upward trend, suggesting the development of increasingly closer economic relationships.

Fukao, Ishido, and Ito (2003) decompose bilateral trade flows into one-way trade, vertical intraindustry trade (VIIT), and horizontal intraindustry trade (HIIT) and compare the trade pattern of East Asia with the one of Europe. They find that international trade in East Asia has still a substantial amount of one-way trade, but the share of VIIT rapidly increases. Ando (2004), on the other hand, decomposes overall trade flows in machinery industries for each East Asian economy into one-way trade, VIIT, and HIIT, based on international trade data at the Harmonized System (HS) six-digit level, in the 1990s. The results clearly present relative declines in one-way trade and drastic increases in VIIT for machinery trade, particularly for machinery parts and components trade, suggesting the development of vertical international production chains in the 1990s in East Asia.

In addition to these findings, we would like to claim that one of the most important changes in the trade pattern of the region is an explosive increase in trade in machinery goods, particularly trade in machinery parts and components for both exports and imports. Table 6.1 shows the values and shares of exports and imports of machinery goods and machinery parts and components⁶ in major East Asian economies⁷ in 1996 and 2000.⁸

6. See table 6A.1 for a definition of parts and components in our study.

7. Due to the lack of data available from the United Nation's (UN) data sources, table 6.1 and figure 6.1 do not include Taiwan, which has also played an important role in developing the networks in East Asia.

8. Although table 6.1 shows only machinery shares in 1996 and 2000, a comparison with the shares at the beginning of the 1990s makes clearer the trend of increase in machinery trade and machinery parts and components in the 1990s; shares of machinery goods and machinery parts and components in total exports, for instance, are respectively 1.8 percent and 0.7 percent for Indonesia, 23.6 percent and 14.9 percent for Thailand, 37.2 percent and 23.5 percent for Malaysia, 42.3 percent and 15.5 percent for Korea, 52.6 percent and 22.6 percent for Singapore, and 76.2 percent and 26.8 percent for Japan in 1990, 18.8 percent and 6.7 percent for China in 1992, and 37.0 percent and 16.1 percent for Hong Kong in 1993. See Ando (2004) for further discussion.

Table 6.1 Importance of machinery trade in the East Asian economies

	Exports		Imports		Exports		Imports	
	1996	2000	1996	2000	1996	2000	1996	2000
	Japan							
Value	Thailand							
Total (US\$1,000)	410,944,244	479,244,574	349,185,062	379,661,760	55,672,988	68,780,636	72,311,216	61,445,996
Share of:								
Machinery goods in total	74.9	74.9	28.1	32.0	40.3	45.6	50.4	47.1
Parts and components in total	35.4	36.2	12.1	16.1	21.7	28.7	30.3	34.0
Parts and components in machinery goods	47.3	48.3	43.1	50.2	54.0	62.8	60.1	72.2
	Korea							
Value	Philippines							
Total (US\$1,000)	129,696,331	172,264,221	150,320,064	160,477,507	20,537,617	38,072,479	34,697,094	33,802,416
Share of:								
Machinery goods in total	54.2	59.6	40.9	41.4	58.7	77.4	53.8	54.1
Parts and components in total	24.1	29.0	20.7	26.5	46.5	60.9	35.7	43.4
Parts and components in machinery goods	44.5	48.7	50.6	64.0	79.1	78.7	66.4	80.2

Machineries are here defined as HS 84-92; that is, they include general machinery, electric machinery, transport equipment, and precision machinery. To capture the features of the trade patterns in East Asia more vividly, figure 6.1 summarizes the shares of machinery goods and machinery parts and components in total exports and imports for economies in East Asia as well as other regions, such as North and South America and Europe in

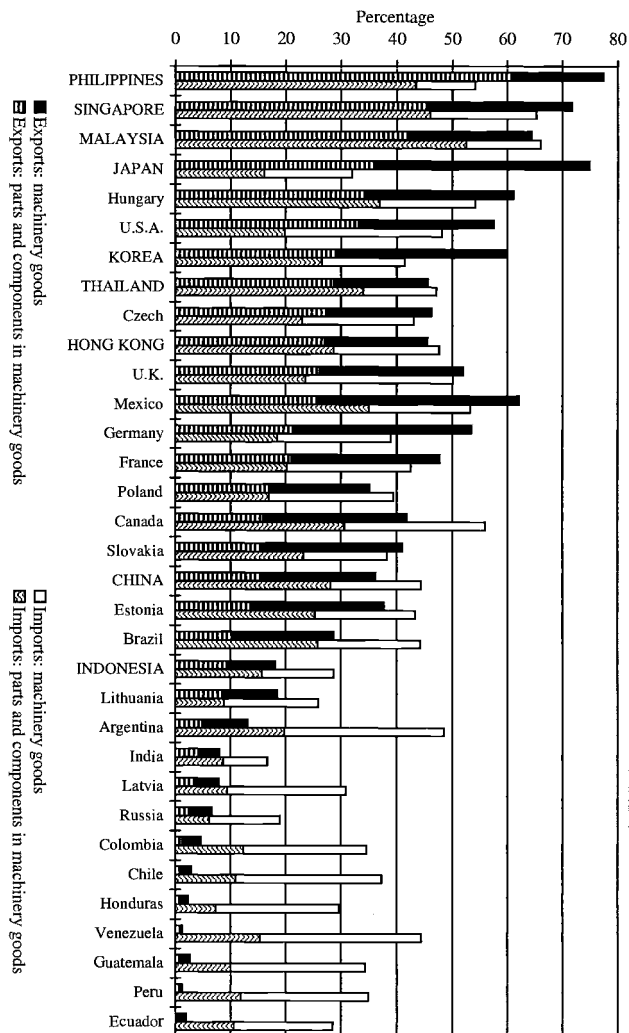


Fig. 6.1 Machinery goods and machinery parts and components: Shares in total exports and imports in 2000

Source: Authors' calculation, based on UN PC-TAS (UN COMTRADE for exports of Hong Kong and exports and imports for Russia and Slovakia).

2000. Note that figure 6.1 plots countries from the one with the highest share of machinery parts and components exports, aiming at addressing the relative significance of machinery parts and components trade among countries in various regions.

An astounding fact is that the shares of machineries in each East Asian country's total exports and imports are indeed very large. Except the cases of imports for Japan and China and exports and imports for Indonesia, the shares of machinery trade are as high as 40 percent or even higher, up to 77 percent, for both export and import sides. They imply how significant the machinery industries are in the East Asian economies. Furthermore, the shares of parts and components in machinery trade are also very high; they are 40 percent to 50 percent and even reach 80 percent in cases of the Southeast Asian countries, and the shares are further increasing even in the short period between 1996 and 2000. These suggest a large portion of back-and-forth transactions of intermediate goods in the international production and distribution networks in machinery industries, which are extended across a large number of countries at different income levels in the region.

In other regions, on the other hand, higher shares of machinery trade and those of machinery parts and components trade are observed only for some specific countries such as Mexico, the United States, Hungary, the Czech Republic, and Germany (figure 6.1). These suggest the existence of networks in machinery industries between the United States and Mexico and between Germany and some Central and Eastern European countries, but these networks are not extensively covering a number of countries. The fact that the shares of machinery exports and imports are indeed high but the share of machinery parts and components exports is not as high in Mexico would support the evidence where Mexico imports machinery parts and components from the United States, assembles them, and exports final goods back to the United States, rather than developing networks across neighboring countries.

Moreover, other countries, particularly the ones in Latin America, present much lower shares of machinery exports than countries in East Asia. At the same time, the shares of machinery exports are much lower than the shares of machinery imports in these countries. These suggest that, in these economies, machinery industries are not well developed yet, and their manufacturing activities are still of the import-substituting type.

Note that not all countries in East Asia are effectively connected with such networks at this moment. The Cambodia, Myanmar, Laos, and Vietnam (CMLV) countries have not been fully involved with the networks yet. These countries have substantially low wage levels but are not entirely successful in attracting labor-intensive production processes. This fact suggests that government policies to reduce service-link costs and encourage agglomeration are crucially important for a country to hook up to international production and distribution networks.

6.5 Evidence from the Microdata of Japanese Firms

Corporate firms in the forerunners of development in the region, Japan, Korea, and Taiwan, have had strong technological competitiveness in machinery manufacturing. Because machines are typically made of a large number of parts and components, the competitiveness in machines depends on both the quality and production cost of parts and components and the managerial ability of vertical production networks in which corporate firms in East Asia particularly have their strengths. When these firms became mature enough to compete in the international arena, and the Southeast Asian countries and China prepared for proper policy environment in the mid-1980s and the 1990s, the formation of international production and distribution networks was a natural consequence.

The networks consist of both intrafirm geographical extension and interfirm business relationships. Up to the 1980s, an important component of the Japanese economic system was the subcontracting system (*shitauke* in Japanese) or long-term relationships between large downstream assemblers and upstream SMEs.⁹ However, the interfirm relationship of Japanese firms has drastically changed since Japanese firms started to actively conduct FDI in the mid-1980s.¹⁰ It is often observed that both large assemblers and SMEs make FDIs together to form a certain size of agglomeration in Southeast Asia or China. Even in such cases, upstream-downstream relationships become more competitive, nonexclusive ones. With strict cost consideration, many Japanese firms are now open to extend their production chains to firms with other nationalities as far as the technological level meets.

Although it is very difficult to trace the nature of such corporate relationships by statistical figures, this section attempts to present some evidence of corporate firms' behavior to understand the mechanics of international production and distribution networks in East Asia by analyzing the firm-level microdata of Japanese corporate firms. Tables in this section are constructed from either of the two sets of microdata, both of which are conducted by the Ministry of International Trade and Industry (MITI), Government of Japan: (a) the fiscal year (F/Y) 1996 and F/Y 2001 Basic Survey of Business Structure and Activity and (b) the F/Y 1999 Survey (the twenty-seventh Basic Survey) of Overseas Business Activities of Japanese Companies. The first firm-level database provides detailed information on parent firms located in Japan and also the number, industry, and regional location of their foreign affiliates. In tables 6.2 to 6.5, constructed from this

9. As for the economic interpretation of the Japanese subcontracting system, see Kimura (2002).

10. At least in the latter half of the 1990s, we can statistically verify that intrafirm transactions of Japanese affiliates in East Asia are gradually substituted by arm's-length transactions. See Kimura and Ando (2004b) for further discussion.

database, foreign affiliates are defined as those with no less than 20 percent Japanese ownership. The second database presents information on the performance of foreign affiliates. In table 6.6, obtained from this database, foreign affiliates include both “affiliates abroad,” with no less than 10 percent ownership by Japanese parent firms, and “affiliates of affiliates abroad” with no less than 50 percent ownership by “affiliates abroad” (both called “Japanese affiliates abroad” hereinafter). A more detailed explanation of these databases is given in appendix A.

Table 6.2 presents (a) the number of parent firms with foreign affiliates and the number of foreign affiliates; (b) the number of parent firms with affiliates in East Asia and the number of affiliates in East Asia; (c) the number of parent firms with affiliates in North America and the number of affiliates in North America; and (d) the number of parent firms with affiliates in Europe and the number of affiliates in Europe, by the industry of parent firms and by the industry of affiliates in 2000.¹¹ In 2000, 3,773 out of 27,655 firms located in Japan (in the data set) have a total of 18,943 foreign affiliates. Among them, 2,994 firms have 10,224 affiliates in East Asia. That is, as many as 80 percent of the Japanese firms going abroad have at least one affiliate in East Asia, and 54 percent of the foreign affiliates of Japanese firms are located in East Asia.

Japanese manufacturing parent firms, particularly machinery parent firms, are active investors in East Asia; close to 70 percent of the Japanese parent firms with affiliates in East Asia are in the manufacturing sector (industries 120 to 320) and half of them are in the machinery sector (290 to 320). The pattern observed for affiliates in East Asia by the industry of affiliates also reveals how dominant manufacturing activities are in East Asia, which is clearly different from the patterns for affiliates in North America or Europe. In East Asia, 60 percent of the affiliates in the region are manufacturing, regardless of the industries of their parent firms, while 38 percent of the affiliates in North America and 31 percent of the affiliates in Europe are.¹² The number of affiliates actually increased in the five years from 1995 to 2000, from 9,132 to 10,224 in East Asia, while the numbers decreased from 3,928 to 3,499 in North America and from 3,019 to 2,913 in Europe. Manufacturing activities are dominant and have been intensified in East Asia in terms of both Japanese parent firms and their affiliates.

Japanese SMEs with regular workers of less than 300 have greatly contributed to such expansion of manufacturing activities in East Asia by Japanese firms. Table 6.3 presents the number of Japanese parent firms with affiliates in East Asia, North America, and Europe in 2000 by the size of parent firms and by the number of affiliates. The table shows that more

11. See table 6A.2 for industry classification.

12. See Kimura and Ando (2003) for a comparative study between Latin America and East Asia, based on the microdata of Japanese corporate firms.

Table 6.2 Japanese parent firms and foreign affiliates by industry, 2000 F/Y

Industry	By industry of parent firm			By industry of affiliate		
	No. of parent firms	%	No. of affiliates	%	No. of affiliates	%
<i>A. Parent firms with foreign affiliates</i>						
<i>Manufacturing sector</i>						
Nonmachinery sectors	1,259	33.4	4,779	25.2	4,427	23.4
120-280, 340						
Machinery sectors	378	10.0	1,821	9.6	961	5.1
290	489	13.0	2,608	13.8	2,014	10.7
300	283	7.5	1,526	8.1	1,168	6.2
310	320	2.5	426	2.2	292	1.5
320	2,505	66.4	11,160	58.9	8,872	46.8
Subtotal						
<i>Nonmanufacturing sector</i>						
480	864	22.9	6,460	34.1	5,790	30.6
Others	404	10.7	1,323	7.0	4,281	22.6
Subtotal	1,268	33.6	7,783	41.1	10,071	53.2
Total	3,773	100.0	18,943	100.0	18,943	100.0
<i>C. Parent firms with affiliates in North America</i>						
<i>Manufacturing sector</i>						
Nonmachinery sectors	460	28.9	843	24.1	592	16.9
120-280, 340						
Machinery sectors	205	12.9	411	11.7	187	5.3
290	215	13.5	434	12.4	223	6.4
300	178	11.2	383	10.9	291	8.3
310	320	4.7	79	2.3	41	1.2
320	1,105	69.4	2,150	61.4	1,334	38.1
Subtotal						
<i>Nonmanufacturing sector</i>						
480	340	21.4	1,085	31.0	1,179	33.7
Others	147	9.2	264	7.5	986	28.2
Subtotal	487	30.6	1,349	38.6	2,165	61.9
Total	1,592	100.0	3,499	100.0	3,499	100.0
<i>B. Parent firms with affiliates in East Asia</i>						
<i>Manufacturing sector</i>						
Nonmachinery sectors	1,038	34.7	2,910	28.5	3,198	31.3
120-280, 340						
Machinery sectors	286	9.6	810	7.9	543	5.3
290	429	14.3	1,598	15.6	1,475	14.4
300	222	7.4	752	7.4	664	6.5
310	75	2.5	226	2.2	202	2.0
320	2,050	68.5	6,296	61.6	6,082	59.5
Subtotal						
<i>Nonmanufacturing sector</i>						
480	697	23.3	3,350	32.8	2,627	25.7
Others	247	8.3	578	5.7	1,515	14.8
Subtotal	944	31.5	3,928	38.4	4,142	40.5
Total	2,994	100.0	10,224	100.0	10,224	100.0
<i>D. Parent firms with affiliates in Europe</i>						
<i>Manufacturing sector</i>						
Nonmachinery sectors	251	27.5	647	22.2	362	12.4
120-280, 340						
Machinery sectors	130	14.2	468	16.1	157	5.4
290	148	16.2	436	15.0	214	7.3
300	87	9.5	256	8.8	132	4.5
310	34	3.7	89	3.1	36	1.2
320	650	71.1	1,896	65.1	901	30.9
Subtotal						
<i>Nonmanufacturing sector</i>						
480	193	21.1	781	29.9	1,308	44.9
Others	71	7.8	146	5.0	704	24.2
Subtotal	264	28.9	1,017	34.9	2,012	69.1
Total	914	100.0	2,913	100.0	2,913	100.0

Source: MITI database.

Notes: Others includes industries "050," "540," and "other;" Number of affiliates for the cases (A), (B), (C), and (D) are the (A) number of foreign affiliates, (B) number of affiliates in East Asia, (C) number of affiliates in North America, and (D) number of affiliates in Europe, respectively.

Table 6.3 Foreign affiliate ownership patterns of Japanese parent firms, 2000 FY (number of parent firms)

Number of regular workers of parent firm	Number of affiliates											Total	%
	1	2	3	4	5	6	7	8	9	10	More		
50 to 99	301	67	25	12	1	2	1				1	410	13.7
100 to 199	413	101	34	23	7	1	2		2			583	19.5
200 to 299	196	92	30	12	8	10	3	2	1		1	355	11.9
300 to 499	242	99	36	28	18	8	6	4	2		4	447	14.9
500 to 999	209	117	65	42	27	20	5	2	4	2	10	503	16.8
1,000 or more	136	107	77	54	55	45	27	38	16	19	122	696	23.2
Total	1,497	583	267	171	116	86	44	46	25	21	138	2,994	100.0
<i>In East Asia</i>													
50 to 99	90	13	2								1	106	6.7
100 to 199	185	14	2	1			1					203	12.8
200 to 299	129	18	2									149	9.4
300 to 499	183	30	10	2	1	2			1			229	14.4
500 to 999	210	58	20	6	3	1	1	2			2	303	19.0
1,000 or more	271	126	69	39	28	17	10	7	7	1	27	602	37.8
Total	1,068	259	105	48	32	20	12	9	8	2	29	1,592	100.0
<i>In North America</i>													
50 to 99	26	2		1								29	3.2
100 to 199	58	8	2	1								69	7.5
200 to 299	43	11	2									56	6.1
300 to 499	84	21	8	3	1	3						120	13.1
500 to 999	113	24	16	4	2	2		1	1	1	3	167	18.3
1,000 or more	178	93	55	37	17	18	14	8	10	9	34	473	51.8
Total	502	159	83	46	20	23	14	9	11	10	37	914	100.0
<i>In Europe</i>													

Source: MITI database.

than 40 percent of the Japanese firms going to East Asia are SMEs, while the shares are much lower in North America and Europe. Furthermore, the fact that a considerable number of firms, including SMEs, have plural affiliates in East Asia also supports that Japanese SMEs are actively involved in manufacturing activities in the region. Such active FDI by Japanese SMEs in East Asia have contributed to forming a critical mass of industrial clusters.

As suggested by table 6.2, Japanese parent firms do not necessarily establish affiliates in their own industries where they have main activities.¹³ In general, parent firms have various activities across industries and establish foreign affiliates in order to conduct a subset of those activities. Table 6.4 provides the detailed information on sector switching between parent firms and their affiliates in East Asia; panel A of table 6.4 includes all sized Japanese firms with affiliates and panel B of table 6.4 focuses on SMEs. The rows denote the industry of parent firms while the columns denote the industry of foreign affiliates. Thus, diagonal cells of the tables indicate the number of non-sector-switching affiliates while off-diagonal cells denote the number of sector-switching affiliates.

In East Asia, 75 percent of the affiliates owned by all sized manufacturing parent firms are in the manufacturing sector.¹⁴ Among them, we observe many sector-switching manufacturing affiliates with manufacturing parent firms (in nondiagonal cells for industries 120 to 340 in both rows and columns), in particular, sector-switching machinery affiliates with manufacturing parent firms (in nondiagonal cells for industries 120 to 340 in rows and industries 290 to 320 in columns). In addition, even manufacturing SMEs have sector-switching manufacturing affiliates, particularly sector-switching machinery affiliates in East Asia, which is not often observed in North America or Europe. Such behavior is typical in manufacturing activities aimed at supplying intermediate goods for other firms or for their own affiliates. It implies that Japanese firms have played an important role in developing vertical production networks in the region.¹⁵

Moreover, manufacturing parent firms also have nonmanufacturing affiliates, particularly in the wholesale trade sector. Sector-switching nonmanufacturing affiliates with manufacturing parent firms (in cells for in-

13. A firm often has various activities at the same time. The industrial classification of a firm located in Japan is determined by the largest activities the concerned firm conducts in terms of the value of sales.

14. In the case of manufacturing SMEs, the share of manufacturing affiliates is much higher; as many as 87 percent of their affiliates are manufacturing.

15. As discussed in footnote 13, while parent firms have in general various activities across sectors, foreign affiliates often conduct a narrower range of activities. What we claim here is that foreign affiliates are more likely to be involved in activities to participate in the production and distribution networks in East Asia even if such activities are not the main activities of parent firms, and thus many cases of sector-switching machinery affiliates (with parent firms mainly involved in other sectors than machinery sectors) can be observed.

Table 6.4 Sector switching between parent firms and their affiliates in East Asia

Industry of parent firm	Industry of affiliate in East Asia																				Total							
	050	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300		310	320	340	480	540	Other	
050	2																										1	3
120		145	1							2														20	3	12	183	
130		5	28							12														19	1	9	74	
140				70	7		2				2									1	2		2	10			96	
150				5	73			2			2									1					12	1		96
160						14	1																1	2				18
170						2	25																1	8				36
180							45				2								1					5				56
190								63															1	6	4	1	6	81
200	1	9	2	43	4	1	1	3	520	3	15	2	4	4	7	6	8	1	3	10	174	5	41	867				
210									2	2	4												9	4	14	36		
220									7	184	6	1	1	1	2	2	8	1				5	33	1	3	254		
230			1						1	3	89				2	1	4	1				3	15	5	3	128		
240													6									1						7
250	2			1					1	4				87	1	7	1	3	1	4	2	21	12	12	12	159		
260	3													1	51	3	10	2	8	4			7			26	115	
270	3								1	2	1			1	161	14	3	30	14			2	30		20	282		
280	1			1		2				4				2	14	161	7	27	5	1	8	34	1	7	277			
290				4				1	10	4				1	8	1	15	362	65	20	18	15	214	10	63	810		
300				2	2			1	5	12				5	1	3	6	79	1009	6	17	9	308	13	119	1598		
310											2			2	5		9	22	25	569		3	59	5	50	752		
320				1					2		1			3		1	6	14			131	56	2	9	226			
340				1				1		10	1					2		2		3	66	48	6	5	145			
480	9	115	11	83	157	13	8	14	9	142	11	60	22	3	70	47	32	63	39	266	34	22	56	1516	80	468	3350	
540	1	3		1	12	1	1	1	1		1			2	2	1	2	2	3	3	1	7	12	100	54	205		
Other		2			3	5			3	1	1			2	1	2	2	12	4	3							312	370
Total	22	284	43	208	258	38	37	63	80	709	17	313	121	11	179	113	222	303	543	1475	664	202	199	2627	256	1237	10224	

(continued)

Table 6.4 (continued)

Industry of parent firm	Industry of affiliate in East Asia																				Total							
	050	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300		310	320	340	480	540	Other	
050	2																										2	
120		41								1														4		3	49	
130			2																								2	
140				29	2																		6				37	
150				4	43			2															5	1			55	
160						7	1															1					9	
170						2	15															1					23	
180								12			1																18	
190									18																		32	
200									1	80	1	1		1	1	6	2				1	5	4	4	2	1	104	
210										1																	4	
220										2		72	2	22	1	1	2	3	1								95	
230																											25	
240														6									1	2			7	
250															23												30	
260																12							2	4			18	
270																	58								3	1	65	
280												4						72	4	1	2				7	91		
290												2	2		1	1	8	109	10	4	4	7	23		7	179		
300												5				2	5	1	232	4	5	37	4			6	303	
310												1			2	1	3	3	45	2	2	3				1	61	
320																			5			34					47	
340												7								1	1	3	24	4			41	
480												4	9	2	8	2	14	17	14	40	10	10	18	401	17	43	774	
540														2													7	31
Other																											1	50
Total	4	66	3	56	102	13	19	17	31	108	5	117	33	10	37	15	78	114	140	301	65	56	69	545	35	126	2165	

Source: MITI database.

dustries 120 to 340 in rows and industries 050, 480, and 540 and “others” in columns) make up 25 percent of the affiliates owned by all sized manufacturing parent firms and 13 percent of the affiliates owned by manufacturing SMEs, suggesting that another strategy in East Asia is to establish global production and distribution networks by internalizing wholesale trade activities. Note that these ratios are much smaller than in North America (49 percent for all sized firms and 48 percent for SMEs) and Europe (60 percent and 51 percent).

Before moving to the performance of Japanese affiliates abroad, let us formally analyze the characteristics of Japanese parent firms investing in East Asia. Panel A of table 6.5 reports the results of logit regression analysis for Japanese parent firms in all sectors and panel B of table 6.5 reports the results of Japanese manufacturing parent firms. The dependent variable for regression No. 1 in both tables is whether a firm has foreign affiliate(s) or not. Similarly, the dependent variable for regressions (3), (4), and (5) is whether a firm has affiliate(s) in East Asia or North America or Europe. The independent variables are the number of regular workers (in log), tangible assets per regular workers, foreign sales, research and development (R&D) expenditure, and advertisement expenditure.¹⁶ For the whole samples, firms with foreign affiliates are likely to have large employment size, capital-intensive technology, large foreign sales, and large R&D expenditure. The coefficients for both the firms’ size and R&D expenditure in the case of affiliates in East Asia are much smaller than those in the case of North America and Europe. It can be concluded that firms going to East Asia are relatively small as we have descriptively discussed, and thus less R&D-intensive, compared with firms going to North America or Europe.¹⁷

Table 6.6, in turn, focuses on the performance of Japanese affiliates in East Asia, North America, and Europe. The table presents (a) the destination of sales and (b) the origin of purchases by Japanese affiliates in East Asia. Most of the goods and services produced by Japanese affiliates in East Asia go to the local market, to Japan, or to other East Asian countries: 49.6 percent for local, 21.9 percent for Japan, and 21.2 percent for countries within the region except local and Japan.¹⁸ By-origin purchases by Japanese affiliates in East Asia also show that they purchase most goods and services from the local market (41.1 percent) or import them from Japan (33.4 percent) or from other East Asian countries (20.7 percent). Japan’s share in purchases is slightly higher than in sales, probably due to

16. Note that variables for foreign sales, R&D expenditure, and advertisement expenditure are in ratios to total sales.

17. Kimura and Ando (2004b) conduct a similar analysis on the characteristics of Japanese parent firms and statistically demonstrate that another feature of Japanese firms going to East Asia is that they are likely to more flexibly deinternalize their activities and to outsource some fragmented production processes, compared to those going to North America or Europe.

18. Contrary to popular opinion, sales to North America by Japanese affiliates in East Asia are small (3.4 percent). Sales to Europe are also small (2.6 percent).

Table 6.5 Logit estimation: Japanese parent firms, 1995 F/Y

Variable	Dependent variables			
	Foreign affiliates: with = 1; without = 0 (1)	Affiliates in East Asia: with = 1; without = 0 (2)	Affiliates in North America: with = 1; without = 0 (3)	Affiliates in Europe: with = 1; without = 0 (4)
<i>A. Parent firms: All sectors</i>				
Constant	-5.547*** (-42.82)	-5.713*** (-42.77)	-8.302*** (-45.23)	-11.085*** (-40.40)
Number of regular workers (log)	0.694*** (31.00)	0.693*** (30.22)	0.960*** (32.91)	1.236*** (30.83)
Tangible assets per regular workers	0.010*** (6.55)	0.003* (1.66)	0.009*** (5.10)	0.007*** (2.85)
Foreign sales: ratio to total sales	7.132*** (25.06)	5.146*** (22.84)	5.288*** (23.61)	5.564*** (23.12)
R&D expenditure: ratio to total sales	9.565*** (8.50)	6.160*** (6.02)	6.160*** (10.06)	11.031*** (8.51)
Advertisement expenditure: ratio to total sales	-0.122 (-0.14)	-1.546 (-1.19)	1.656 (1.42)	2.757* (1.92)
Log likelihood	-5,948.385	-5,425.176	-3,366.289	-1,823.668
No. of observations	13,623	13,623	13,623	13,623

Table 6.5 (continued)

Variable	Dependent variables			
	Foreign affiliates: with = 1; without = 0 (1)	Affiliates in East Asia: with = 1; without = 0 (2)	Affiliates in North America: with = 1; without = 0 (3)	Affiliates in Europe: with = 1; without = 0 (4)
<i>B. Parent firms: Manufacturing sector</i>				
Constant	-5.769*** (-35.19)	-5.924*** (-35.63)	-8.302*** (-37.83)	-11.628*** (-33.81)
Number of regular workers (log)	0.775*** (26.97)	0.770*** (26.74)	1.078*** (28.72)	1.340*** (26.60)
Tangible assets per regular workers	0.006*** (2.93)	0.000 (0.09)	0.010*** (4.61)	0.008*** (2.77)
Foreign sales: ratio to total sales	6.200*** (20.10)	4.275*** (17.61)	4.899*** (19.35)	5.065*** (18.26)
R&D expenditure: ratio to total sales	6.341*** (5.51)	3.469*** (3.39)	9.834*** (7.48)	9.265*** (6.99)
Advertisement expenditure: ratio to total sales	0.846 (0.79)	-0.030 (-0.03)	2.570 (1.60)	1.798 (1.56)
Log likelihood	-3,994.629	-3,715.727	-2,291.635	-1,275.963
No. of observations	8,577	8,577	8,577	8,577

Source: MITI database.

Note: Numbers in parentheses are *t*-statistics.

***Significant at the 1 percent level.

*Significant at the 10 percent level.

Table 6.6 Intraregional production networks: Sales and purchases by Japanese affiliates in East Asia, 1998 F/Y

Industry	No. of affiliates	Sales										Purchases									
		Total sales (million JPY)					Share in total sales (%)					Total purchases (million JPY)					Share in total purchases (%)				
		%	Local	Japan	Third countries (total)	East Asia	North America	Europe	%	Local	Japan	Third countries (total)	East Asia	North America	Europe	%	Local	Japan	Third countries (total)	East Asia	North America
<i>Manufacturing sector</i>																					
120 + 130	162	2.6	343,929	1.5	69.1	16.2	14.7	6.4	3.3	3.5	137,424	0.9	78.8	6.6	14.6	8.0	0.4	0.5			
140 + 150	399	6.4	503,397	2.2	43.6	30.2	26.1	12.2	4.9	7.4	254,218	1.7	54.0	26.6	19.4	13.1	2.3	0.8			
160	23	0.4	17,204	0.1	15.3	56.3	28.3	24.0	0.9	0.1	7,818	0.1	94.0	2.7	3.3	0.0	0.0	3.3			
170	14	0.2	7,073	0.0	52.8	34.3	12.9	8.8	4.0	0.0	4,821	0.0	75.2	13.8	11.0	7.0	0.0	3.0			
180	36	0.6	50,256	0.2	74.2	12.5	13.3	9.0	3.5	0.0	15,328	0.1	62.5	20.5	17.0	14.1	1.8	1.1			
190	27	0.4	27,536	0.1	77.8	0.4	21.8	11.5	0.4	5.5	2,694	0.0	73.7	16.6	9.8	0.0	1.9	7.8			
200	529	8.5	1,414,684	6.1	69.8	6.7	23.5	15.7	5.0	1.5	579,333	3.8	53.6	19.4	27.0	13.3	6.8	1.9			
210	17	0.3	36,418	0.2	21.2	65.7	13.1	2.9	0.0	10.2	32,061	0.2	21.7	18.0	60.4	45.4	10.3	3.9			
220	109	1.8	92,230	0.4	64.7	20.1	15.2	9.7	1.7	2.9	38,584	0.3	68.0	25.7	6.3	5.1	0.2	0.5			
230	54	0.9	107,614	0.5	41.4	34.3	24.3	13.2	4.9	5.1	24,259	0.2	57.4	23.6	19.0	17.1	0.3	1.6			
240	16	0.3	7,196	0.0	4.5	21.2	74.3	22.5	44.0	7.8	5,282	0.0	10.0	6.8	83.2	41.2	9.8	3.2			
250	160	2.6	334,130	1.4	69.7	17.2	13.2	8.8	3.5	0.8	140,533	0.9	41.3	31.5	27.2	23.1	3.3	0.5			
260	166	2.7	423,491	1.8	85.4	2.9	11.7	6.5	2.6	0.1	229,136	1.5	19.2	70.0	10.8	10.4	0.0	0.2			
270	110	1.8	281,041	1.2	55.9	15.6	28.6	26.3	0.9	1.0	155,313	1.0	44.1	31.7	24.2	19.0	0.3	1.1			
280	121	1.9	97,240	0.4	70.9	13.4	15.7	11.9	1.9	1.4	47,014	0.3	67.8	29.0	3.2	1.7	0.3	1.1			
290	315	5.1	688,971	3.0	32.4	40.7	27.0	14.8	5.5	4.6	400,705	2.6	57.7	32.2	10.1	8.8	0.8	0.4			
300	916	14.7	5,191,673	22.3	32.3	32.9	34.8	24.9	5.3	3.0	3,711,079	24.4	35.8	37.0	27.2	26.3	0.4	0.2			
310	478	7.7	2,140,129	9.2	81.0	11.1	7.9	2.2	3.5	1.5	1,380,996	9.1	53.4	37.2	9.4	6.1	2.5	0.7			
320	100	1.6	464,375	2.0	27.2	45.9	26.9	23.1	1.5	2.0	271,580	1.8	40.2	41.2	18.6	14.5	2.6	1.5			
330 + 340	83	1.3	95,985	0.4	22.3	63.6	14.1	2.8	7.5	2.9	63,645	0.4	55.1	37.7	7.1	5.9	0.4	0.7			
<i>Nonmanufacturing sector</i>																					
480	957	15.4	8,524,268	36.7	41.3	19.4	39.3	33.0	2.2	2.8	6,333,657	41.6	28.4	35.2	36.4	28.3	1.5	2.7			
Others	1,421	22.9	2,386,309	10.3	77.7	11.2	11.1	8.0	1.5	1.2	1,387,281	9.1	72.7	19.5	7.8	5.5	1.1	0.6			
Total	6,213	100.0	23,235,149	100.0	49.6	21.9	28.4	21.2	3.4	2.6	15,222,761	100.0	41.1	33.4	25.5	20.7	1.5	1.3			

Source: MITI database.

Note: "Others" includes industries "050," "540," and "other."

the supply of complicated machinery parts and components from Japan.¹⁹ These reveal that more than 90 percent of the sales and purchases by Japanese affiliates are among the East Asian countries, including Japan, and suggest the presence of active intraregional production networks in East Asia. In addition, a similar picture is observed for sales by U.S. affiliates in East Asia; besides the local market (56.2 percent), 17.1 percent of the goods produced by U.S. affiliates in East Asia goes to other East Asian countries.²⁰ This supports that active intraregional production networks have been developed not only by Japanese firms but also by other MNEs, such as U.S. firms and indigenous firms in the region.

In the case of North America and Europe, in contrast, sales to Japan are fairly small; 5.2 percent and 5.8 percent, respectively. In addition, more than half of the sales of the affiliates in the regions are from affiliates in the nonmanufacturing sector (59.2 percent for North America and 63.4 percent for Europe), particularly in wholesale trade sector (47.5 percent and 44.2 percent). This indicates that they aim to sell products in the local market or in countries nearby rather than forming vertical chains of production networks.

The empirical observation we have discussed may not directly prove the relevance of three lines of new theoretical thought. However, active FDI by Japanese SMEs, the existence of many sector-switching manufacturing affiliates, and intraregional trade by Japanese affiliates indeed imply how such logic works in developing international production and distribution networks in East Asia.

6.6 Evidence from the Firm Nationality Approach

The last section tried to capture the activities of Japanese firms in East Asia by analyzing affiliate holdings and by-destination sales and by-origin purchases. These statistical figures, however, do not directly indicate the magnitude of Japanese firms' activities in exporting from Japan and producing in East Asia and who is trading with whom. The amount of gross sales does not necessarily reflect the importance of each transaction because intermediate inputs embodied in traded commodities may be counted multiple times. One of the ways to quantify the importance of transactions is to introduce the concept of value added contents.

To quantify the whole Japanese firms' activities in different locations and embodied value added contents in international transactions, this section employs the firm nationality approach, which is first proposed by Baldwin and Kimura (1998) and Kimura and Baldwin (1998) in a two-

19. The share of purchases from North America is quite small.

20. Unfortunately, statistics for purchasing side are not available for U.S. affiliates in East Asia. See Kimura and Ando (2004a) and Lipsey (2004) for further discussion on the activities of U.S. firms in East Asia.

country setting and is extended to a three-country setting by Kimura (1998). The three-country setting considers three geographical territories, that is, Japan, Asia,²¹ and the rest of the world (ROW) as well as three nationals, that is, Japanese, Asians, and foreigners (the national of ROW). “Japanese” consist of Japanese-owned firms located in Japan, households, and governments located in Japan and foreign affiliates of Japanese firms (FAJFs) located in Asia and ROW.²² Asians and foreigners are defined in the symmetric way. Three nationals reside in three different locations, and thus nine blocks are drawn as in figure 6.2. Conceptually, transactions within a block and between blocks are illustrated as eighty-one (nine times nine) arrows in total. We can, however, fill out fourteen arrows of transactions because only statistical data from the Japanese side are readily available.

The numbers shown for fourteen arrows in figure 6.2 stand for the estimated Japanese value added contents of each transaction added at the starting point of the corresponding arrow in 2000. Table 6B.1 provides the summary table and the estimation method of each estimate. Additional explanation of the estimation method and data description is given in appendix B as well. Table 6.7 presents estimates of the value added contents embodied in sales by Japanese to Asians in Asia and to foreigners in ROW, estimated based on table 6B.1.

Although these figures are only rough estimates with a number of reservations on the data set, the value added account provides useful insights on the activities of Japanese MNEs, including intrafirm and arm’s-length relationships. The following are the three major findings. First, activities of Japanese firms have gradually shifted from Japan to Asia. When we focus on Japanese firms who sell products to Asians in Asia, value added contents of “to produce in Japan and distributing through FAJF in Asia” and value added contents of “to produce in Asia and sell locally” increased from 1996 to 2000 (increase in the share by 2.1 percent), while the share of “to produce in Japan and export directly” decreased by 3.7 percent.²³ Also, when we compare value added contents of “to produce in Asia and sell locally” with “to produce in Japan and distribute through FAJF in Asia,” the former becomes larger in 2000 though it was smaller in 1996. This implies that importance of local value added has enhanced vis-à-vis inputs from Japan.

Second, international production and distribution networks consist not only of Japanese firms but also of the mixture of firms of different nation-

21. Asia stands for Asian countries east of Pakistan in this section.

22. Note that “Japanese” in this definition is different from those on the residency basis or those in the sense of factor holders; we treat FAJF as controlled by Japanese and count all activities of FAJF as activities by Japanese.

23. The same analysis (figure 6.2 and table 6.7) was also conducted for 1996, but the results were omitted in the paper.

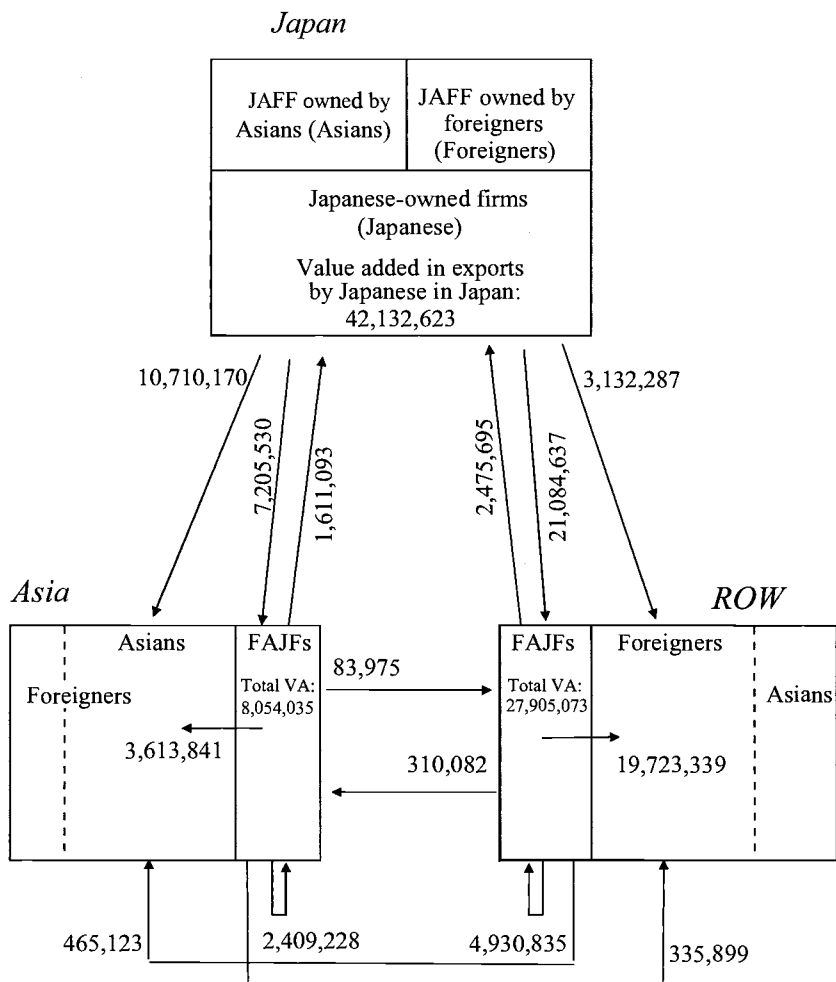


Fig. 6.2 Japanese value added embodied in sales to Asians and foreigners by Japanese: Three-country setting (2000)

Source: Table 6B.1.

Note: Unit = million JP yen.

alities. When value added in exports by Japanese in Japan to Asians (Asian firms) and foreigners (MNEs other than Japanese) in Asia is compared with that to Japanese (Japanese affiliates in Asia) in Asia, for instance, the former is larger than the latter. Thus, it is not true that the activities by Japanese firms are solely based on subcontracting relationships or intrafirm relationships between Japanese parent firms and Japanese affiliates in East Asia though such activities still consist of a significant portion;

Table 6.7 Major channels for Japanese firms to sell products abroad in 2000 (million JPY)

	VA contents	%
For Japanese firms to sell products to Asians in Asia (total of below):	18,373,691	100.0
To produce in Japan and export directly	10,710,170	58.3
To produce in Japan and distribute through FAJF in Asia	3,233,118	17.6
To produce in Japan and distribute through FAJF in ROW	351,439	1.9
To produce in Asia and sell locally	3,613,841	19.7
To produce in ROW and export to Asia	465,123	2.5
For Japanese firms to sell products to foreigners in ROW (total of below):	38,394,682	100.0
To produce in Japan and export directly	3,132,287	8.2
To produce in Japan and distribute through FAJF in ROW	14,902,647	38.8
To produce in Japan and distribute through FAJF in Asia	300,511	0.8
To produce in ROW and sell locally	19,723,339	51.4
To produce in Asia and export to ROW	335,899	0.9

Source: The above figures are estimated based on table 6B.1.

Note: Minor indirect channels such as “to produce in Japan and to distribute through FAJF in ROW and then through FAJF in Asia” are omitted.

rather, the activities do include transactions with indigenous firms and MNEs in Asia.²⁴

In addition, when we again focus on Japanese firms who sell products to Asians in Asia, the channel for direct exports to Asia from Japan is still important as the share of “to produce in Japan and export directly” suggests: 58.3 percent in 2000. In direct exports from Japan to Asia, capital goods for “Asian” firms are certainly significant. Besides, intermediate inputs, particularly machinery parts and components, for “Asian” firms are also large; combined with the information on Japan’s export in table 6.1, roughly one-third to half of them are machinery parts and components.

Third, the connection with North America or Europe is thin for both exports and imports. Among several channels for Japanese firms to sell products, the shares of “to produce in ROW and export to Asia” and “to produce in Asia and export to ROW” are pretty small. These low ratios imply weak connections with North America and Europe, confirming that contrary to popular opinion, sales to North America by Japanese affiliates in East Asia are small.

6.7 Current Policy Issues

We now observe proliferation of bilateral and regional preferential trade arrangements all over the world, and the wave of regionalism comes to

24. The transactions between Japanese firms in Japan and Japanese affiliates in ROW are indeed large, but the purpose is to sell Japanese products locally (in North America or Europe) rather than contributing to forming networks. This is consistent with the facts observed in section 6.5 that the large portion of affiliates in North America and Europe is in the wholesale trade sector and more than 40 percent of the total sales by affiliates in North America or Europe are from affiliates in the wholesale trade sector.

East Asian developing economies. It is sometimes claimed that the formal policy formation for regional economic integration is a bit delayed in East Asia, compared with other regions such as Latin America and Central and Eastern Europe. However, we would like to claim that the development of international production and distribution networks provides different economic backgrounds and different policy demands, and thus the implication of regionalism may also be different.

The dual-track approach has so far worked pretty well in East Asia. Figure 6.3 presents over-time changes in the customs-duty import ratios in East Asian developing countries. This is the ratio of total customs duty revenue of a country to the cost, insurance, and freight (c.i.f.)-based import value. It is immediately noticed that the ratios are much smaller than the average tariff figures that we usually discuss as an indicator for trade barriers. Moreover, the ratios present clear decreasing trends over time. These phenomena are partly due to unilateral tariff reduction for information technology (IT)-related products in the 1990s and also due to the effective usage of the duty-drawback system. In fact, MNEs in export-oriented industries are now paying a very small amount of tariffs in these countries.

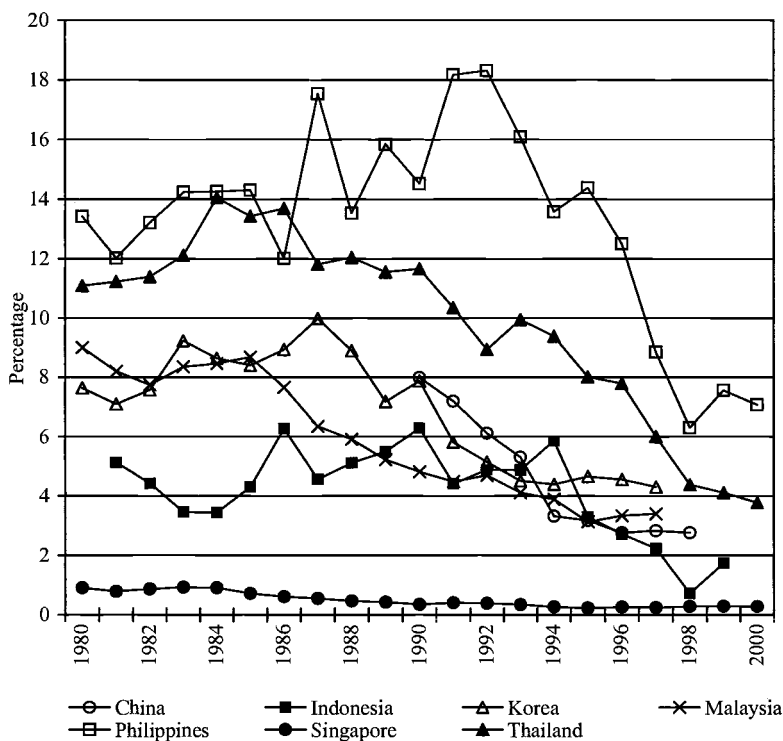


Fig. 6.3 Custom duties import ratios in East Asia

Sources: Drawn from Ando and Estevadeordal (2003).

Such a policy package has at least partially mitigated antiexport biases with trade protection for import-substituting industries and has allowed them to attract both import-substituting FDI and export-oriented FDI so far.

Further activation of the international production and distribution networks, however, requires new policy setting. First, fostering import-substituting industries was not, after all, very successful, with a few exceptions, and the cost of protection gradually becomes unbearable. Indeed, Southeast Asian countries and China still have high tariffs for a number of import-substituting industries. To substitute imports by domestic production, governments of these countries have long provided trade protection for domestic firms or incoming foreign companies. However, trade protection still cannot be removed because of the long-lasting poor competitiveness of these industries. The protection cost is borne by consumers and other industries, including export-oriented industries. It cannot be continued forever, and policymakers gradually recognize that it is now time to reorganize these industries in a more competitive environment. These industries include automobiles, domestic electric appliances, petrochemicals, and iron and steel.

Second, even if tariffs are properly removed, the business environment of East Asia is still far from borderless. Cross-border transaction costs are high for various reasons. Physical infrastructure in transportation and telecommunications is one of the important factors to improve the business environment. Trade facilitation in customs clearance and other bureaucratic procedures is another vital element. As a more abstract form of transaction costs, legal systems and economic institutions, such as standards, intellectual property rights protection, and dispute settlement facilities, are also crucial. To keep attracting FDI and encourage the formulation of agglomeration, policies beyond simple tariff removal become essential.

Third, the sophistication of networks and the development of agglomeration require extensive involvement of local indigenous firms. The focus of local industry promotion is not placed on infant industry protection for import substitution anymore. Rather, the issue is what the government can do in order to make local indigenous firms penetrate into international vertical production chains. Policymakers know that impatient performance requirements for foreign companies such as local contents requirement and technology transfer requirement have not worked very well. Government-financed technology development centers for local technicians have also borne lukewarm results in many cases. The governments should ultimately make an effort in enhancing human resources for both entrepreneurs and engineers, but human capital development takes time. The role of government is obviously important, but there is no easy policy to reach the goal.

These three issues are, in the authors' opinion, natural policy agenda in

the formation of the international production and distribution networks, and we hope that policymakers in this region have clear minds in confronting these issues. The East Asian countries are now actively engaging the effort toward formulating regional trade arrangements. The contents of such arrangements are expected to reflect necessary policy reform in the East Asian countries.

6.8 Conclusion

This paper claimed the importance of international production and distribution networks in East Asia and tried to verify their distinctive characteristics in their significance in each economy, their extensiveness covering many countries in the region, and their sophistication weaving both intrafirm and arm's-length transactions. Although a lot of difficulties exist in capturing those characteristics with official statistical figures, the finely disaggregated international trade statistics proves that production-block-wise fragmented patterns of location choices have extensively been developed in East Asia. The microstructure of production and distribution networks is hard to observe directly, but microdata of Japanese parent firms and their foreign affiliates suggest the sophistication of networks that consist of both intrafirm and arm's-length transactions, including firms with various firm nationalities. We observe that the formation of international production and distribution networks has been backed up by drastic changes in development strategies fully utilizing the force of globalizing corporate activities. The mechanics of the networks seem to be well explained by new economic thought of fragmentation and agglomeration. The formation of the networks carries profound policy implication in reformulating development strategies and designing regional trade arrangements.

Appendix A

Data Sources for Section 6.5

The Basic Survey of Business Structure and Activity (*Kigyo Katsudo Kihon Chosa* in Japanese) is the MITI survey, first conducted for F/Y 1991, then for F/Y 1994, and annually since then. The Basic Survey has several attractive features. First, the samples in the survey are comprehensive, covering all firms with more than fifty workers, capital of more than thirty million yen, and establishments in mining, manufacturing, wholesale and retail trade, and restaurants. Foreign affiliates covered in the survey are

those with no less than 20 percent Japanese ownership. Second, the ratios of questionnaire returns are high; the actual ratios are not disclosed but are about 90 to 95 percent. Statistics collected by the Government of Japan are legally classified into two categories: designated statistics (*shitei toukei*) and approved statistics (*shounin toukei*). The Basic Survey is the first type, and thus firms in the survey must return the questionnaires under the Statistics Law. Third, it provides firm-level data rather than the data on an establishment basis. Although establishment-level data are useful in analyzing production activities, firm-level data are much more appropriate to examine corporate activities as a whole (see table 6A.1).

The Survey of Overseas Business Activities of Japanese Companies, which is also conducted by MITI, has been conducted annually since F/Y 1970. Firms targeted by the survey are those with Japanese affiliates abroad of Japanese firms, except firms in finance, insurance, or real estate. The Survey of Overseas Business Activities is of the approved type so that the effective return ratios tend to be as low as 60 percent (in the case of the F/Y 1999 survey, the returned ratio is 56.0 percent). As explained in section 6.5, Japanese affiliates abroad include both “affiliates abroad” with no less than 10 percent ownership by Japanese parent firms and “affiliates of affiliates abroad” with more than 50 percent ownership by such “affiliates abroad,” but the survey can distinguish the former and the latter if necessary.

The industry classification used in this paper is presented in table 6A.2. Because the industry classification of the Survey of Overseas Business Activities is different from that of the Basic Survey, the latter industry classification is matched with the former to make them comparable. Unfortunately, services sectors are not fully covered by both surveys.

Table 6A.1 Definition of machinery parts and components

<i>HS classification</i>
840140, 840290, 840390, 840490, 840590, 8406, 8407, 8408, 8409, 8410, 8411, 8412, 8413, 8414, 841520, 841590, 8416, 8417, 841891, 841899, 841990, 842123, 842129, 842131, 842191, 842199, 842290, 842390, 842490, 8431, 843290, 843390, 843490, 843590, 843680, 843691, 843699, 843790, 843890, 843991, 843999, 844090, 844190, 844240, 844250, 844390, 8448, 845090, 845190, 845240, 845290, 845390, 845490, 845590, 8466, 846791, 846792, 846799, 846890, 8473, 847490, 847590, 847690, 847790, 847890, 847990, 8480, 8481, 8482, 8483, 8484, 8485, 8503, 850490, 8505, 850690, 8507, 850890, 850990, 851090, 8511, 8512, 851390, 851490, 851590, 851690, 851790, 8518, 8522, 8529, 853090, 8531, 8532, 8533, 8534, 8535, 8536, 8537, 8538, 8539, 8540, 8541, 8542, 854390, 8544, 8545, 8546, 8547, 8548, 8607, 8706, 8707, 8708, 870990, 8714, 871690, 8803, 8805, 9001, 9002, 9003, 900590, 900691, 900699, 900791, 900792, 900890, 900990, 901090, 901190, 901290, 9013, 9014, 901590, 901790, 902490, 902590, 902690, 902790, 902890, 902990, 903090, 903190, 903290, 9033, 9110, 9111, 9112, 9113, 9114, 9209

Table 6A.2 **Industry classification**

Manufacturing sector	
120	Food processing
130	Beverages, tobacco, and animal feed
140	Textiles
150	Apparel
160	Wood and wood products
170	Furniture and fixtures
180	Pulp, paper, and paper products
190	Publishing and printing
200	Chemicals
210	Petroleum and coal products
220	Plastic products
230	Rubber products
240	Leather and leather products
250	Ceramics, clay, and stone products
260	Iron and steel
270	Nonferrous metal
280	Metal products
290	General machinery
300	Electric machinery
310	Transport equipment
320	Precision machinery
330	Arms
340	Other manufacturing
290 + 300 + 310 + 320	Machinery sector
Nonmanufacturing sector	
050	Mining
480	Wholesale trade
540	Retail trade
Other	Services and other

Appendix B

The Estimation Method and Data Sources for Section 6.6

The detailed estimation method is described in table 6B.1. Japanese value added in exports of Japanese-owned firms is calculated by subtracting the import component in the exports. The proportion of the import component in exports (8.504 percent) is obtained from Management and Coordination Agency (1999). Exports of Japanese-owned firms are calculated by subtracting exports of Japanese affiliates of foreign firms (JAFF) from exports of Japan. The data for exports of JAFF are available from METI (2002b). Assuming that the ratio of value added to sales is the same no matter where the sales destination is, we obtain the Japanese value added in ex-

Table 6B.1 Exports versus FDI by Japanese-owned firms (million JPY)

Row no.	Category	2000	
		Exports	Value added (VA)
(1)	Japanese value added in exports of Japanese-owned firms in Japan		
(1.1)	In exports to FAJFs (Japanese)	46,048,596	42,132,623
(1.1a)	located in Asia	30,919,567	28,290,167
(1.1b)	located in ROW	7,875,240	7,205,530
(1.2)	In exports to Asians (non-Japanese)	23,044,326	21,084,637
(1.2a)	located in Asia	11,705,616	10,710,170
(1.2b)	located in ROW	11,705,616	10,710,170
(1.3)	In exports to foreigners (non-Japanese and Asian)	n.a.	n.a.
(1.3a)	located in Asia	3,423,414	3,132,287
(1.3b)	located in ROW	n.a.	n.a.
(2)	Value added by FAJFs in Asia	3,423,414	3,132,287
(2.1)	In goods and services sold to Japanese	36,376,123	8,054,035
(2.1a)	located in Japan	18,537,086	4,104,295
(2.1b)	located in Asia (other FAJFs in Asia)	7,276,515	1,611,093
(2.1c)	located in ROW (other FAJFs in ROW)	10,881,299	2,409,228
(2.2)	In goods and services sold to Asians (non-Japanese)	379,272	83,975
(2.2a)	located in Japan	16,321,948	3,613,841
(2.2b)	located in Asia	n.a.	n.a.
(2.2c)	located in ROW	n.a.	n.a.
(2.3)	In goods and services sold to foreigners (non-Japanese and Asian)	1,517,089	335,899
(2.3a)	located in Japan	n.a.	n.a.
(2.3b)	located in Asia	n.a.	n.a.
(2.3c)	located in ROW	1,517,089	335,899
(3)	Value added by Japanese affiliates in ROW		
(3.1)	In goods and services sold to Japanese	92,638,856	27,905,073
(3.1a)	located in Japan	25,617,494	7,716,611
(3.1b)	located in Asia (other FAJFs in Asia)	8,218,775	2,475,695
(3.1c)	located in ROW (other FAJFs in ROW)	1,029,405	310,082
(3.2)	In goods and services sold to Asians (non-Japanese)	16,369,314	4,930,835
		1,544,107	465,123

Table 6B.1 (continued)

Row no.	Category	2000	
		Exports	Value added (VA) %
(3.2a)	located in Japan	n.a.	n.a.
(3.2b)	located in Asia	1,544,107	465,123
(3.2c)	located in ROW	n.a.	n.a.
(3.3)	In goods and services sold to foreigners (non-Japanese and Asian)	65,477,255	19,723,339
(3.3a)	located in Japan	n.a.	n.a.
(3.3b)	located in Asia	n.a.	n.a.
(3.3c)	located in ROW	65,477,255	19,723,339

Sources: METI (2001) for exports of Japan; METI (2002b) for exports of JAFF; METI (2002a) for sales and purchases of FAJF; Management and Coordination Agency (1999, pp. 406) for the import inducement coefficient of export in Japan for 1995: 0.08504.

Notes: n.a. = not available. FAJF: Foreign affiliates of Japanese firms that include "affiliates abroad" with no less than 10 percent ownership by Japanese parent firms and "affiliates of affiliates abroad" with more than 50 percent ownership by such "affiliates abroad"; JAFF: Japanese affiliates of foreign firms with foreign share of more than one-third; ROW: All countries other than Japan and Asia (region); Japanese: Households and governments in Japan + all firms located in Japan – JAFF + FAJF; Asians: Households and governments in Asia + Asian-owned firms located in Asia + affiliates of firms owned by Asians in Japan and ROW; Foreigners: Households and governments in ROW + foreign-owned firms located in ROW + affiliates of foreign firms in Japan and Asia.

Method of estimation, by row number:

$$(1) ([\text{Japanese total exports}] - [\text{Exports by JAFF}] \times (1 - 0.08504) = (1.1) + (1.2) + (1.3))$$

$$(1.1) (1.1a) + (1.1b) = (1.1)$$

$$(1.1a) ([\text{Imports from Japan by FAJF in Asia}] - [\text{Imports from JAFF by FAJF in Asia (n.a.)}] \times (1 - 0.08504))$$

$$(1.1b) ([\text{Imports from Japan by FAJF in ROW}] - [\text{Imports from JAFF by FAJF in ROW (n.a.)}] \times (1 - 0.08504))$$

$$(1.2) (1.2a) + (1.2b) = (1.2)$$

$$(1.2a) ([\text{Japanese exports to Asia}] - [\text{Exports to Asia by JAFF (available only for exports to Asia)}] \times (1 - 0.08504) - (1.1a) - (1.3a))$$

$$(1.2b) [\text{Japanese exports to p.c. nationals located in ROW (n.a.)}] \times (1 - 0.08504)$$

$$(1.3) (1.3a) + (1.3b) = (1.3)$$

(continued)

Table 6B.1 (continued)

- (1.3a) [Japanese exports to foreigners located in Asia (n.a.)] \times (1 - 0.08504)
(1.3b) ([Japanese exports to ROW] - [Exports to ROW by JAFF]) \times (1 - 0.08504) - (1.1b) - (1.2b)
(2) (Sales by FAJF in Asia) - (Purchases by FAJF in Asia) = (2.1) + (2.2) + (2.3)
(2.1) (2.1a) + (2.1b) + (2.1c) = (2.1)
(2.1a) (2) \times (Ratio of sales to Japan by FAJF in Asia) - (2.2a) - (2.3a)
(2.1b) (2) \times ([Ratio of local sales by FAJF in Asia] \times [Ratio of sales to FAJF in local sales by FAJF in Asia (proxy: 0.4)])
(2.1c) (2) \times ([Ratio of sales to ROW by FAJF in Asia] \times [Ratio of sales to ROW by FAJF in Asia (proxy: 0.2)])
(2.2) (2.2a) + (2.2b) + (2.2c) = (2.2)
(2.2a) (Value added in goods and services sold to JAFF [owned by Asians] by FAJF in Asia [n.a.])
(2.2b) (2) \times (Ratio of local sales by FAJF in Asia) \times (Ratio of sales to Asians in local sales by FAJF in Asia [proxy: 0.6]) - (2.1b) - (2.3b)
(2.2c) (Value added in goods and services sold to Asians located in ROW by FAJF in Asia [n.a.])
(2.3) (2.3a) + (2.3b) + (2.3c) = (2.3)
(2.3a) (Value added in goods and services sold to JAFF [owned by foreigners] by FAJF in Asia [n.a.])
(2.3b) (Value added in goods and services sold to foreigners located in Asia by FAJF in Asia [n.a.])
(2.3c) (2) \times (Ratio of sales to ROW by FAJF in Asia) \times (Ratio of sales to foreigners in sales to ROW by FAJF in Asia [proxy: 0.8]) - (2.1c) - (2.2c)
(3) (Sales by FAJF in ROW) - (Purchases by FAJF in ROW) = (3.1) + (3.2) + (3.3)
(3.1) (3.1a) + (3.1b) + (3.1c) = (3.1)
(3.1a) (3) \times (Ratio of sales to Japan by FAJF in ROW) - (3.2a) - (3.3a)
(3.1b) (3) \times ([Ratio of sales to Asia by FAJF in ROW] \times [Ratio of sales to FAJF in Asia in sales to Asia by FAJF in ROW (proxy: 0.4)])
(3.1c) (3) \times ([Ratio of local sales by FAJF in ROW] \times [Ratio of sales to FAJF in local sales by FAJF in ROW (proxy: 0.2)])
(3.2) (3.2a) + (3.2b) + (3.2c) = (3.2)
(3.2a) (Value added in goods and services sold to JAFF [owned by Asians] by FAJF in ROW [n.a.])
(3.2b) (3) \times (Ratio of sales to Asia by FAJF in ROW) \times (Ratio of sales to Asians in sales to Asia by FAJF in ROW [proxy: 0.6]) - (3.1b) - (3.3b)
(3.2c) (Value added in goods and services sold to Asians located in ROW by FAJF in ROW [n.a.])
(3.3) (3.3a) + (3.3b) + (3.3c) = (3.3)
(3.3a) (Value added in goods and services sold to JAFF [owned by foreigners] by FAJF in ROW [n.a.])
(3.3b) (Value added in goods and services sold to foreigners located in Asia by FAJF in ROW [n.a.])
(3.3c) (3) \times ([Ratio of local sales by FAJF in ROW] \times [Ratio of sales to foreigners in sales to ROW by FAJF in ROW (proxy: 0.8)]) - (3.1c) - (3.2c)

ports of Japanese-owned firms to FAJF in Asia (7,205,530 million Japanese (JP) yen), to FAJF in ROW (21,084,637 million JP yen), to Asians in Asia (10,710,170 million JP yen), and to foreigners in ROW (3,132,287 million JP yen). There is no information on exports to foreigners in Asia or exports to Asians in ROW.

Value added earned by FAJF in Asia (8,054,035 million JP yen) is calculated as sales minus purchases, which are available from METI (2002a). Assuming again that the ratio of value added to sales is the same no matter where the sales destination is, we obtain the value added by FAJF in goods and services sold to Japanese located in Japan (1,611,093 million JP yen), to Japanese located in Asia (2,409,228 million JP yen), to Japanese located in ROW (83,975 million JP yen), to Asians located in Asia (3,613,841 million JP yen), and to foreigners located in ROW (335,899 million JP yen). Data are not available for sales by FAJF to Asians in Japan and ROW or those to foreigners in Japan and ROW. Value added by FAJF in ROW in goods and services sold to various places is estimated in the same way.

The Ministry of Economy, Trade and Industry (2002b) defines Japanese affiliates of foreign firms as those with foreign share of more than one-third. Therefore, exports of JAFFs in the analysis are those by such affiliates. The Ministry of Economy, Trade and Industry (2002a) defines Japanese affiliates abroad as both “affiliates abroad” with no less than 10 percent ownership by Japanese parent firms and “affiliates of affiliates abroad” with more than 50 percent ownership by such “affiliates abroad” as mentioned previously. Thus, sales and purchases by FAJFs in the analysis are those by such affiliates. In METI (2002a), it is known that exports in sales and imports in purchases by FAJFs are overstated because FAJFs are sometimes reported as exports and imports when they are selling locally, but the ultimate destinations and origins are foreign countries. We therefore regard 30 percent of sales and purchases to and from Japan and ROW in manufacturing as local transactions. Moreover, there is no available information on the magnitude of transactions among FAJFs in METI (2002a). We therefore use 0.4 (0.6) as a proxy of the ratio of sales to FAJFs (Asians) in local sales by FAJFs in Asia, 0.2 (0.8) as a proxy of the ratio of sales to FAJFs (foreigners) in sales to ROW by FAJFs in Asia, 0.4 (0.6) as a proxy of the ratio of sales to FAJFs in Asia (Asians) in sales to Asia by FAJFs in ROW, and 0.2 (0.8) as a proxy of the ratio of sales to FAJFs (foreigners) in local sales by FAJFs in ROW.

Because both METI (2002a) and METI (2002b) are approved statistics, the returned ratios are not so high. As for METI (2002b), 1,935 out of 3,742 parent firms returned the questionnaires (the returned ratio is 51.7 percent). In the case of METI (2002a), 2,157 out of 3,430 parent firms returned the questionnaires (the returned ratio is 62.9 percent), and the number of Japanese affiliates abroad covered is 14,991.

References

- Ando, Mitsuyo. 2004. Fragmentation and vertical intra-industry trade in East Asia. Paper presented at conference, 79th Annual Western Economic Association International. 30 June–3 July, Vancouver, Canada.
- Ando, Mitsuyo, and Antoni Esteveordal. 2003. Trade policy formation in Latin America and Asia-Pacific: A comparative analysis. Paper presented at the LAEBA panel at the FIEALC meeting, Globalization in Asia and Latin America: Trade, Investment and Finance. 24 September 2003, Osaka, Japan.
- Arndt, Sven W., and Henryk Kierzkowski. 2001. *Fragmentation: New production patterns in the world economy*. Oxford, UK: Oxford University Press.
- Baldwin, Robert E., and Fukunari Kimura. 1998. Measuring U.S. international goods and services transactions. In *Geography and ownership as bases for economic accounting*, ed. R. E. Baldwin, R. E. Lipsey, and J. D. Richardson, 9–36. Chicago: University of Chicago Press.
- Cheng, Leonard K., and Henryk Kierzkowski. 2001. *Global production and trade in East Asia*. Boston: Kluwer Academic.
- Deardorff, Alan V. 2001a. Fragmentation across cones. In *Fragmentation: New production patterns in the world economy*, ed. Sven W. Arndt and Henryk Kierzkowski, 35–51. Oxford, UK: Oxford University Press.
- . 2001b. Fragmentation in simple trade models. *North American Journal of Economics and Finance* 12:121–37.
- Dunning, John H. 1993. *Multinational enterprises and the global economy*. Wokingham, UK: Addison-Wesley.
- Fujita, Masahisa, Paul Krugman, and Anthony J. Venables. 1999. *The spatial economy: Cities, regions, and international trade*. Cambridge, MA: MIT Press.
- Fukao, Kyoji, Hikari Ishido, and Keiko Ito. 2003. Vertical intra-industry trade and foreign direct investment in East Asia. RIETI Discussion Paper Series no. 03-E-001.
- Jones, Ronald W., and Henryk Kierzkowski. 1990. The role of services in production and international trade: A theoretical framework. In *The political economy of international trade: Essays in honor of Robert E. Baldwin*, ed. Ronald W. Jones and Anne O. Krueger. Oxford, UK: Basil Blackwell.
- Kimura, Fukunari. 1998. Japanese multinationals and regional integration in Asia. In *Asia & Europe: Beyond competing regionalism*, ed. Kiichiro Fukasaku, Fukunari Kimura, and Shujiro Urata, 111–33. Brighton, UK: Sussex Academic Press.
- . 2000. Location and internalization decisions: Sector switching in Japanese outward foreign direct investment. In *The role of foreign direct investment in East Asian economic development*, ed. Takatoshi Ho and Anne O. Krueger. Chicago: University of Chicago Press.
- . 2002. Subcontracting and the performance of small and medium firms in Japan. *Small Business Economics* 18:163–75.
- . 2003. Development strategies for economies under globalisation: South-east Asia as a new development model. In *New Asian regionalism: Responses to globalisation and crises*, ed. Tran Van Hoa and Charles Harvie, 72–95. London: Palgrave.
- Kimura, Fukunari, and Mitsuyo Ando. 2003. Fragmentation and agglomeration matter: Japanese multinationals in Latin America and East Asia. *North American Journal of Economics and Finance* 14 (3): 287–317.
- . 2004a. The economic analysis of international production/distribution networks in East Asia and Latin America: The implication of regional trade arrangements. *Business and Politics*, forthcoming.

- . 2004b. Two-dimensional fragmentation in East Asia: Conceptual framework and empirics, in “Outsourcing and fragmentation: Blessing or threat?” special issue, *International Review of Economics and Finance*, forthcoming.
- Kimura, Fukunari, and Robert E. Baldwin. 1998. Application of a nationality-adjusted net sales and value added framework: The case of Japan. In *Geography and ownership as bases for economic accounting*, ed. R. E. Baldwin and J. D. Richardson, 49–80. Chicago: University of Chicago Press.
- Krugman, Paul. 1991. Increasing returns and economic geography. *Journal of Political Economy* 99:183–99.
- . 1995. *Development, geography, and economic theory*. Cambridge, MA: MIT Press.
- Lipsey, Robert E. 2004. *U.S. firms and East Asian development since 1990*. Paper presented at workshop of the World Bank Institute, Foreign Direct Investment and Economic Development: Lessons from East Asian Experience. 30 November and 1 December 2003, Bali, Indonesia.
- Management and Coordination Agency. 1999. *1995 input-output tables: Explanatory report*. Tokyo: Management and Coordination Agency, Government of Japan.
- The Ministry of Economy, Trade and Industry (METI). 2001. *White paper on international trade 2001* [in Japanese]. Tokyo: METI, Government of Japan.
- . 2002a. *The 31st survey of overseas business activities of Japanese companies* [in Japanese]. Tokyo: Printing Office, Ministry of Finance, Government of Japan.
- . 2002b. *The 35th survey of Japanese affiliates of foreign firms* [in Japanese]. Tokyo: Printing Office, Ministry of Finance, Government of Japan.
- . 2003. *White paper on international trade 2003* [in Japanese]. Tokyo: METI, Government of Japan.
- Pangestu, Mari. 2003. In *Development, trade, and the WTO: A handbook*, ed. Bernard Hoekman, Philip English, and Aaditya Matto, 149–59. Washington, DC: World Bank.
- World Bank. 1993. *The East Asian miracle: Economic growth and public policy*. Oxford, UK: Oxford University Press.

Comment Meng-chun Liu

This paper, by Professors Ando and Kimura, which concentrates on Japan’s machinery industries as a case study, intends to underline the international production and distribution networks comprising vertical production chains and distribution networks across East Asian countries in the organization of international trade.

This is an interesting paper that contains a careful statistical analysis. Generally speaking, from the perspective of production networks, the paper is motivated to explore the ways in which Japanese firms organize their international trade with neighboring East Asian countries. The paper be-

Meng-chun Liu is the deputy director of the International Division of the Chung Hua Institution for Economic Research.

gins with an introduction to policy backgrounds within East Asia and then goes on to provide theoretical ideas and empirical works relevant to cross-border production networks. It concludes by utilizing Baldwin and Kimura's "firm nationality approach" to measure the economic activities of Japanese firms in terms of their transaction channels.

Some interesting results are derived by their empirical work, yet we still look forward to the authors' clarifying some questions about this paper. First of all, the paper highlights an important research issue, particularly in the context of the global economy. We have indeed seen significant integration of the global economy in recent decades, brought about by expanding international trade and direct capital flows, with the increasing integration of global markets and the disintegration of the production process clearly going hand in hand. We may therefore regard the disintegration of production processes as the overseas expansion of production networks, with the manufacturing and service activities being performed both at home and abroad. Trade liberalization and the reduction in international transaction costs are two important factors driving the global integration process. Both international outsourcing and prolonged production "roundaboutness" are characteristic features of production networks, while international outsourcing plays a critical role in the process of international production networks, and the improvements in transaction efficiencies will generally enlarge international outsourcing.

This paper stresses that the production networks are organized by corporations' foreign direct investment (FDI) and "the mixture of firms of various nationalities." In other words, the paper recognizes that the formation of production networks relies on both FDI and international subcontracting relationships. Furthermore, cross-border production networks underline the phenomenon of prolonged production roundaboutness, and it seems that Japanese firms play a central role in arranging the international division of labor, which is both vertically integrated and producer driven (as opposed to the alternative form of production network that is horizontally integrated and buyer driven).

The role of multinationals and FDI in shaping international trade is well recognized in the literature. Drawing on the theories of the fragmentation, agglomeration, and internationalization of corporate firms, the authors suggest, theoretically, that firms' comparative advantages can still work in determining trade patterns. This is a good starting point from which to describe the formation of production networks and trade patterns across regional countries; however, the paper seems to link the empirical results to the theoretical background rather weakly.

Second, the products manufactured by the machinery industries are capital goods in nature, with the demand for such products being derived by the suppliers of downstream industries. That is, the trade in machinery and relevant components is heavily reliant upon the development of the im-

porting countries' downstream industries. Moreover, the international transfer of production technologies is usually embodied in capital goods, comprising mainly machinery. Without a doubt, outward FDI from Japanese firms to East Asia, as well as the attendant technology transfers, can help to boost trading in machinery between Japan and its trading partners; however, this paper seems to ignore these important driving forces.

Third, table 6.1 in this paper provides data on the importance of trade in machinery in the East Asian economies. Taiwan was ranked as the fifteenth largest trading economy in the world in 2002, and it also has significant trade with Japan, especially in machinery. However, table 6.1 does not include Taiwan's machinery trade data. The authors are expected to take this into account.

Finally, in this paper, production agglomeration plays an important role in influencing trading patterns via the formation of production networks. Foreign direct investment is clearly dominant in many industrial clusters in East Asia, such as the Kelang Valley and Penang in Malaysia, and some of the early studies have argued that indigenous firms fail to achieve industrial linkage with FDI firms, thus weakening the industrial cluster, in terms of shaping its comparative advantages. One of the preconditions for successful development of clusters is therefore the participation of local indigenous firms in the production networks, which raises important policy implications. For example, in addition to the enhancement of human resources, which is mentioned in this paper, the government may need to consider how to promote entrepreneurship in the host developing countries.

Comment Somkiat Tangkitvanich

The issue of production and distribution networks is important but has not received sufficient attention in trade literature in the past. The authors have identified key patterns that characterize the nature of the production and distribution networks in East Asia. Based on two sets of detailed survey data, they have shown, convincingly, that the production and distribution networks in East Asia are geographically extensive, sophisticated, and important to the understanding of trade patterns in the region. The readers, however, need to be aware that the data presented in this paper are based solely on surveys of Japanese multinational corporations (MNCs). As a result, any comparison of the characteristics of production and distribution networks in East Asia and that of other regions such as Latin America should be noted with care.

Somkiat Tangkitvanich is research director for Information Economy at the Thailand Development Research Institute.

In the paper, the extensiveness and the sophistication of the production and distribution networks are analyzed by using three theories: the fragmentation theory, the agglomeration theory, and the internalization theory of firms. As a policy researcher trying to understand the implications of the results, I am attracted to two issues that are not explicitly addressed by the paper. The first issue concerns the efficiency of the current production network in East Asia. This question arises because the formation of the network is driven not only by the comparative advantage of each production location but also by the host country's foreign direct investment (FDI) policy. As suggested in the paper, until recently, FDI policy in Southeast Asia was based on the "selective acceptance" principle. Because investments in many industries, particularly the machinery industries, involve high sunk costs and are thus subject to increasing returns, the extensiveness and sophistication of the current production and distribution networks identified by the authors may simply be an outcome of past investment policy that promotes inefficient capital-intensive industries.

My second point is related to the first one. The authors mentioned in passing at the end of the paper the implications of the production and distribution networks on regional trade arrangement. Suppose that the existing networks are a result of past misguided policy, can regional trade arrangements, currently mushrooming in the region, provide some remedies and how? Traditional pair-wise bilateral free trade agreements (FTAs) are unlikely to provide the necessary economic integration for an industry whose production networks involve more than two countries. For example, suppose that a product is first produced in country *A*, then slightly processed in country *B* without a substantial transformation, and then finally exported to country *C*. Even though *C* may have bilateral FTAs with *A* and *B* separately, neither FTAs would be beneficial because the product would be classified as originating from *A*. A regionwide FTA appears to be a far more superior solution, provided that the rules of origin are carefully designed. These two issues should be explored in future studies.