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## The Changing Structure of Japanese Trade Flows [1]

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### Abstract

The changes to the structure of Japanese exports and imports in the second half of the 1980s departed significantly from past trends. Econometric analysis confirms that some of the structural changes—notably the importance of consumer goods trade—cannot be fully explained using conventional trade equations. However, the structural changes were consistent with the likely nonlinear effects of the unusually large appreciation of the yen during 1985-87, which, among other things, precipitated a surge in Japanese foreign direct investment.

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[1] It should be noted that the term "country" used in this paper does not in all cases refer to a territorial entity that is a state as understood by international law and practice. The term also covers some territorial entities that are not states but for which statistical data are maintained and provided internationally on a separate and independent basis.

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# Summary

This paper describes and analyzes trends in the structure of Japanese exports and imports, focusing in particular on developments in the second half of the 1980s. The paper shows that changes in the structure of trade flows in this period departed significantly from past trends.

Real exports expanded rapidly up to the mid-1970s, when exports accounted for about 7 percent of world imports. Subsequently, real export growth tended to fall short of total demand in trading partner countries, although favorable price developments pushed the value of exports to close to 10 percent of world imports in the mid-1980s. In the second half of the 1980s, real export growth slumped following the sharp appreciation of the yen after August 1985. The slump reflected weak demand for Japanese consumer goods exports, whose share of total exports declined in contrast to past trends. Capital goods exports, meanwhile, continued to expand, reinforcing historical trends. Econometric analysis cannot fully account for these developments, whose pattern is consistent with the surge in Japanese foreign direct investment that followed the unusually large appreciation of the yen in 1985-87.

Real import growth expanded faster than overall domestic demand in the period up to the large world oil price rise of 1973-74. In the subsequent ten years, however, real import penetration remained fairly constant on account of slow growth in demand for nonmanufactures that partly reflected energy conservation efforts. Imports of manufactures, however, continued to expand faster than real domestic demand in this period. The yen's appreciation of 1985-87 precipitated a sharp accentuation of real manufactured import growth in the second half of the 1980s, although real growth of nonmanufactured imports remained at a modest pace. The rapid growth of manufactured imports greatly exceeded the predictions of a conventional import demand equation. The unusually rapid growth of manufactured imports can, in turn, be traced to a quadrupling of consumer goods imports.

# I.  Introduction

This paper describes and analyzes the changing structure of Japan's trade flows, focusing in particular on developments in the second half of the 1980s.  The paper concludes that some of the changes in trade structure in this period represent significant departures from past trends.  The departures can be attributed, in part, to the unusually large appreciation of the yen during 1985-87.

The paper is organized as follows.  Part II describes long-term historical trends in exports and provides a formal analysis of developments in the structure of exports after 1985.  Part III presents a corresponding analysis of imports.  Conclusions are drawn together in Part IV.

# II.  Exports

Japan's exports consist almost entirely of manufactured goods.  The structure of exports tends to be more specialized than that of other OECD countries with a heavy concentration of exports in a number of high value-added product groups. 1/  The rapid post-war increase in the real share of Japanese exports in world markets came to a halt in the early 1970s and stagnated until the mid-1980s.  In the second half of the 1980s, real market share declined substantially as the average real growth of exports in the period 1985-89 recorded its lowest level of any five-year period of the last three decades.  At the same time, the trend toward specialization in capital goods exports accelerated, partly at the expense of consumer goods exports.  These recent developments were spurred by the appreciation of the yen in 1985-87, particularly because the strong yen encouraged investment in production facilities abroad to a much greater extent than in previous episodes of yen appreciation.

## 1.  Historical trends in exports

Japan's share of world exports, which was little more than 1 percent in 1950, increased substantially in the 1950s and 1960s, and by 1970 amounted to close to 7 percent (see tabulation below).  Nevertheless, the importance of exports in the economy as a whole remained fairly stable--accounting for about 9 percent of nominal gross national product (GNP) in this period--because rapid export growth was matched by spectacular growth of GNP. 2/  Japan's share of world exports remained stable in the 1970s before climbing to nearly 10 percent in the second half of the 1980s.  The increasing share in the 1980s, however, mainly reflected relative export price gains as opposed to rapid volume growth,

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1/  For a more detailed analysis of Japan's relative export specialization, see Lincoln (1990) and OECD (1989).

2/  By contrast, exports are estimated to have exceeded 20 percent of GNP in the immediate prewar period.

as had been the case in the 1950s and 1960s. 1/ Indeed, the ratio of Japan's export volume to real market demand (an export-weighted index of partners' real non-oil imports), changed little on average in the 1970s and fell markedly in the 1980s. Partly because of the much reduced rate of Japan's real economic growth in the last two decades, exports increased to a peak of 13 1/2 percent of GNP in 1984 before falling back to the level of the 1960s and early 1970s by 1989.

Japanese Exports

| | 1950 | 1960 | 1970 | 1975 | 1980 | 1985 | 1989 |
|---|---|---|---|---|---|---|---|
| | | | | (In percent) | | | |
| Value share of total world exports | 1.4 | 3.4 | 6.7 | 6.7 | 6.8 | 9.7 | 9.5 |
| Nominal share of GNP | ... | 9.1 | 9.5 | 11.2 | 12.3 | 13.2 | 9.7 |
| Real market share 2/ (1975=100) | ... | 41.5 | 86.6 | 100.0 | 92.8 | 93.3 | 72.9 |

During the 1960s, the rising market share of Japanese exports reflected, in large part, cost competitiveness gains (Table 1 and Chart 1). Export growth went hand in hand with a rapid expansion in the capital stock that was supported by a high level of national savings. However, the rising real market share came to an end at the beginning of the 1970s. For the next decade and a half, real market share changed little on average, although export performance fluctuated quite widely from year to year owing to swings in competitiveness.

The fluctuations were particularly wide in the 1970s. Early in this decade, exports weakened substantially owing to a sizable appreciation of the yen and the effects of the so-called Nixon shock, 3/ but rebounded soon after despite the unfavorable effects on competitiveness of the trebling of world oil prices. However, as cost competitiveness continued to deteriorate in the second half of the decade, especially following the sharp--but reasonably short-lived--appreciation of the yen in 1977-78, exports slumped, only to recover again at the end of the decade as competitiveness was restored.

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1/ The relative price gains were due in large part to a deterioration in the terms of trade of countries exporting nonmanufactured products. Against countries that primarily export manufactures, Japanese price competitveness has not changed significantly in the last 15 years.

2/ Ratio of export volume to trading partners' non-oil import volume.

3/ In 1971, U.S. President Nixon imposed a 10 percent surcharge on all imports into the United States, Japan's biggest export market.

Table 1.  Japan:  Trends in Real Export Growth, 1960-89

(Average annual percent change)

|  | 1960-64 | 1965-69 | 1970-74 | 1975-79 | 1980-84 | 1985-89 |
|---|---|---|---|---|---|---|
| Export volume | 18.7 | 17.5 | 13.8 | 5.8 | 10.0 | 2.7 |
| Market growth | 6.6 | 12.9 | 8.7 | 9.5 | 7.3 | 7.2 |
| Relative export unit values | -4.6 | -0.3 | 3.0 | -2.9 | -0.3 | 1.1 |
| Relative unit labor costs in manufacturing | ... | -0.7 | 5.6 | 0.8 | 2.1 | 6.3 |
| Profitability at world prices | 0.2 | 0.5 | -3.9 | 1.9 | -0.3 | -2.5 |
| Real net capital stock | 11.6 | 13.4 | 15.9 | 8.4 | 6.1 | 6.2 1/ |
| Nominal effective exchange rate | -0.1 | 0.3 | 2.3 | 4.9 | 4.3 | 8.2 |

Sources and data definitions:  See Annex.

1/  Covers 1985-88.

Cost competitiveness deteriorated during most of the 1980s, and to an especially large extent after 1985. For example, an index of Japan's relative unit labor costs, that stood at 100 in 1980, increased to 107 in 1985 and rose substantially to 135 in 1989. The latter rise reflected an unusually large appreciation of the yen that took place in 1985-87: in nominal effective terms, the yen appreciated some 51 percent between August 1985 (the month before the Plaza meeting) and December 1987.

In the first half of the 1980s, Japanese exporters retained their market share despite the moderate deterioration of cost competitiveness and the turbulent effects of the second large world oil price rise at the beginning of the decade. In this period, it is likely that nonprice factors, such as improvements in quality, helped market penetration in a number of key sectors such as automobiles, industrial machinery, and consumer electronic products. But in the second half of the decade, export growth stagnated and Japan's market share declined markedly owing to the very deep, and prolonged, loss of competitiveness. By 1989, the downturn in market share was more severe than the downswings of the export cycles of the 1970s.

Over the last three decades, the composition of Japan's exports has changed appreciably. These compositional changes, in turn, have reflected a number of factors including the maturing of Japan's economy and changing comparative advantage. At a broad level of disaggregation, the most discernable trend has been a steady increase in the share of capital equipment and consumer durable goods in total exports while the share of industrial supplies and consumer nondurables has declined (Table 2). By the mid-1980s, capital and consumer durable goods accounted for about three fourths of all exports compared with about 40 percent in the mid-1960s.

In the period 1985-89, the trend increase in the share of capital equipment in total exports accelerated sharply while the share of consumer durables declined. For capital equipment, export growth was concentrated in technology-intensive products. For consumer goods, the decline in export share mainly reflected slow growth in nonauto consumer goods exports.

At a finer degree of disaggregation, developments in a number of key export categories illustrate a general trend toward specialization in more sophisticated, high-quality, differentiated products. The declining share of industrial supplies and consumer nondurable goods in total exports, for example, can be attributed in large part to a decline in the importance of textile materials and apparel from some 30 percent of total exports in 1960 to less than 3 percent in 1989. Given the

CHART 1

JAPAN

# EXPORT MARKET SHARE AND COMPETITIVENESS, 1960-89

(1975=100)
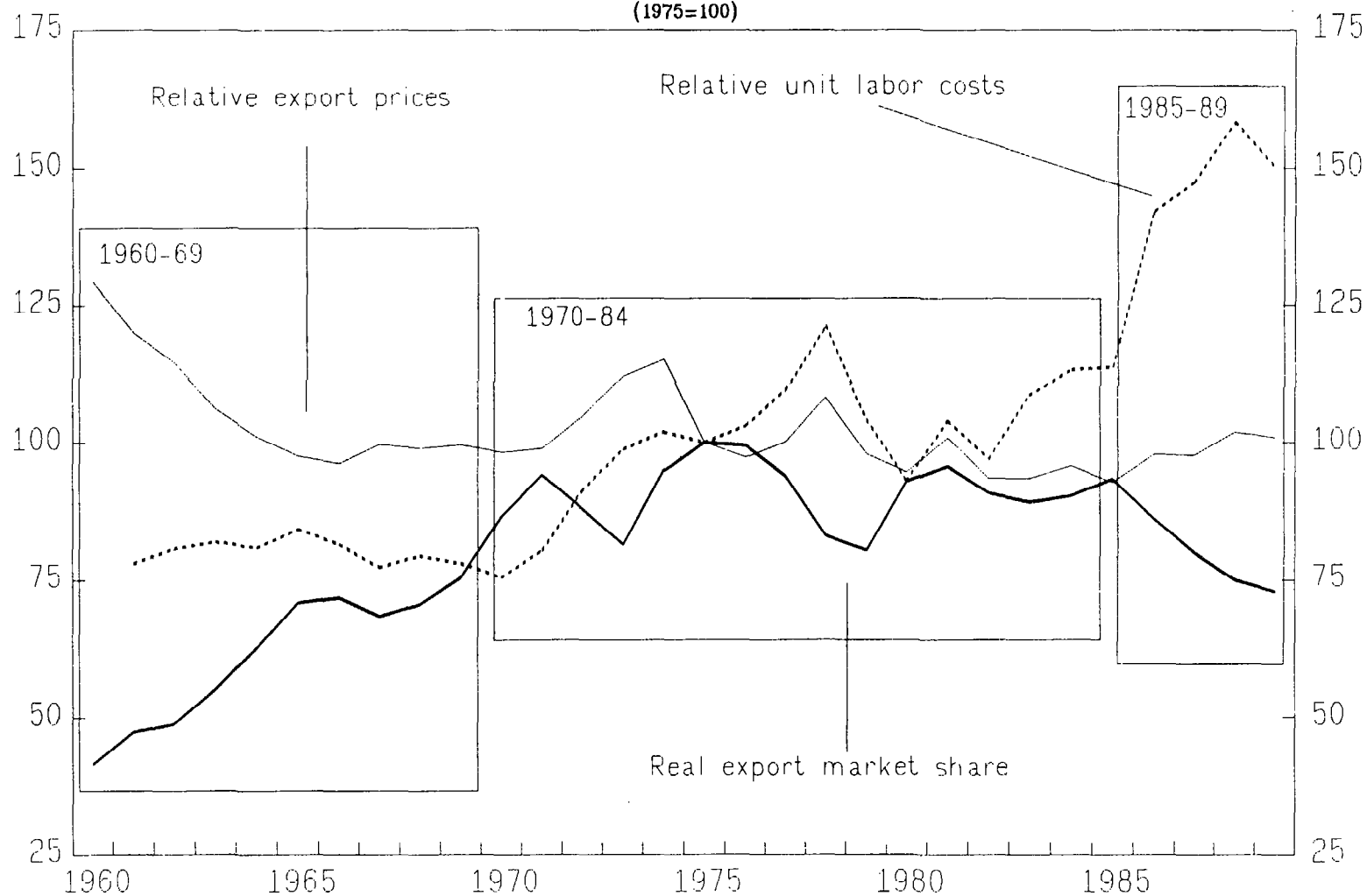


Source: staff estimates.

Table 2.   Japan:  Export Composition, 1965-89

(In percent of total exports)

|  | 1965-69 | 1970-74 | 1975-79 | 1980-84 | 1985-89 |
|---|---|---|---|---|---|
| By end-use |  |  |  |  |  |
| Industrial supplies | 41.0 | 37.0 | 32.0 | 25.1 | 18.8 |
| Of which:  Textiles | 10.9 | 7.1 | 4.3 | 3.4 | 2.3 |
| Metals | 14.7 | 16.4 | 15.6 | 11.3 | 6.7 |
| Capital equipment | 29.7 | 33.6 | 41.0 | 43.1 | 50.7 |
| Consumer nondurables | 6.0 | 2.8 | 1.2 | 1.1 | 0.9 |
| Of which:  Textiles | 4.2 | 1.9 | 0.8 | 0.6 | 0.4 |
| Consumer durables | 18.0 | 22.5 | 23.1 | 28.2 | 27.6 |
| Of which:  Passenger cars | 2.6 | 6.7 | 9.7 | 12.7 | 14.9 |
| By commodity classification |  |  |  |  |  |
| Textiles | 16.5 | 10.1 | 5.7 | 4.5 | 3.0 |
| Iron and steel | 13.5 | 15.2 | 14.6 | 10.2 | 6.1 |
| Motor vehicles | 4.4 | 9.3 | 14.2 | 17.7 | 19.1 |
| Selected technology-intensive goods 1/ | ... | ... | ... | 5.4 2/ | 7.8 |
| Selected consumer electrical goods 3/ | 6.5 | 7.1 | 5.8 | 6.9 | 5.7 |

Source:  Nikkei Telecom.

1/  Data processing machines, integrated circuits, and telecommunication equipment.
2/  Covers 1983-84.
3/  Television and radio receivers and tape recorders (including videocassette recorders).

homogeneous nature of these products, the extent to which increased capital-intensity of production could counteract the growing comparative advantage of producers in lower labor-cost countries was limited. The same has been true for exports of iron and steel, the growth of which supported exports of industrial supplies in the 1960s and early 1970s. Exports of iron and steel declined substantially in the second half of the 1970s and 1980s, from a peak of over 19 percent in 1974 to 5 percent of total exports in 1989, and have only been protected from an even greater decline through specialization in higher value-added products.

The rising prominence of capital and consumer durable goods exports during the 1970s and early 1980s mainly reflected the expansion of the motor vehicle industry in Japan, as well as rapid growth in exports of heavy industrial machinery and consumer electronic products. In the case of the motor vehicle industry, exports of both industrial vehicles and passenger cars increased in the 1970s to a peak of over 7 million units in 1985, including over 5 million passenger cars. At the same time, the value-added content of motor vehicle exports rose substantially, partly because voluntary export restraints (VERs) on Japanese automobile exports to the United States and Europe encouraged the sale of larger and more luxurious cars in these markets. [1] In the case of consumer electronics exports, the tendency was for Japanese producers to export increasingly sophisticated and more technologically advanced products.

In the mid-to-late 1980s, the rising share of exports of capital goods was also, to a large extent, due to the rapid growth of technology-intensive exports such as telecommunications equipment, integrated circuits, and data processing machines. The share of these three products in total exports doubled to over 9 percent between 1983 and 1989. However, at the same time, exports of consumer electronic products declined in relative importance as the cost competitiveness of Japanese producers with respect to producers in newly industrializing economies declined substantially. In response to this loss of competitiveness, as well as to counter growing protectionism in overseas markets, Japanese manufacturers have expanded or relocated their production facilities abroad.

Large-scale overseas direct investment is a comparatively new phenomenon in Japan. In the 1960s and 1970s, overseas direct investment grew steadily but nevertheless amounted to the equivalent of little more than 1 percent of total private domestic fixed capital formation (see tabulation below). By contrast, in this period, overseas direct investment by U.S. residents amounted to 4.5 percent of U.S. private fixed investment, and German direct investment amounted to about 3 percent of German private fixed investment. In 1988, overseas

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[1] See Collyns and Dunaway (1987) and Feenstra (1988).

production by Japanese firms was about 5 percent of their total output compared with over 20 percent in the United States, and 17 percent in the (former) Federal Republic of Germany.

Overseas Direct Investment Flows 1/

|  | 1970-74 | 1975-79 | 1980-84 | 1985-89 |
|---|---|---|---|---|
| In billions of U.S. dollars | | | | |
| Japan | 5.4 | 10.6 | 21.4 | 118.8 |
| United States | 43.4 | 79.4 | 29.7 | 138.4 |
| (Former) Federal Republic | | | | |
| of Germany | 7.1 | 14.8 | 17.9 | 46.9 |
| In percent of private domestic fixed investment | | | | |
| Japan | 1.1 | 1.4 | 1.8 | 4.2 |
| United States | 4.6 | 4.9 | 1.3 | 4.1 |
| (Former) Federal Republic | | | | |
| of Germany | 2.5 | 3.0 | 2.9 | 5.3 |

In 1986-89, Japanese overseas direct investment soared to unprecedented levels and in 1989 amounted to over 6 percent of private domestic fixed capital formation. While much of overseas investment has been in the financial and real estate sectors, a growing proportion has been directed toward the manufacturing sector. Direct investment in the automobile sector--particularly in the United States--has been one of the most prominent overseas manufacturing ventures: automobile production in the United States quadrupled between 1985 and 1989 to 3/4 million units and Japanese automobile manufacturing capacity in the United States is forecast to amount to 2 million units in the next few years (see tabulation below). Investment in consumer electronics overseas production plants has also been considerable.

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1/ These data, which are taken from national balance of payments sources, are rather coarse indicators of overseas long-term investment. On the one hand, they do not include finance raised in the host country which, according to Japan's Ministry of Trade and Industry (1988), accounted for as much as 60 percent of Japanese financing in 1986. On the other hand, they include investments for nonproductive uses such as real estate purchases.

Japanese Automobile Sales in the United States

|                                 | 1985    | 1986    | 1987    | 1988    | 1989    |
|---------------------------------|---------|---------|---------|---------|---------|
| Total, thousands                | 2,404   | 2,678   | 2,673   | 2,701   | 2,792   |
| Imported from Japan             | 2,218   | 2,383   | 2,192   | 2,110   | 2,013   |
| Produced in the United States   | 186     | 295     | 481     | 591     | 779     |
| (Percent of total)              | (7.8)   | (11.0)  | (18.0)  | (21.9)  | (27.9)  |

Reflecting the new trends in the structure of Japanese exports, the regional direction of exports underwent an important shift in the second half of the 1980s. Apart from an oil price induced boost of exports to the Middle East during 1974-85, the regional direction of exports had, until then, remained fairly static (Table 3). Post-1985, the share of exports to the newly industrializing economies (NIEs) of Asia, 1/ the United States, and Western Europe has risen significantly. These regions provide the major markets for the more technology-intensive exports that Japan now produces, and are also the regions in which Japanese overseas direct investment has been concentrated.

## 2. The changing structure of exports after 1985

This section analyzes developments in exports after the yen began to appreciate in 1985. The analysis consists of an examination of the predictions of conventional export equations that capture the "normal" behavior and trends in exports for a given domestic and external economic environment; unexplained developments in exports might indicate breaks from past structural trends. The section begins with a brief discussion of some reasons why an unusually large exchange rate change might precipitate a structural break in exports.

### a. Forces for structural change

In a period in which the exchange rate appreciates rapidly, a break in the pattern of export behavior would not necessarily be all that surprising. In particular, a large exchange rate appreciation might elicit a more-than-proportionate response of exports than would be predicted by measured trade elasticities. These more-than-proportionate, or "hysteresis", effects could result from the presence of sizable sunk costs that exporters incur when they enter a foreign market. For small or temporary exchange rate changes, exporters would be unwilling to pull out of an export market because the costs of subsequent market re-entry might be substantial. 2/ However, for large

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1/ Hong Kong, Korea, Singapore, and Taiwan Province of China.
2/ For a more detailed treatment of this point, see Baldwin and Krugman (1989).

Table 3.  Japan:  Exports by Regional Destination, 1960-89

(Percent of total exports)

|  | 1960-64 | 1965-69 | 1970-74 | 1975-79 | 1980-84 | 1985-89 |
|---|---|---|---|---|---|---|
| Industrial countries | ... | 51.4 | 52.7 | 46.1 | 50.7 | 61.1 |
| North America | 29.8 | 32.9 | 31.5 | 25.8 | 30.3 | 38.5 |
| Of which:  United States | 27.2 | 30.2 | 28.3 | 23.8 | 28.0 | 36.0 |
| Western Europe | 13.0 | 13.1 | 15.8 | 15.6 | 15.5 | 18.8 |
| Developing countries | ... | 46.1 | 44.6 | 50.0 | 46.5 | 37.2 |
| Middle East | 4.4 | 4.1 | 4.5 | 10.8 | 11.0 | 4.5 |
| Asia | 23.7 | 30.1 | 26.5 | 25.9 | 26.4 | 27.2 |
| Of which: | | | | | | |
| Newly industrializing | | | | | | |
| economies 1/ | 11.0 | 12.1 | 13.5 | 14.0 | 14.0 | 16.5 |
| China | 0.9 | 2.8 | 2.8 | 3.1 | 3.5 | 4.4 |
| Other  2/ | ... | 2.5 | 2.7 | 3.9 | 2.8 | 1.7 |

Source:  Nikkei Telecom.

1/  Newly industrializing economies:  Hong Kong, Korea, Singapore, and Taiwan Province of China.

2/  State trading economies (not including China) and exports not classified by region.

or permanent exchange rate changes, a greater proportion of exporters may calculate that future expected profits in the overseas market would be insufficient to justify remaining in the market. Overall, the observed behavior of exports after a large exchange rate appreciation would be difficult to predict because it would depend on exporters' expectations about the degree of permanency of the appreciation. Exports might initially hold up well until exporters realized that the appreciation represented a permanent loss of competitiveness; at that point exports could decline sharply.

The relatively new drive by Japanese firms to globalize their operations, as evidenced by the sharp rise in overseas direct investment in 1986-89, presents a further reason why exports might be expected to have deviated from past trends after 1985. Of course, increased overseas direct investment is a normal response to a loss of competitiveness: in the period 1986-89, however, the response was unusually large by historical standards. Globalization of the operations of Japanese corporations via overseas direct investment would affect both the supply of and demand for exports. 1/ On the supply side, globalization would tend to lead to a displacement of exports (a level effect) and possibly a change in the response of exports to relative price/cost signals (an elasticities effect). On the demand side, globalization could result in a temporary boost to capital goods exports. Given that a large proportion of overseas direct investment has been in the consumer goods sectors, one might, therefore, expect to find a break from past trends in both exports of consumer and capital goods. The effects on aggregate exports, however, would be ambiguous in the short run because reduced exports of consumer goods might be offset by higher exports of capital goods.

In summary, there are good reasons to expect that the large appreciation of the yen in 1985-87 could have precipitated a structural break in export behavior. However, it would be difficult to attribute any such breaks to any particular explanation, and, in general, plausible explanations tend to overlap: the "hysteresis" effects of large permanent exchange rate changes could find their counterpart in rising overseas direct investment.

b.   Analytical results

Estimates of reduced form equations for the volume of total exports and the two subcategories, capital equipment and consumer goods, provided the basis for the analytical results. These equations were estimated using data from the period 1975-85 when, it was assumed, trends in exports were stable and predictable. Data prior to 1975 were not included in the sample because other analysis indicated that a break

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1/ The effects described here are of a partial equilibrium nature and do not take into account the effects of globalization on relative prices, incomes, or exchange rates.

in export behavior occurred in the mid-1970s, while data after 1985 were
used for post-sample analysis. Reduced form equations were chosen
because significant breaks from past trends could occur in either export
supply or demand. The equations were of the form:

$$XV_i = a_1 * XV_{i,-1} + a_2 * WT + a_3 * CAP_i + a_4 * PROF_i + a_5 * IR_i$$

$$+ a_6 * WDD_i + a_7 * DUMVER + a_0 \qquad (1)$$

where, for category i, XV is export volume; WT an indicator of market
demand in partner countries; CAP production capacity; PROF the ratio of
competitors' prices to domestic prices or costs ("profitability"); IR
the inventory/sales ratio; WDD an indicator of the composition of world
demand; and DUMVER a constant-shift dummy variable for the introduction
of voluntary export restraints on exports of motor vehicles to the
United States in May 1981. 1/ All variables were expressed in
logarithms.

Equation (1) derives from a simple supply and demand system.
Because it is a reduced form, export prices do not appear in the
equation. Competitiveness effects are reflected in the ratio of
competitors' to domestic prices/costs, which are translated into the
same currency by the exchange rate. The lagged dependent variable
allows for sluggish quantity adjustment because of fixed contracts or
adaptive expectations. The inventory/sales ratio takes into account
nonprice adjustment effects not otherwise captured by the equation's
dynamics.

The estimation results found important supply and demand influences
on exports at both the aggregate and disaggregated levels (Table 4).
Capital goods exports were also found to depend on the composition of
world demand, being positively related to the ratio of investment to
total domestic demand in trading partner countries. No corresponding
compositional term could be found for the consumer goods equation,
however. In addition, the domestic capacity term in the consumer goods
equation was statistically insignificant and, therefore, dropped.

The tests for structural breaks in export trends were carried out
in two stages. First, formal statistical tests measured whether the
equations' parameters differed significantly in the period 1986-89 from
those in earlier periods. The results showed a significant change in
the parameters of the consumer goods equation but not in the coeffi-
cients of the total exports and capital goods equations.

Second, the equations were used to forecast the behavior of exports
in 1986-89 (Chart 2). The forecasts utilized actual outcomes for the
exogenous variables (world trade, profitability, etc.) but previously

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1/ A more complete data description is contained in the Annex.

Table 4.  Japan:  Equations for Export Volume

| | Total exports | | Capital goods | | Consumer goods | |
|---|---|---|---|---|---|---|
| **Coefficient on: 1/** | | | | | | |
| Lagged dependent variable | 0.65 | (5.5) | 0.53 | (4.4) | 0.87 | (13.3) |
| World trade | 0.36 | (2.8) | 0.32 | (1.6) | 0.24 | (2.4) |
| Domestic capacity | 3.77 | (3.2) 2/ | 0.62 | (1.8) | ... | (...) |
| Profitability | 0.23 | (2.8) | 0.23 | (1.9) | 0.36 | (4.1) |
| Composition of world demand | ... | (...) | 0.64 | (2.2) | ... | (...) |
| Inventory/sales ratio | 0.17 | (1.2) | 0.15 | (1.4) | ... | (...) |
| VER dummy | ... | (...) | ... | (...) | -0.05 | (2.3) |
| Constant | -0.87 | (1.2) | -2.85 | (2.6) | -0.45 | (2.2) |
| **Long-run elasticities:** | | | | | | |
| World trade | 1.04 | | 0.69 | | 1.90 | |
| Domestic capacity | ... | | 1.33 | | ... | |
| Profitability | 0.67 | | 0.48 | | 0.67 | |
| **Summary statistics:** | | | | | | |
| R-bar squared | 0.99 | | 0.97 | | 0.99 | |
| Standard error (percent) | 2.94 | | 4.89 | | 3.84 | |
| Durbin's H-statistic | 0.73 | | -1.58 | | 0.01 | |
| Test for parameter stability 3/ | 19.9 | | 5.0 | | 31.1 | |

Estimated by OLS.  Sample period 1975:Q1-1985:Q4; t-statistics are in parentheses.
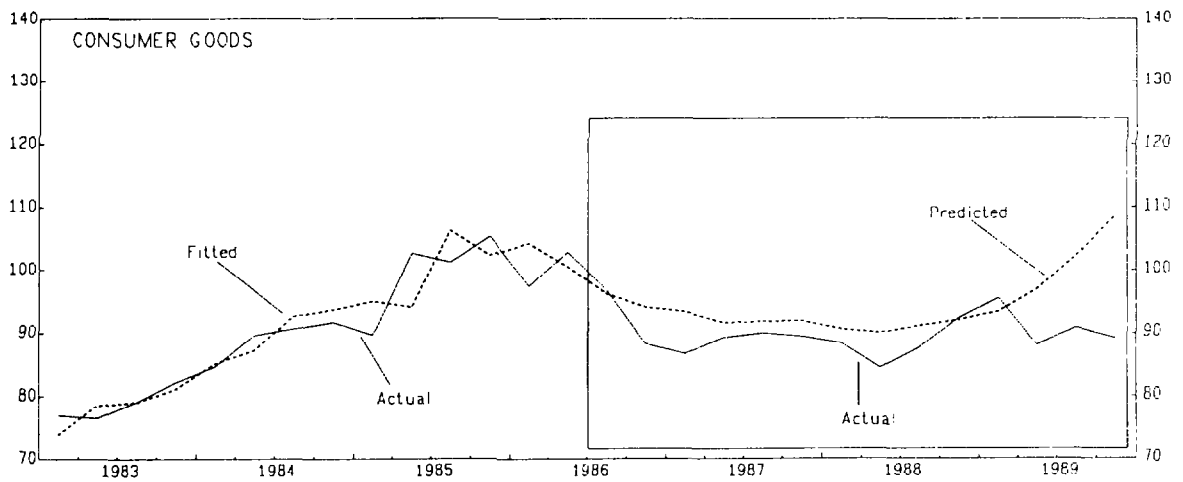
Source:  Staff estimates.

1/  See Annex I for data definitions.
2/  First difference of capacity.
3/  Distributed as chi-squared with 16 degrees of freedom (Hendry 1980).  The critical 95 percent confidence level is 26.3:  a value greater than this implies that the estimated coefficients are statistically different from those described in the table during the period 1986-89.

# CHART 2

## JAPAN
## EXPORT VOLUME BY END USE, 1983-89
### (1985=100)
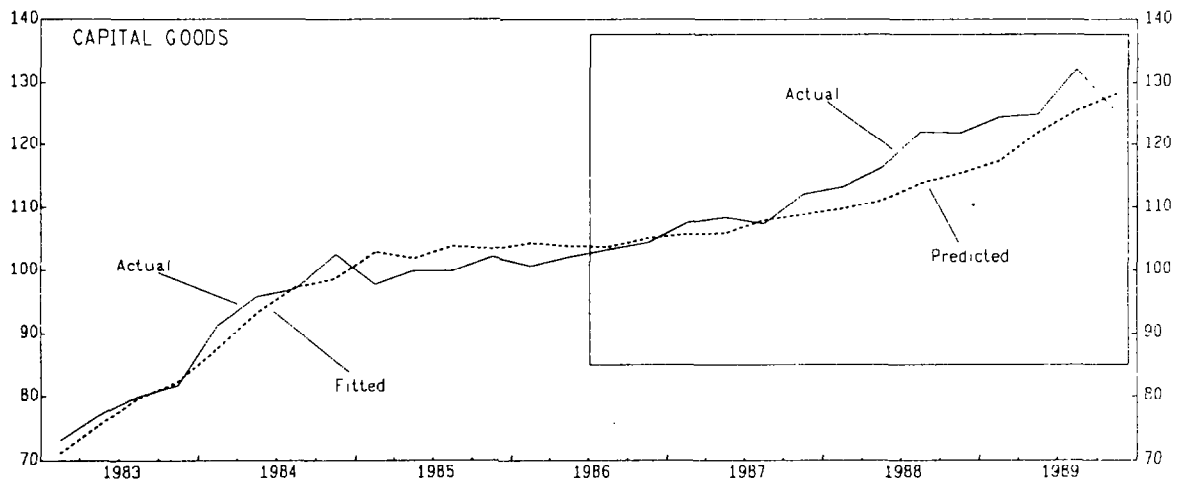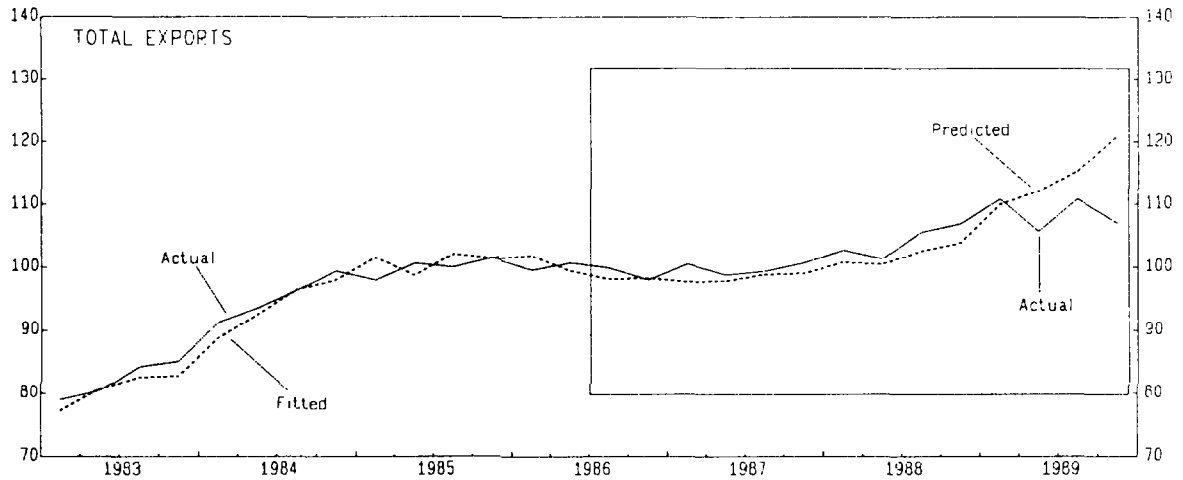


Source: Staff estimates.

predicted values for the lagged dependent variables. The forecasts were thus dynamic, as opposed to static, in which lagged dependent variables assume historical outcomes. From Chart 2, it is clear that the equations underpredict the strength of capital goods exports after 1985 but overpredict exports of consumer goods. 1/ For total exports, the results are mixed: initially the equation tends to underpredict exports, but, in 1989, the equation predicts a stronger pickup in exports than that which actually occurred.

The forecast results—an unexpected weakness in exports of consumer goods offset by stronger demand for capital goods exports—are consistent with the expected effects on the structure of exports of an unusual degree of overseas investment. However, the results could also reflect, in part, either equation misspecification or measurement error. In particular, the high value of Durbin's h-statistic for the capital goods equation (it is almost significant at the 95 percent confidence level) and the poor representation of the supply side in the consumer goods equation are symptomatic of possible misspecification. In addition, measurement error was potentially large in 1989 because sharp slowdowns in demand in China and in the U.S. automobile market, which are important markets for Japanese exports, were not fully represented in the indicators of world demand.

## III.  Imports

Japan is endowed with comparatively few natural resources and, therefore, relies to a great extent on imports for supplies of raw materials and fuels. By contrast, imports of manufactured goods have traditionally amounted to a relatively small proportion of GNP by the standards of many other industrial countries, despite low tariffs and the existence of few formal trade barriers. 2/ The share of manufactures in total imports, which had been rising steadily for 30 years, increased sharply in the period 1985-89. While some of the increased share of manufactured imports merely reflected steep declines in the prices of commodity imports, notably oil, the volume growth of manufactured exports in this period—and the surge in consumer goods imports in particular—was very strong by historical standards.

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1/  This result agrees with the Bank of Japan (1989), but shows less underprediction of capital goods exports, possibly because of the inclusion here of the composition-of-world-demand variable that takes into account the world investment boom in this period.

2/  Whether the level of manufactured imports is "unusually" low in comparison with other industrial countries has been the subject of a lively and, it should be stressed, inconclusive debate in the literature. For a survey of this literature, see Takeuchi (1989).

1.  Historical trends in imports

    During the 1950s and 1960s, real import demand increased much more rapidly than both real domestic demand and industrial production, although the ratio of imports to GNP remained at about 10 percent owing to both fluctuations in world prices and real appreciation of the yen (Table 5). The sizable increase in real import penetration in this period occurred despite only a modest decline in the price of imports relative to domestic goods prices (Table 6). By the early 1970s, partly because Japan's rate of economic growth was much more rapid than that of other countries, Japan was absorbing about 7 percent of total world exports compared with about 1 1/2 percent in 1950.

    The oil price rise of 1973-74 pushed the share of imports in nominal GNP to 13 1/2 percent but heralded an end to the period of rising real import penetration. Indeed, between 1975 and 1985, the average share of real imports in total domestic demand remained largely unchanged, while import volume growth fell short of that of industrial production. Following the sharp appreciation of the yen after August 1985, real import penetration again started to increase rapidly. But, reflecting the lower domestic currency price of imports, as well as the collapse in world oil prices in 1985-86, the share of imports in GNP declined to below 7 percent in the second half of the 1980s, the lowest level in four decades. 1/

    The unchanged share of real imports in real domestic demand between 1975 and 1985 reflected offsetting trends in manufactured and nonmanufactured imports. Real imports of manufactured goods continued to grow faster than real domestic demand in this period helped, in part, by declining import prices relative to domestic prices. 2/ By contrast, nonmanufactured import demand failed to keep pace with the expansion of domestic demand owing partly to the slow growth in mineral fuels imports that resulted from improvements in energy efficiency.

    The divergence between the growth rate of real manufactured and nonmanufactured imports intensified after 1985: manufactured import volume grew at a 20 percent annual rate during 1986-89, about four times faster than the growth of nonmanufactured import volume. At the same

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1/ According to data published by Japan's Economic Planning Agency (EPA), the ratio of imports to GNP in the second half of the 1980s was at its lowest level of the century, with the exception of the war-affected years, 1942-48.

2/ Declining tariff rates made a modest additional contribution to the improved competitiveness of imports in the 1970s and 1980s. In 1987, tariff revenue amounted to 3.4 percent of total imports compared with 6.6 percent in 1971.

Table 5.  Japan:  Imports, 1960-89

|  | 1960 | 1970 | 1975 | 1980 | 1985 | 1989 |
|---|---|---|---|---|---|---|
| | | | (In percent) | | | |
| Share of total world exports | | | | | | |
|    Total imports | 3.8 | 6.5 | 7.0 | 7.4 | 7.2 | 7.3 |
|    Manufactures | 0.8 | 2.0 | 1.4 | 1.7 | 2.2 | 3.7 |
| Imports/GNP | | | | | | |
|    Total imports | 10.1 | 9.3 | 11.6 | 13.3 | 9.8 | 7.4 |
|    Manufactures | 2.2 | 2.8 | 2.4 | 3.1 | 3.0 | 3.7 |
| | | | (1975 = 100) | | | |
| Share of real total domestic demand | | | | | | |
|    Total imports | 63.1 | 109.7 | 100.0 | 106.2 | 101.1 | 121.8 |
|    Manufactures | 58.9 | 88.5 | 100.0 | 132.8 | 163.8 | 264.6 |
| Share of industrial production | | | | | | |
|    Total imports | 74.7 | 97.3 | 100.0 | 94.3 | 87.2 | 109.5 |
|    Manufactures | 69.7 | 78.5 | 100.0 | 117.9 | 141.2 | 238.0 |

Source:  staff estimates.

Table 6.  Japan:  Trends in Import Growth, 1960-89

(Average annual percent change)

|  | 1960-64 | 1965-69 | 1970-74 | 1975-79 | 1980-84 | 1985-89 |
|---|---|---|---|---|---|---|
| Import volume growth | | | | | | |
| Total | 19.7 | 15.5 | 9.5 | 3.9 | 1.3 | 8.8 |
| Manufacturing | 19.0 | 14.0 | 19.4 | 6.2 | 6.7 | 15.9 |
| Relative import prices 1/ | | | | | | |
| Total | ... | -0.9 | 4.2 | 0.3 | 2.0 | -7.4 |
| Manufacturing | ... | 3.1 | -4.7 | -0.6 | -0.4 | -3.7 |
| Real total domestic demand | 11.5 | 10.4 | 6.4 | 4.2 | 2.3 | 5.4 |
| Manufacturing production | 16.4 | 13.8 | 7.0 | 3.6 | 3.7 | 4.5 |

Sources and data definitions:  See Annex.

1/  Import unit values divided by the wholesale price index of domestic demand products.

time, the composition of imports by end-use--which had remained fairly static in the previous ten years--changed dramatically (Table 7). In particular, the share of consumer goods in non-oil imports more than doubled from 7 percent in 1985 to 16 percent in 1989, while the share of (non-oil) intermediate goods declined substantially. Within the intermediate goods category, there was an intensification of the longer-run trend toward increased importance of manufactured industrial supplies as opposed to crude materials and fuels. The share of capital goods in total non-oil imports also increased steadily after 1985, continuing a trend that had begun around 1980.

Developments in specific commodities illustrate a general trend over the past three decades toward imports displacing Japanese production of lower value-added manufactured products. In turn, this trend has mirrored the changing structure of Japanese output in this period--in particular, the declining importance of materials processing industries--and has paralleled, to some extent, developments in exports. For example, imports of textile goods have increased substantially as Japanese producers have faced fierce competition from overseas suppliers. And, for similar reasons, iron and steel imports have increased considerably in recent years while imports of iron ore have stagnated in absolute terms and declined sharply in relative terms. However, since 1985, there has also been a rapid expansion in demand for imports of consumer products, such as automobiles and audiovisual equipment, as well as for industrial machinery and equipment. A rising proportion of these goods is being supplied by Japanese production facilities located abroad. 1/

The growing proportion of imports being supplied by Japan's regional trading partners represents a further notable trend (see tabulation below). This trend has reflected, in part, the pattern of development in Asia, and, since 1985, the effects of the decline in Japanese competitiveness. A flow of Japanese capital goods has helped to develop industries in the Asian region that now compete directly with some of Japan's own traditional industries. In the last half of the 1980s, Japan also experienced a sharp increase of imports, particularly of consumer goods, from Western Europe.

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1/ Overseas subsidiaries of Japanese firms accounted for about 11 percent of manufactured imports in 1987. An Economic Planning Agency survey (1989) indicated that a rising proportion of firms had plans to import from their overseas subsidiaries.

Table 7.  Japan:  Import Composition, 1965-89

(In percent of non-oil imports)

|  | 1965-69 | 1970-74 | 1975-79 | 1980-84 | 1985-89 |
|---|---|---|---|---|---|
| **By end-use** | | | | | |
| Industrial supplies 1/ | 63.3 | 59.7 | 55.9 | 58.1 | 49.5 |
| Of which:  Textiles | 0.9 | 1.9 | 2.1 | 1.7 | 2.0 |
| Metals | 7.8 | 6.1 | 4.8 | 6.9 | 7.1 |
| Crude materials | 40.9 | 34.9 | 27.9 | 22.1 | 16.5 |
| Capital equipment | 10.8 | 12.4 | 10.5 | 12.0 | 13.8 |
| Consumer nondurables | 0.9 | 2.3 | 3.5 | 3.6 | 5.9 |
| Of which:  Textiles | 0.3 | 1.5 | 2.4 | 2.4 | 4.0 |
| Consumer durables | 1.7 | 3.1 | 3.2 | 3.0 | 6.2 |
| Food and direct consumer goods | 22.7 | 21.5 | 25.0 | 20.8 | 19.2 |
| **By commodity classification** | | | | | |
| Iron ore | 7.6 | 6.6 | 5.3 | 4.2 | 2.4 |
| Iron and steel | 2.3 | 0.9 | 0.8 | 1.6 | 2.3 |
| Machinery and equipment | 11.5 | 13.2 | 11.7 | 12.8 | 16.0 |
| Motor vehicles | ... | ... | 0.8 2/ | 0.5 | 1.6 |
| Audiovisual equipment | ... | ... | ... | 0.3 3/ | 0.7 |
| **Memorandum item:** | | | | | |
| Oil/total imports | 16.1 | 21.4 | 36.5 | 40.5 | 20.8 |

Source:  Nikkei Telecom.

1/  Excluding oil.
2/  Covers 1978-79.
3/  Covers 1983-84.

Japanese Imports by Regional Origin

|  | 1965-69 | 1970-74 | 1975-79 | 1980-84 | 1985-89 |
|---|---|---|---|---|---|
| Share of non-oil imports from: |  |  |  |  |  |
| United States | 33.1 | 31.6 | 29.3 | 31.1 | 27.7 |
| Western Europe | 11.5 | 12.8 | 13.3 | 13.9 | 18.0 |
| Asia 1/ | 19.2 | 18.6 | 24.9 | 27.5 | 28.3 |

## 2. The changing structure of imports after 1985

This section analyzes developments in imports after 1985 using the same procedure employed above for exports. After discussing some sources for structural change, estimates of import equations are presented and analyzed.

### a. Forces for structural change

The sizable yen appreciation after August 1985 might have been expected to have caused a break in the pattern of import behavior for similar reasons to those described in the section on exports. For example, the presence of hysteresis effects are just as likely on the import side as on the export side of the trade account. These effects imply that a more-than-proportionate increase in import volume might occur following a large exchange rate change than most estimates of trade elasticities would predict. The more-than-proportionate increase would reflect the large initial costs associated with penetrating a new market: a large, permanent real appreciation of the yen could make it profitable for overseas suppliers to make the financial commitment to establishing a market presence in Japan. At the same time, the growing importance of Japanese overseas production could have led to an unexpected surge in imports from overseas subsidiaries.

In addition, a number of other developments in the second half of the 1980s might have augmented import demand. For example, the second half of the 1980s saw a reduction in tariff rates and quantitative restrictions on agricultural imports, as well as some attempts (such as a loosening of standards and certification requirements) to lower informal trade barriers. Furthermore, the yen appreciation increased the profitability of imports and thereby encouraged a rise in imports through channels not under the control of the large trading companies that have traditionally handled most of the import business in Japan.

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1/ Excluding Singapore and Indonesia which are major suppliers of oil products to Japan.

b.  Analytical results

Demand equations were estimated using data from the period 1975-85 for imports disaggregated first by commodity type and second by end-use. The equations were of the form:

$$MV_i = b_1 * MV_{i,-1} + b_2 * Y_i + b_3(PM_i - PY_i) + b_4 * NPF_i + b_0 \qquad (2)$$

where, for import category i, MV is import volume; Y a relevant indicator of domestic demand; PM import prices; PY the price of domestically produced goods that compete with the imported goods; and NPF a variable to capture nonprice factors. 1/ All variables were expressed in natural logarithms. The lagged dependent variable allowed for gradual dynamic adjustment of volumes.

The estimation results identified positive domestic demand effects and negative relative price effects for most of the categories of imports (Tables 8 and 9). 2/ In the long run, manufactured imports were found to be much more sensitive to both changes in domestic demand and relative prices than nonmanufactured imports. By end-use, consumer goods constituted the most price-sensitive category of imports, while capital goods constituted the category most sensitive to changes in the demand variables.

As with the analysis of exports, the equations were used to predict developments in the period 1986-89. The analysis detected an unexpected surge in manufactured imports in this period that could be pinpointed mainly to unusually rapid growth in consumer goods imports (Chart 3). By contrast, the growth of nonmanufactured imports was slower than predicted. Aggregating these two results, the prediction error for total import volume was relatively small. Both the manufactured and nonmanufactured import equations failed their respective tests for parameter stability, indicating significant changes in the behavior of imports by commodity classification in 1986-89 relative to earlier trends.

The equation for imports of consumer goods failed the formal test for parameter stability by a wide margin and substantially underpredicted actual growth in 1986-89 (Chart 4). By contrast, for capital goods, there was little evidence of systematic prediction bias and the capital goods equation passed the parameter stability test. In effect,

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1/  The best proxies for this variable were found to be the level and first difference of the operating ratio in manufacturing. Other variables used are described in the Annex.

2/  The relative price elasticity of capital goods imports was extremely low and not statistically different from zero.

Table 8.  Japan:  Volume Equations for Imports by
Commodity Classification

|  | Manufactured imports 1/ | | Nonmanufactured imports | |
|---|---|---|---|---|
| Coefficient on: | | | | |
| Lagged dependent variable | 0.64 | (6.5) | 0.71 | (7.4) |
| Domestic demand  2/ | 0.58 | (3.2) | 0.11 | (2.5) |
| Relative prices | -0.25 | (3.8) | -0.08 | (2.7) |
| Operating ratio in manufacturing | 0.41 | (2.6) | ... | (...) |
| Change in operating ratio in manufacturing | 0.77 | (3.0) | ... | (...) |
| Constant | -7.52 | [3.3) | 0.87 | (2.6) |
| Long-run elasticities: | | | | |
| Domestic demand | 1.60 | | 0.37 | |
| Relative prices | -0.69 | | -0.28 | |
| Summary statistics: | | | | |
| R-bar squared | 0.99 | | 0.79 | |
| Standard error (percent) | 2.61 | | 2.78 | |
| Durbin's H-statistic | 1.04 | | -0.66 | |
| Test for parameter stability 3/ | 56.2 | | 27.9 | |

Estimated by OLS.  Sample period 1975:Q1-1985:Q4; t-statistics are in parentheses.

Source:  Staff estimates.

1/  Excluding nonmonetary gold.
2/  Real total domestic demand plus exports of goods and services for manufactured imports; industrial production in mining and manufacturing for nonmanufactured imports.
3/  Distributed as chi-squared with 16 degrees of freedom (Hendry 1980).  The critical 95 percent confidence level is 26.3:  a value greater than this implies that the estimated coefficients are statistically different from those described in the table during the period 1986-89.

Table 9.  Japan:  Equations for Import Volume by End-Use

| | Consumer goods | | Capital goods | | Intermediate goods | | Food | |
|---|---|---|---|---|---|---|---|---|
| **Coefficient on:** | | | | | | | | |
| Lagged dependent variable | 0.68 | (8.1) | 0.46 | (3.8) | 0.61 | (5.9) | 0.39 | (2.9) |
| Domestic demand 1/ | 0.44 | (3.1) | 0.93 | (3.5) | 0.22 | (3.8) | 0.56 | (3.6) |
| Relative prices | -0.46 | (5.5) | -0.04 | (0.4) | -0.12 | (3.1) | -0.18 | (2.7) |
| Operating ratio in manufacturing | 0.40 | (1.8) | 0.82 | (2.2) | ... | (...) | ... | (...) |
| Constant | -5.73 | (3.3) | -11.78 | (4.5) | 0.80 | (2.7) | -4.05 | (2.9) |
| **Long-run elasticities:** | | | | | | | | |
| Domestic demand | 1.39 | | 1.72 | | 0.57 | | 0.92 | |
| Relative prices | -1.47 | | -0.08 | | -0.30 | | -0.29 | |
| **Summary statistics:** | | | | | | | | |
| R-bar squared | 0.97 | | 0.92 | | 0.85 | | 0.91 | |
| Standard error (percent) | 4.29 | | 7.24 | | 3.14 | | 4.09 | |
| Durbin's H-statistic | -0.36 | | -0.97 | | 0.46 | | -0.40 | |
| Test for parameter stability 2/ | 222.0 | | 9.2 | | 19.1 | | 41.5 | |

Estimated by OLS.  **Sample period 1975:Q1-1985:Q4; t-statistics are in parentheses.**
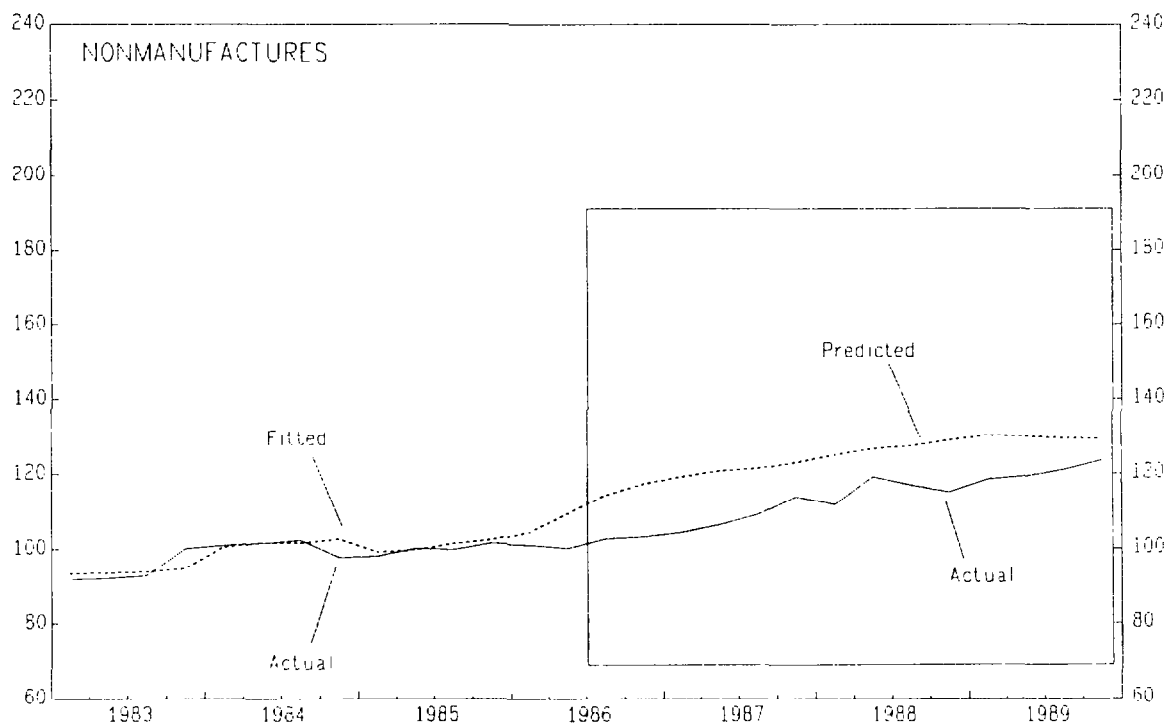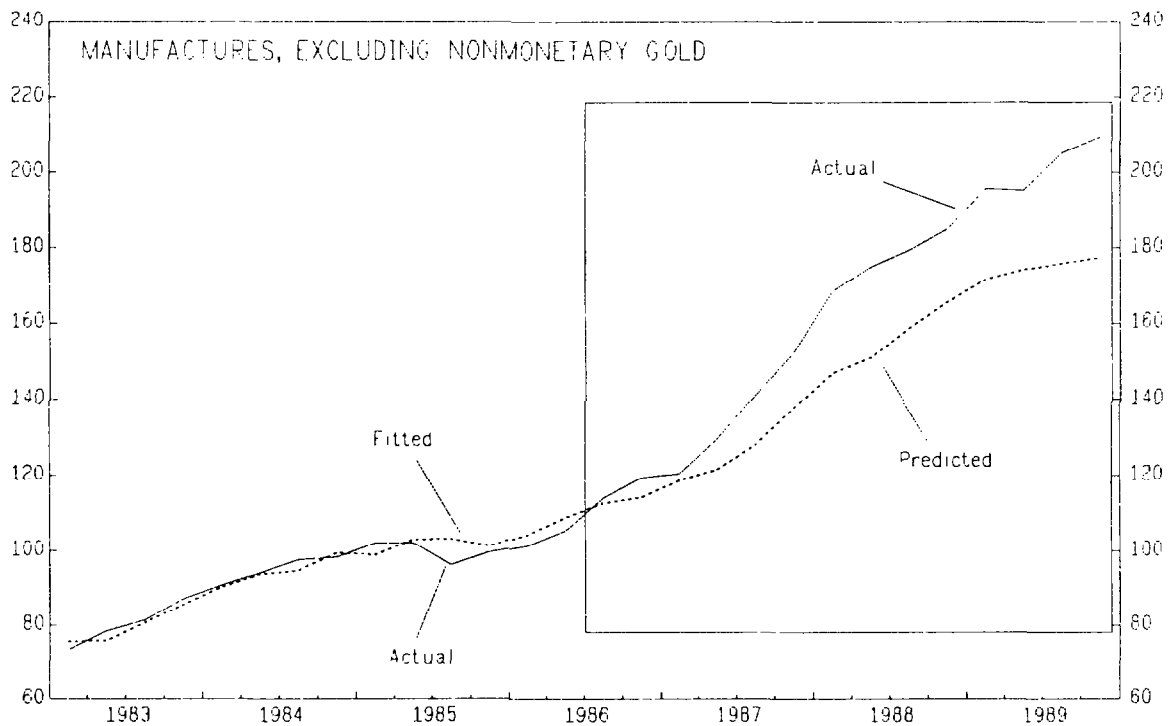
Source:  Staff estimates.

1/  Real fixed investment for capital goods imports, real consumption for consumer goods imports and food, and industrial production for intermediate goods imports.

2/  Distributed as chi-squared with 16 degrees of freedom (Hendry, 1980).  The crticial 95 percent confidence level is 26.2:  a value greater than this implies that the estimated coefficients are statistically different from those described in the table during the period 1986-89.
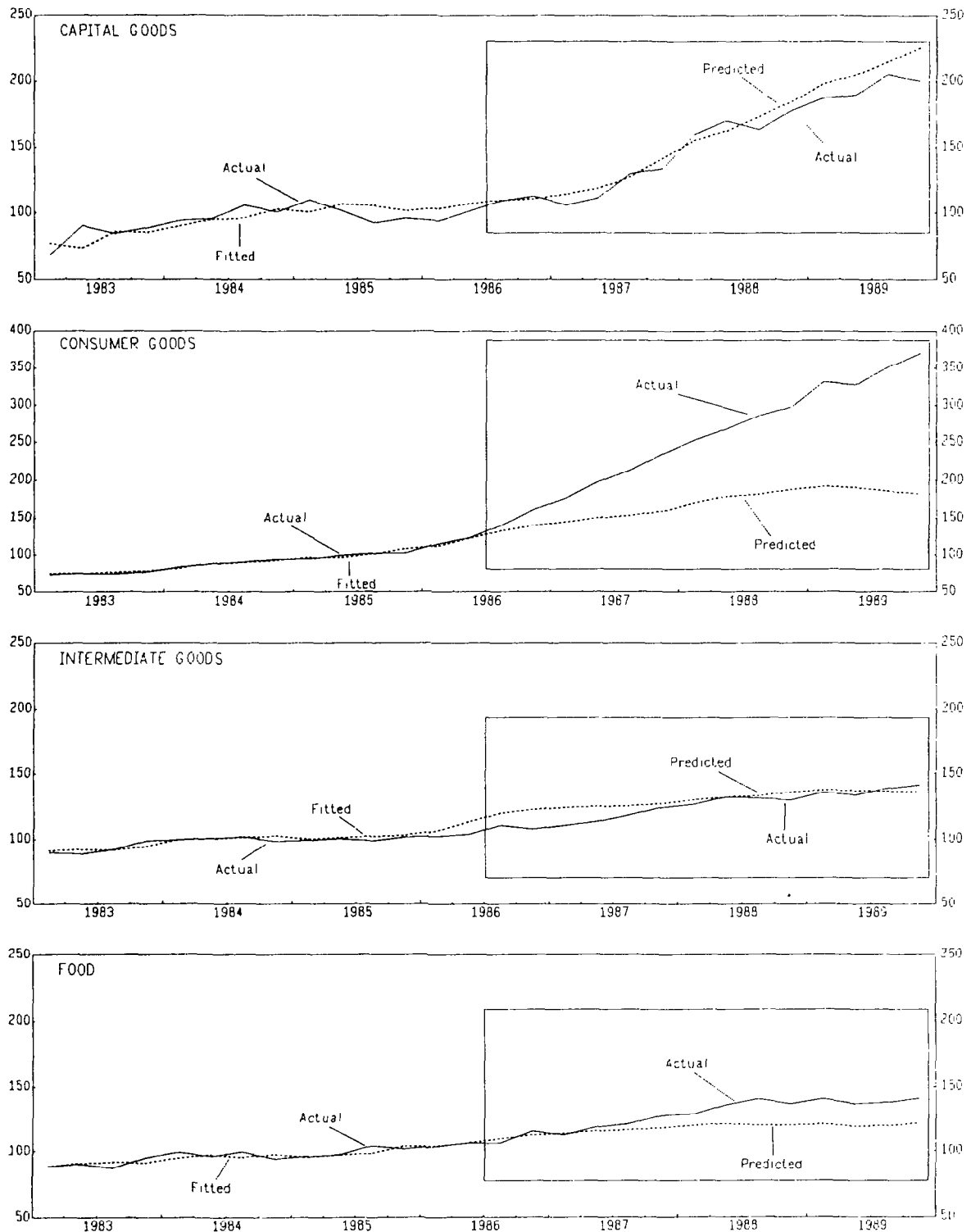
CHART 3

JAPAN

# IMPORT VOLUME BY COMMODITY CLASSIFICATION, 1983-89
(1985=100)

MANUFACTURES, EXCLUDING NONMONETARY GOLD

Actual

Fitted

Predicted

Actual

1983    1984    1985    1986    1987    1988    1989

NONMANUFACTURES

Fitted

Predicted

Actual

Actual

1983    1984    1985    1986    1987    1988    1989

Source: Staff estimates.

CHART 4

JAPAN

# IMPORT VOLUME BY END USE, 1983-89
## (1985=100)



Source: Staff estimates.

the rapid growth of capital goods imports appears to have been consistent with the domestic investment boom in the late 1980s, but the spectacular growth of consumer goods imports was far out of proportion with overall growth in consumer demand in this period.

The results for the two other end-use import categories--intermediate goods and food--were mixed. The equation for intermediate goods overpredicted import demand by a small amount while the food equation significantly underpredicted import demand. However, for both these categories, nonprice factors (such as energy conservation and agricultural quotas) play an important role in determining import demand. Since these nonprice factors are not fully reflected in the equations, the analytical results should be treated cautiously.

## IV.  Conclusions

The yen appreciation after August 1985 has had a significant impact on the composition of Japan's exports and imports, and on consumer goods trade in particular. In the case of exports, consumer goods have declined as a share of exports in contrast to previous compositional trends. This result could well reflect, in part, the displacement of consumer goods exports by goods produced in Japanese production facilities abroad following an unusual degree of overseas direct investment by Japanese corporations. The conclusion is supported by somewhat stronger-than-expected growth of capital goods exports in the period 1986-88. In the case of imports, consumer goods demand has been considerably greater than developments in overall domestic demand and relative prices would have suggested. In turn, demand for consumer goods imports has facilitated a substantial rise in the penetration of manufactured imports in Japan.

## Data Definitions and Sources

1.   The data in Table 1 and Chart 1 contain staff estimates of a number
of indicators of market conditions for Japanese exports.  The following
describes principal sources and definitions:

     a.   Market growth:  Based on export weighted index of non-oil
import volumes of nine trading regions; 1985=100.  The index is a
geometric average of a fixed-weight index (based on export shares in
1984-86) and a variable-weight index (based on period export shares).
The nine regions are:  Australia (4.4), Canada (4.0), France (2.0), the
(former) Federal Republic of Germany (6.6), Korea (6.8), the Middle East
(10.3), Taiwan Province of China (5.2), the United Kingdom (4.4), and
the United States (56.5).  1/  Data for industrial countries were
supplied by the IMF's Research Department; data for Korea and Taiwan
Province of China were proxied by International Financial Statistics
data on total import value divided by import unit values; data for the
Middle East were proxied by Saudi Arabian import value divided by U.S.
export unit values.  2/

     b.   Relative export unit values:  Japanese export unit values
divided by competitors' export unit values, all expressed in U.S.
dollars.  Competitors' unit values were constructed as an 11-country
weighted average of manufactured export unit values.  The countries
are:  Austria (1.1), Belgium (2.5), Canada (3.3), France (8.1), the
(former) Federal Republic of Germany (16.6), Italy (5.4), the
Netherlands (2.5), Sweden (2.2), Switzerland (2.3), the United Kingdom
(9.30, and the United States (46.6).  3/  Data were supplied by the IMF
Research Department.

     c.   Relative unit labor costs in manufacturing:  Japanese units
labor costs divided by competitors' unit labor costs, all in U.S.
dollars.  Competitors' unit labor costs were based on the same
11-country weighted average described in 1 b. above.  Data were supplied
by the IMF Research Department.

     d.   Profitability at world prices:  Competitors' export unit
values divided by average variable products costs in Japan.  The latter
is defined as a weighted average of manufacturing labor costs (17.7)
and, for intermediate costs, the overall wholesale price index
(82.3).  4/

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     1/   Normalized weights for the fixed-weight index in parentheses.
     2/   The same method was also used for Korea and Australia for the
early 1960s.
     3/   The weights (in parentheses) are based on McGuirk (1989) and
utilize a combination of bilateral trade and third market weights.
     4/   Weights in parentheses are taken for 1985 input-output tables.

        e.   Real net capital stock:  Average net capital stock (national
accounts definition) divided by fixed investment deflator.

        f.   Nominal effective exchange rate:  A weighted average of
bilateral exchange rates against the yen using the same 11-country
weighting system described in 1 b. above.  An increase indicates an
appreciation of the yen.

2.   The following data definitions and sources were used in the export
volume equations (Table 4):

        a.   Dependent variables:  The volume of capital goods exports was
constructed by dividing value by a weighted average of the unit values
of electrical equipment, nonelectric machinery, and transport equipment
excluding passenger cars.  The volume of consumer goods exports was
constructed by dividing value by the wholesale price index of exports of
consumer goods.  Data were taken from The Summary Report on Trade of
Japan (Japan Tariff Association) and Price Indexes Monthly (Bank of
Japan).

        b.   Independent variables:  World trade as described in 1 a.
above.  Data for inventory/sales ratios and domestic capacity variables
for total, capital goods, and consumer goods production were taken from
Industrial Statistics Monthly (Ministry of Trade and Industry).
Profitability for total exports is described in 1 c. above for total
exports; for capital goods exports, it was defined as a weighted average
of competitors' export unit values and fixed investment deflators
divided by the domestic wholesale price of capital goods; for consumer
goods, it was defined as a weighted average of competitors' export unit
values and consumer expenditure deflators divided by the domestic
wholesale prices of consumer goods. 1/  The composition of world demand
(capital goods exports equation) was the ratio of indices of partners'
fixed investment to domestic demand.  Both these indices used the nine-
region weighting described in 1 a. above.

3.   The following data definition and sources were used in the import
volume equations (Tables 8 and 9):

        a.   Dependent variables:  Manufactured import volume was defined
as manufactured import value minus nonmonetary gold imports, divided by
the unit value index for manufacturing imports.  Nonmanufactured import
volume was defined as value divided by a weighted average of unit values
of total imports and manufactured imports.  Capital goods import volume
was defined as import value divided by a weighted average of import unit
values of electrical equipment, nonelectrical eqiupment, and transport

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    1/  In both the capital and consumer goods competitiveness indicators,
the weights were based on McGuirk (1989).  Third market weights were
applied to export unit values while bilateral weights were applied to
investment or consumption deflators.

equipment excluding passenger cars. Consumer goods import volume was defined as value divided by manufactured import unit values. Intermediate goods import volume was defined as import value divided by a weighted average of import unit values of raw materials, mineral fuels, iron and steel, and chemicals. Food import volume was defined as import value divided by unit value of food imports. Data were taken from The Summary Report on Trade of Japan (Japan Tariff Association).

b.    Independent variables:  The following domestic demand variables were used:  domestic demand plus exports for manufactured imports; industrial production in mining and manufacturing for nonmanufactured imports; private plus public consumption for consumer goods imports and for food; and total fixed investment for capital goods imports. Data based on national accounts and production statistics in constant prices. Relative price variables were defined as the relevant import unit value divided by the relevant sectoral domestic wholesale price index.

## References

Baldwin, Richard and Paul Krugman, "Persistent Trade Effects of Large Exchange Rate Shocks," The Quarterly Journal of Economics, Vol. 104 (November 1989), pp. 635-54.

Collyns, Charles and Steven Dunaway, "The Cost of Trade Restraints:  The Case of Japanese Automobile Exports to the United States," Staff Papers, International Monetary Fund (Washington), Vol. 34 (March 1987), pp. 150-75.

Feenstra, Robert C., "Quality Change Under Trade Restraints in Japanese Autos," The Quarterly Journal of Economics, Vol. 103 (February 1988), pp. 131-46.

Hendry, David F., "Predictive Failure and Econometric Modelling in Macroeconomics:  The Transactions Demand for Money," in Econometric Modelling, ed. by P. Ormerod (Heinemann, 1980).

Japan, Bank of Japan, "Balance of Payments Adjustment in Japan:  Recent Developments and Prospects," Research and Statistics Department Special Paper No. 178 (May 1989).

Japan, Economic Planning Agency, "Annual Inquiry on Firms' Behavior in 1989" (Tokyo:  1989).

Japan, Ministry of Trade and Industry, "Report on Diversification Activities of Manufacturing Firms" (November 1988).

Lincoln, Edward J., Japan's Unequal Trade, The Brookings Institution (Washington, 1990).

McGuirk, Anne Kenny, "Export Price Functions" unpublished; Washington: International Monetary Fund (1989).

Organization for Economic Cooperation and Development, "OECD Economic Surveys:  Japan, 1988/89" (Paris:  1989).

Takeuchi, Kenji, "Does Japan Import Less Than It Should?  A Review of the Econometric Literature," The Asian Economic Journal, Vol. 3 (September 1989), pp. 138-70.