Spotlight on Japan's Competitiveness

Part 2: The Emergence of Asian Nations and the Competitiveness of Japanese Manufacturing Industry

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Significance of the International Competitiveness of Manufacturing Industry

In discussing international competitiveness at the industrial level, reference is often made to manufacturing industry performance. The logic is that industrial products which are the output of the manufacturing industry are usually exposed to competition on international markets, the results of which emerge as the trade patterns of individual industries. Trends in productivity are certainly important in considering long-term industrial competitiveness, but using trade statistics produces more timely and detailed information on competitiveness by product. For example, the electronics industry is one of Japan's leading export industries, but with the recent catch-up by South Korea, Taiwan and other Asian countries, trade statistics reveal a steady decline in the exports of some products even as imports climb. Japan's competitiveness may well be falling in regard to these products. Here we will consider the competitiveness of Japan's manufacturing industry from the perspective of trade statistics.

The international competitiveness of manufacturing industry is important in considering the medium to long-term prosperity of the national economy as a whole. It has been suggested that the increasing economic weight of services has been accompanied by a decline in the importance of manufacturing industry. For example, the gross domestic product (GDP) share of manufacturing industry in 1998 was 21.2% in Japan, 16.9% in the United States and 20.1% in Europe as an average. However, the importance of manufacturing industry is obvious from the dynamic perspective of economic growth contribution. In all Organization for Economic Cooperation and Development (OECD) nations, manufacturing industry productivity is in fact growing faster than service industry productivity, driven by the dynamic development of new products and production technology which characterizes manufacturing industry. Economic growth from the supply side can be broken down into growth of total factor productivity (TFP), and growth of the productivity factor inputs of labor and capital. With no likelihood of major growth in labor and capital inputs, medium to long-term economic growth will depend on rising productivity. A driving force of mid-term productivity will be innovation in manufacturing industry.

Made in America, a report on U.S. industrial competitiveness published in the late 1980s, elected to analyze manufacturing industry on the grounds that: (1) while manufacturing industry alone accounts for no more than around 20% of GDP, this share grows substantially when high added-value services such as information processing and engineering services are added; (2) because the trade balance cannot be kept in equilibrium on the strength of the service industry alone, manufacturing industry with its export strength will have to be retained in some form; and (3) while capital moves around internationally with comparative freedom, the lack of freedom of labor means that manufacturing industry is vital in maintaining domestic employment. Case studies in the report were also analyzed with an emphasis on the dynamic aspect of manufacturing industry, identifying the presence of an internationally competitive manufacturing industry as important in stimulating the economy as a whole.

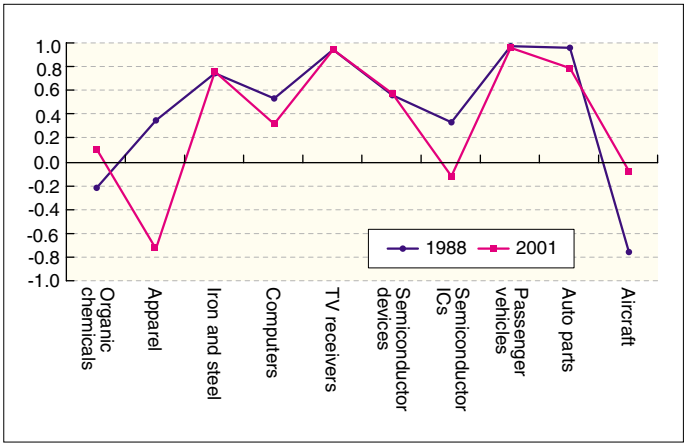
Actual Strength of Japan's Manufacturing Industry as Demonstrated in Trade Statistics

Japan's trade structure has changed significantly over the last 10 years. Moving into the 1990s, the total value of trade with East Asia began to outweigh the total value of trade with the United States, and ties between Japan and East Asia are steadily deepening in terms of not only trade but investment too.[1] Changes in Japan's trade structure have emerged not only in terms of the composition of trade partners, but also in the composition of products. Looking at trade with East Asia, the yen appreciation which followed the Plaza Accord in the late 1980s led Japanese companies, particularly in the electrical industry, to shift into East Asia. A trade pattern has accordingly been established whereby electronic parts and capital goods are exported to East Asia and electrical products are imported back. The electronics industry has also been going from strength to strength in South Korea and Taiwan, and electronics parts imports have begun to increase.

We used trade specialization indexes (TSIs) based on trade statistics to examine the changes in the international competitiveness of Japan's manufacturing industry. A TSI is the value derived when import value is subtracted from export value for the product in question to produce the net value of exports, which is then divided by gross trade value, which is the combined value of the import and export values. This figure is then reduced to a value between 1 and -1. In other words, where the product in question comprises 100% exports (all exports and no imports), the value will be 1, or -1 in the case of 100% imports. Where exports and imports are even, the value will be 0. Accordingly, the greater the TSI, the greater the export competitiveness of the product in question in some aspect such as product quality or price compared to the trading partner.

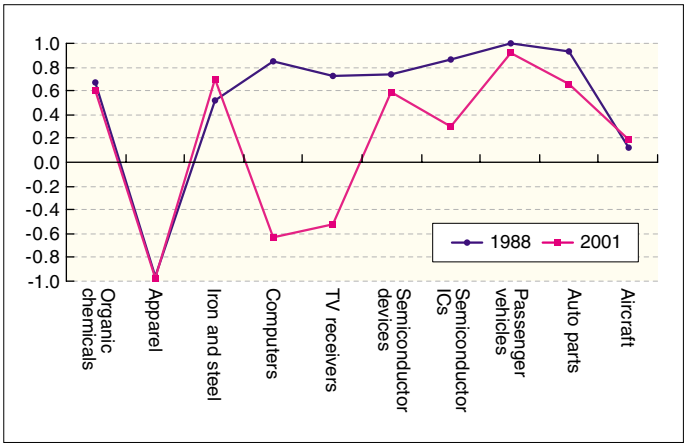
Figures 1 and 2 compare TSIs in 1988 and 2001 for trade with the United States and East Asia. Firstly, looking at the United States, the TSI has held close to 1 for automobiles and auto parts, suggesting that Japan's auto industry has strong international competitiveness. However, the TSIs for computers and integrated circuits (ICs)

Figure 1 Trends in trade specialization indexes with the United States



Source: Author's calculation using "Trade Statistics," Ministry of Finance

Figure 2 Trends in trade specialization indexes with East Asia



Source: Author's calculation using "Trade Statistics," Ministry of Finance

have been declining over the last decade, and ICs in particular evidence an import excess. The TSIs for organic chemical products and aircraft have remained negative, with imports in surplus, and although these figures are moving close to zero, this would seem to reflect a decline in imports following the recent economic slump in Japan.

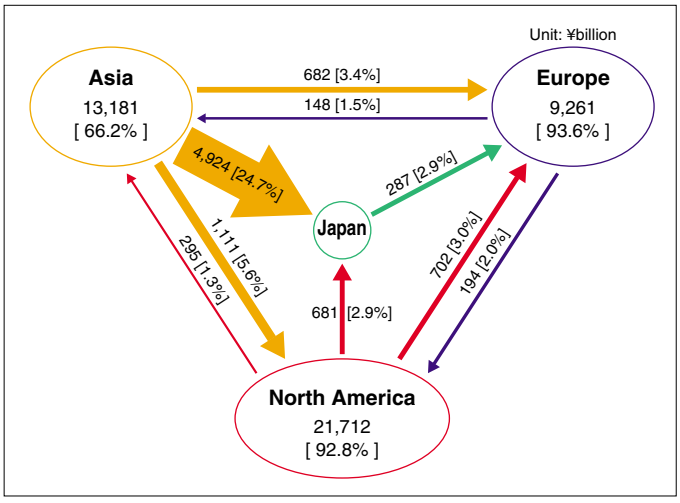
A comparison of the TSIs with East Asia over the last decade clearly reveals those areas which have undergone major change, as well as areas where this has not been the case. For example, looking at automobiles and auto parts, the TSI for auto parts has fallen slightly, but Japan's export competitiveness seems to remain strong. There has also been little change in the export competitiveness of iron and steel or organic chemical products, while apparel has sustained an import surplus. By contrast, in the electronics sector, Japan has lost competitiveness in regard to numerous products. For final products such as computers and TV receivers, export surpluses have turned overnight into import surpluses. Similarly for electronic parts, the TSI for semiconductor ICs has plunged. Final-assembly products seem to have been affected by Japanese companies shifting their production bases to East Asia. The slump in semiconductor ICs, for example, has been heavily influenced by slipping TSIs with South Korea, Taiwan and other Newly Industrializing Economies (NIEs), indicating that technological progress in local companies in East Asia is reducing the comparative advantage of Japanese companies.

Foreign Direct Investment and Its Impact on Trade Patterns

When examining trade patterns with East Asia, it is important to include consideration of the impact of the offshore shift of production bases, mainly of electrical machinery. Production bases were transferred to East Asia in response to the yen appreciation which followed the 1985 Plaza Accord, starting with increased direct investment in Thailand, Malaysia and other Association of South-East Asian Nations (ASEAN) countries. Since the 1990s, policies introduced by the Chinese government to encourage the transition to a market economy have seen investment in China by Japanese companies boom. According to the Ministry of Finance's foreign direct investment statistics, direct investment in East Asia by manufacturing industry comprised a cumulative total of around ¥6 trillion between fiscal 1990 and fiscal 2001, 27% of which was in the electrical machinery industry. In addition, chemicals, steel and nonferrous metals, and transportation machinery accounted for more than 10%. This vigorous direct investment was followed by the offshore transfer of production which had been conducted in Japan, also impacting on trade patterns. For example, if final products such as electrical appliances and computers are manufactured overseas rather than in Japan, products which were formerly exported will disappear from trade statistics, pushing down TSIs. Conversely, if electronic parts manufactured in Japan are used as the materials for these final products, products which were not formerly present in trade statistics will be treated as exports, boosting TSIs.

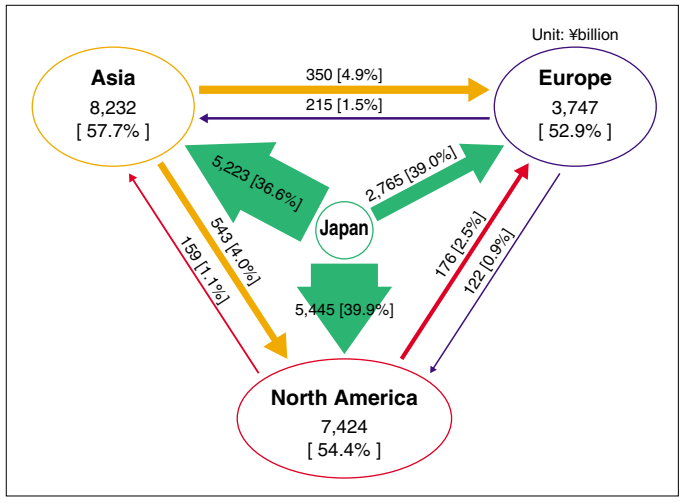
To quantify the impact of increasing offshore production on trade patterns, we will examine the offshore activities of Japanese companies as revealed in the Survey of Overseas Business Activities (Ministry of Economy, Trade and Industry). Figure 3 indicates the sales amount in fiscal 2000 according to the destination of products manufactured by Japanese overseas affiliates established locally in East Asia. It appears that 66.2% of production by these local operations is supplied to the same regional market, with 24.7% reverse-imported to Japan. The Japanese local operations in the United States and Europe sell more than 90% of their products in the domestic markets, which suggests that they were established with an eye to the local market. By contrast, many of the Japanese operations established in East Asia were looking for division of production with Japan. Figure 4 conversely delineates the sources from which local affiliates procure their parts. The local procurement rate in East Asia is 57.7%, with 36.6% dependent on imports from

Figure 3 Sales amount of Japanese affiliates by destination (FY2000)



Source: Survey of Overseas Business Activities, Ministry of Economy, Trade and Industry

Figure 4 Procurement amount of Japanese affiliates by source (FY2000)



Source: Survey of Overseas Business Activities, Ministry of Economy, Trade and Industry

Japan. The reliance of foreign production operations on imports from Japan for the bulk of parts procurement is also true for operations in the United States and Europe. Finally, when the extent of the impact on trade as a whole of the activities of these foreign-based operations was examined by comparing trade amounts with East Asia in the trade statistics for 2000, reverse-imports accounted for around ¥5 trillion of the gross import amount of around ¥17 trillion, while exports to locally-established operations accounted for around ¥5 trillion of the gross export amount of around ¥21 trillion, indicating a substantial share of trade absorbed by transactions with locally-established Japanese companies.

In terms of the impact on trade of the transfer of production to East Asia, on a macro level, exports to Japanese affiliates and reverse-imports are virtually equal, but is the same true on a micro level of individual industries? As detailed data has not yet been released for fiscal 2000, we will examine the fiscal 1999 data, which indicates that reverse-imports outweighed local procurement in the case of electrical machinery, serving to boost Japanese imports, while transportation machinery saw local procurement top reverse-imports. The electrical machinery industry therefore seems to be lean toward local production aimed at division of production with East Asia, while for transportation machinery, the focus is more on the local market.

Industrial Competitiveness As Seen in Trade Statistics and Implications for "Hollowing-Out"

The view that bilateral trade patterns are determined by the relative competitiveness of individual products dates back to traditional trade theory, led mainly by the classical economist David Ricardo. The Ricardian model assumes that products are manufactured by the single production factor of labor, with product competitiveness defined by labor productivity. In other words, as production technology levels differ among countries, those countries manufacturing the same product with the higher productivity technology will become exporters of that product to countries with lower productivity. Here it should be noted that trade patterns are determined simply by the relative comparative advantage of a product, and do not reflect absolute productivity levels. For example, even where Country A has extremely high productivity in all industries compared to Country B and enjoys a comparative advantage at the absolute level, because Country A's labor is a finite production resource, it would be impossible for Country A to handle all production, including that for Country B. Accordingly, Country A selects those products where its productivity is particularly high and consumes these domestically as well as exporting them, importing products where Country A has relatively low productivity from Country B, which handles the production of said products.

The Heckscher-Ohlin model (H-O model) developed this single production factor model using the three factors of capital, labor and land. The H-O model sees trade patterns as being determined by countries' different endowment of production factors. Take, for example, labor-intensive textile products and capital-intensive electronic parts. China has the advantage of comparatively abundant and cheap labor, while Japan enjoys comparatively abundant supplies of capital. According to the H-O model, China has a comparative advantage in textiles, while Japan has a comparative advantage in electronic parts, resulting in textiles being exported from China to Japan, and electronic parts being exported from Japan to China.

How can we use these trade theories to interpret the trade patterns indicated by the TSIs in the previous section? Firstly, in terms of TSIs with the United States, because both Japan and the United States are developed nations with no major disparities in labor and capital availability, the Ricardian model suggests that the trade pattern reflects the difference in TFP for individual products. For example, TSIs reveal that Japan still maintains a comparative advantage over the United States for automobiles and auto parts. In terms of the absolute level of productivity too, the TFP of Japan's automobile industry is greater than that of

the United States.[2] Conversely, the TSI has fallen heavily for the electronics industry, suggesting that Japan's comparative advantage over the United States has declined.

In terms of trade patterns with East Asia, because the East Asian countries have a more abundant supply of cheap labor than Japan, the H-O model suggests that Japan would export capital-intensive products and import labor-intensive products. TSIs in fact confirm an export surplus in capital-intensive industries such as automobiles and chemical products, with labor-intensive industries such as textile products recording import surpluses. Within the electronics industry, the H-O model can explain the negative TSIs for such industries as electrical appliances, computers, and other processing and assembly industries, because these are more labor-intensive than semiconductors and other electronic parts.

Further, as observed earlier, Japanese companies in the electronics industry have been transferring their production operations, particularly assembly processes, abroad to East Asia. This globalization of business activities by Japanese companies is basically in line with economic theory, and can be regarded as providing merit to Japan. At the same time, concern has also been expressed over negative aspects such as the deterioration of domestic employment and loss of Japan's manufacturing technology. An effective means of examining the legitimacy of these concerns over industrial hollowing-out is to consider the preconditions of traditional trade theories such as the Ricardian model and the H-O model. The two key preconditions for these economic models are (1) perfect product markets and production factor markets and (2) conformance of the product market with the law of diminishing returns.

Firstly, given a perfect production factor market (the labor market is particularly important here), an offshore production shift would cause domestic employment to decline, but the surplus employment would be absorbed by areas with high productivity. However, in reality, because workers find it difficult to change professions, inter-industry labor shifts do not necessarily proceed smoothly. Further, although the law of diminishing returns is an important concept forming the basis of microeconomics, increasing returns can be observed in industries such as software, where fixed costs are high and marginal costs are small, and semiconductor ICs, where "learning by doing" boosts productivity. In these industries, the shift of production operations based on temporary comparative advantage could lead to a reduction in the long-term industrial competitiveness of the industries in question.

The difficulty of shifting workers between industries is a labor market problem, and should be resolved through active labor policies such as re-employment assistance, while an unemployment insurance system and other safety nets are being set in place to deal with the unemployment arising from industrial structure transformation. Accordingly, it would be a mistake to restrict the global movement of industries which have lost their international competitiveness in order to secure domestic employment. However, a more serious examination is necessary for the argument that manufacturing technology, which has been the wellspring of the competitiveness of the Japanese manufacturing industry, is now being eroded. The law of increasing returns suggests that if workers' skills are accumulating according to the growing production volume in a certain industry, productivity will rise. Where this law is functioning, major economic damage could be caused by the loss of the accumulated skills due to the offshore shift of production. Further, the external economic effect created by the clusters of related industries is also a factor in increasing returns, and where one industry which is part of an industrial cluster shifts overseas, the external effect produced by the cluster will be lost, impacting negatively on those industries remaining at home. In trade theory too, strategic trade theory has emerged as a new area incorporating increasing returns and imperfect competition.[3] This cutting-edge theory postulates that the merits and demerits of offshore production shifts have to be determined by the productivity characteristics of the particular industry, as well as the situation of the external economies with related industries.

Returning to the pattern of TSIs with East Asia, because the assembly processes for electric appliances and computers are labor-intensive, these are not areas in which technological progress will lead to an explosive surge in productivity. In that sense, the offshore shift of production of these products which has continued since the late 1980s represents a decision by companies to optimize their production bases from a global standpoint, and as such, should provide merit for industry as a whole. On the other hand, the declining TSIs for such products as semiconductors and computer parts require serious investigation. As these industries are capital-intensive and are open to swift technological innovation, there is great strategic significance in manufacturing such products domestically. Moreover, the falling TSIs in these areas seem to be primarily due to the emergence of South Korean and Taiwanese companies. As the international competitiveness of products with a rapid pace of technological innovation is critical in boosting the medium to long-term productivity of the nation as a whole, strategic steps will need to be taken to restore Japan's electronics industry.

Notes

1) "East Asia" here refers to China (including Hong Kong), Taiwan, South Korea, Singapore, Thailand, Malaysia, the Philippines and Indonesia.

2) Refer to Part 1 of the "Spotlight on Japan's Competitiveness" series in *JJTI,* Sept./Oct. 2002 issue.

3) Numerous papers have been published on this subject, including Helpman, E. and P. Krugman (1985), *Market Structure and Foreign Trade: Increasing Returns, Imperfect Competition, and the International Economy,* MIT Press.

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