The Japan – U.S. Bilateral Trade

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The bilateral trade imbalance between the United States and Japan has already improved in real terms since the exchange rate changes. However, the degree of improvement has been moderate to date. This paper examines factors influencing the adjustment process of the trade imbalance, focusing on relative price changes and structural factors.

Since the meeting of the G-5 nations (France, Japan, United Kingdom, United States, and West Germany) in September 1985, a significant realignment of exchange rates has taken place. Between September 1985 and November 1987, the dollar fell against the Japanese yen from 236.63 yen/dollar to 135.37 yen/dollar — a depreciation of 42.8 percent. Against a basket of major currencies, the dollar depreciated over this period an average of 34.3 percent.[1] In response, policymakers shifted their primary concern from encouraging further depreciation of the dollar to stabilizing its value near current levels.

Such a drastic change in exchange values was expected to help correct international trade imbalances. In general, a currency realignment influences real trade flows by changing relative prices between domestic and foreign tradables, thereby altering the quantities of domestic and foreign goods demanded. If the adjustment in exchange rates were sizable and sustained long enough to convince people that the trend would not be reversed in the foreseeable future, it might also provoke supply responses.

Japan's trade surplus in *real* terms, in fact, has contracted markedly since the beginning of 1986, as import quantities have risen and export quantities fallen (Table 1). In addition, Japan's *nominal* trade surplus has started to decline as well. With such changes in external trade performance, the growth pattern of the Japanese economy has experienced a rapid transformation from growth led by external demand to growth led by domestic demand.

Since trade between Japan and the United States forms the largest part of the two countries' respective external imbalances, Japanese policymakers and their U.S. counterparts have paid keen attention to developments in Japan's bilateral surplus with the U.S. A better understanding of the recent evolution of that trade therefore is important. This paper seeks to contribute to that understanding by: 1) analyzing what actually has occurred to the real bilateral merchandise trade since the currency realignment, and 2) examining the factors affecting the adjustment process of the bilateral trade imbalance.

With these two themes in mind, the remainder of this paper is organized in the following manner. The first section reviews the recent evolution of trade between Japan and the United States. Sections II and III discuss several influences on the adjustment process in the bilateral trade imbalance, focusing on the role of relative price changes and structural factors. The last section offers a summary and conclusions, as well as policy implications.

I. Exchange Rate Realignment and the Japan-U.S. Trade

In fiscal 1986 (from April 1986 to March 1987), Japan's *nominal* trade surplus with the U.S. swelled by $8.7 billion and recorded an all-time high of $52.0 billion. This enormous bilateral trade surplus now accounts for more than half (57.9 percent in fiscal 1986) of Japan's total trade surplus. Viewed from the U.S. perspective, this surplus is a trade deficit amounting to 34.5 percent of its total trade deficit, and one that is far larger than its trade deficit with any other single trading partner. Although Japan's *nominal* surplus with the U.S. shows signs of flattening out or even declining modestly in recent quarters (from $4.6 billion in the fourth quarter of 1986 to $4.3 billion in the third quarter of 1987, based on seasonally adjusted monthly averages), the extent of improvement has remained moderate due to the so-called J-curve effect. The J-curve describes the typical pattern of adjustment to changes in the relative value of a currency. Specifically, as a currency appreciates, export prices rise and lead at first to an *increase* in the nominal value of exports even though the real value (that is, the quantity) falls as higher prices lead to reduced demand. With time, even the nominal value of exports falls as demand fully adjusts to the higher prices.

To measure accurately the effectiveness of the currency realignment in correcting trade imbalances, it is necessary to examine the *real* bilateral trade balance.

An examination of Japan's real trade balance with respect to the U.S., presented in Chart 1,[2] shows that Japan's real exports to the U.S. began to fall around mid-1986, while its real imports from the U.S. took an upward turn with large fluctuations arising from imports of nonmonetary gold.[3] Correspondingly, its real trade balance with respect to the U.S.[4] has declined.

Two observations are in order, however. First, despite the sharp appreciation of the yen against the dollar, Japan's real exports to the U.S. have not diminished significantly. In fact, Japan's real exports to the U.S. dropped only by 2.7 percent between the third quarter of 1985 and the first quarter of 1987. Second, Japan's real imports from the U.S. have not grown as quickly as those from other regions. Japan's real imports from the U.S. recorded growth of 9.7 percent during the period, compared to growth rates of 48.9 percent and 22.3 percent, respectively, from the European Community and Asian countries.[5] These qualifications require further analysis.

Chart 2 shows that Japan's real exports to the U.S. have been depressed by the rise in relative prices since 1986, and that part of this effect has been offset by slow but continued growth in the U.S. economy and the high income elasticity of Japan's exports. These results come from a regression equation including relative price and U.S. income variables.

Since a variety of Japan's export items have been under administrative or voluntary export/import restraints,[6] any

Chart 1
Japan's Real Trade with the U.S.

1980=100

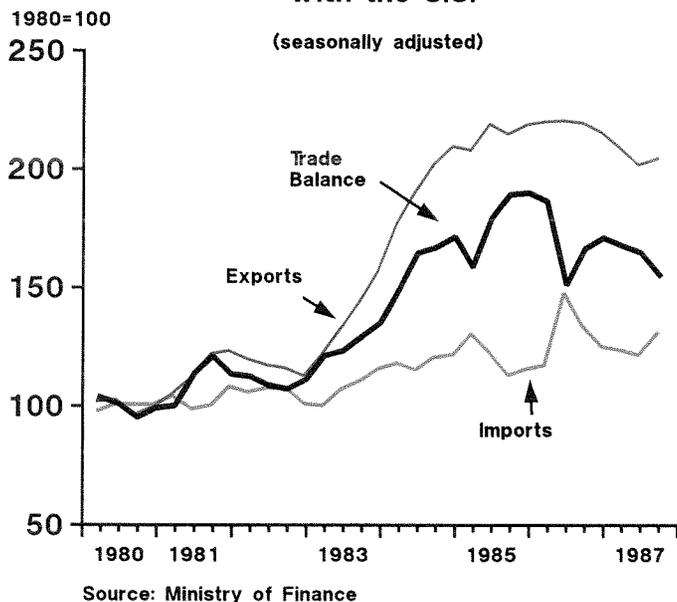(seasonally adjusted)

Source: Ministry of Finance

Table 1
Japan's Nominal and Real Trade Balance
(Billions of dollars; customs clearance basis)

Fiscal Year	Nominal Balance	Real Balance (1980 dollars)
1980	− 5.9	− 6.9
1981	9.2	5.3
1982	9.3	6.8
1983	23.3	14.3
1984	35.1	24.9
1985	52.6	28.8
1986	89.8	5.0
1987/1st half (annual rate)	74.6	− 13.3

Source: Ministry of Finance (Japan)

Chart 2
Contributing Factors to the Growth of
Japan's Export Volume to the U. S.
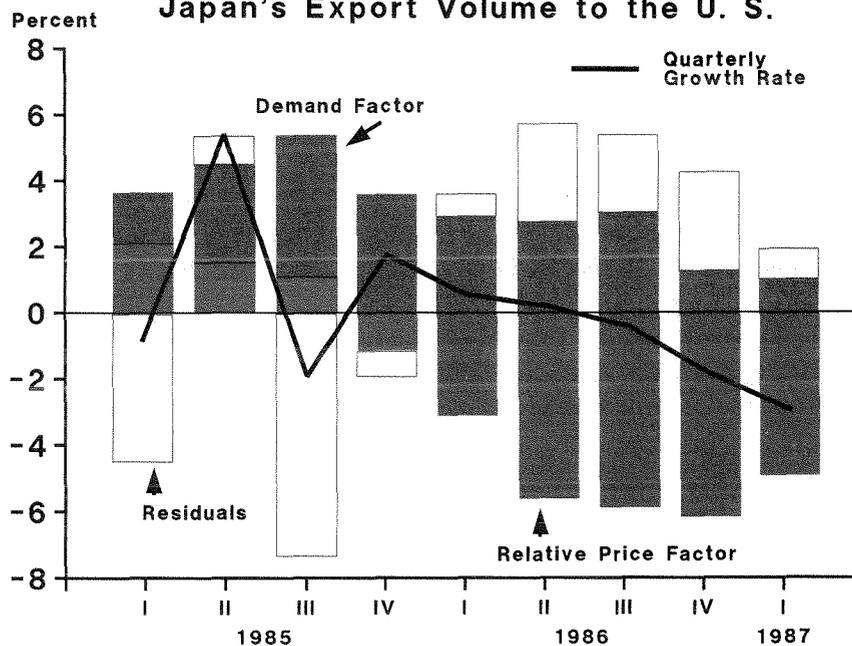
1. Contributing factors were estimated from the following real export equation:

In (real exports to the U.S.) = 3.46 * In (U.S. real domestic demand*)
(17.5)
+ 1.13 * In (relative price**)
(8.4)
− 12.38
(−13.8)
sample period: 1976/2Q − 1987/1Q
R2 = 0.9229

2. Serial correlation corrected by a Cochrane-Orcutt adjustment (RHO = 0.74).
3. Independent variables are two-quarter moving averages of U.S. real domestic demand and four-quarter moving averages of relative price.

* real GNP - real net exports
**weighted average of U.S. PPI and Japan's competitors' export prices / Japan's export prices

analysis based on this traditional specification of an export equation may not capture price and income effects perfectly. Nevertheless, the reasonably good fit of the real export equation estimated indicates that the yen's steep climb has been a dominant factor in limiting the growth of Japan's exports during the period under study.[7] The positive residuals, however, suggest that other factors must be examined to help explain why Japan's exports have not responded even more. Likewise, it is important to analyze the factors that have contributed to somewhat weak growth in Japan's imports of U.S. goods.

In the following two sections, we will look at some of the factors that have been affecting the current adjustment of the Japan-U.S. bilateral trade imbalance in more detail. The analysis will focus on 1) whether the deterioration in Japan's relative export prices has, in fact, been restrained relative to the depreciation of the dollar; 2) why and how Japan's exports to the U.S. have been so responsive to the growth in U.S. demand; 3) whether the composition of U.S. trade with Japan has influenced U.S. exports to Japan; and 4) whether the improvement in U.S. relative export prices fully reflects the dollar's depreciation.

II. Factors Affecting Japan's Real Exports

Pricing Behavior Under the Strong Yen

Although Japan's real exports to the U.S. have been substantially depressed by a rise in relative export prices, many analysts contend that Japanese exporters have limited increases in their export prices and, instead, have squeezed their profits in yen terms to prevent a marked decline in their market shares. In other words, adjustment in the bilateral trade imbalance has been delayed by the practice of restraining export price hikes.

To analyze this argument, it is useful to introduce the

concept of "cumulative pass-through." The cumulative pass-through is defined as the ratio of the cumulative percent change in export prices to the cumulative percent change in exchange rates during a given period. The pass-through in the current "yen-daka" (strong yen) phase is much lower, hovering within a range of 50-55 percent,[8] compared to a ratio of 70-80 percent during the last strong yen period in 1977-1978 (Chart 3). This lower pass-through indicates that Japan's export prices have been less responsive to exchange rate movements in the more recent period.

Since Japanese exporters' pricing strategies cannot be independent of their competitors' prices in world markets, it is useful to examine how Japan's export prices responded to changes in competitors' prices. To do so, we decomposed Japan's cumulative pass-through ratio into two factors — "the world price inflation factor" and "the Japanese exporters' adjustment factor" (Table 2). The first factor measures the pass-through implicitly assuming that Japan is a price-taker in the world export market.[9] The second factor takes account of the extent to which Japanese exporters may have been able to adjust their export prices in response to various elements such as foreign competition, foreign demand growth, and differences in quality of products.

When we compare the value of each of these two components in the period 1985Q3-1987Q1 with their values in the period 1977Q1-1978Q4, it is clear that both lower world-wide inflation and increased foreign competition at a time of slower foreign demand growth contributed to the lower pass-through in the more recent period.

The more modest increases in foreign export prices in the later period reflect the greater price stability worldwide since the early 1980s. Many have argued that such price stability has limited the opportunities to pass currency appreciation through to export prices. At the same time, price stability, especially of raw materials, lowered the domestic output costs of Japanese exporters and enabled them to restrain the pass-through.

The reduced adjustment of Japan's export prices to foreign export prices can be attributed mainly to stiff competition from newly industrializing countries (NICs), especially those in southeast Asia. For instance, Korea, Hong Kong, and Singapore's combined share of U.S. imports rose from only 3.7 percent in 1975 to 4.5 percent in 1980; their share rose another 2.7 percentage points in the following six years. Some of this increase in market share may be ascribed to the fact that since 1985 the exchange rates of their currencies have not appreciated against the U.S. dollar as much as they have against the yen.

In short, confronted with greater competition within a stable price environment worldwide, Japanese firms were unable to raise their export prices fully in response to the rise in value of the yen. As a result, they accepted lower unit sales (in terms of yen) from exports to avoid drastic cutbacks in their production.[10] Thus, it is clear that reduced pass-through has dampened the effect of the currency appreciation on adjustments in export quantities.

Commodity Composition of Japan's Exports

In addition to the restrained adjustment in export prices, another factor that has played a role in the moderate trade adjustment to date is the commodity composition of

Chart 3
A Lower Export Pass-Through Rate in the More Recent Strong-Yen Periods
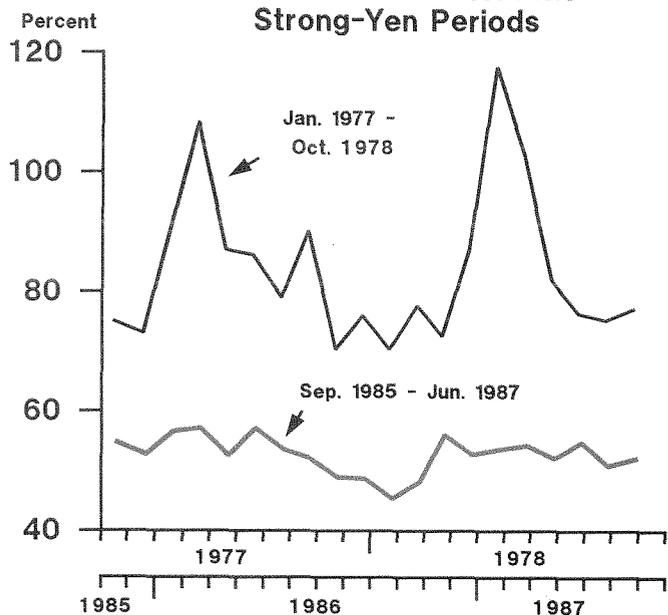
Source: Ministry of Finance (Japan) and Bank of Japan

Table 2
Breakdown of Pass-Through

Period	Pass-Through	World Price Inflation Factor	Japanese Exporters' Adjustment Factor
1977Q1-1978Q4	75	41	33
1985Q3-1987Q1	54	26	28

Notes:

Pass-through ratio $= \dfrac{\text{cumulative \% change in export price (B)}}{\text{cumulative \% change in exchange rate (A)}}$

$= $ (cumulative % change in export price of industrial countries)/(A)

$+$ (B - cumulative % change in export price of industrial countries)/(A)

The "world price inflation factor" is defined as the first term of the right-hand side above, and the "Japanese exporters' adjustment factor" as the second term.

Source: OECD, Ministry of Finance (Japan), Bank of Japan

Japan's exports to the U.S. This section examines the role of structural factors in Japan's exports.

The analysis presented here divides Japan's real exports to the U.S. into several major commodity categories[11] — consumer goods, production goods, capital goods *including* office machinery, and capital goods *excluding* office machinery. Chart 4 shows that real exports of consumer goods to the U.S. have been falling since the beginning of 1986. This decline is primarily the result of the rise of Japan's relative consumer goods export prices rather than an overall decline in U.S. demand for consumer goods. In fact, private consumption remained strong in the U.S. while Japan's real exports of consumer goods dropped 20.2 percent between the first quarter of 1986 and the first quarter of 1987.
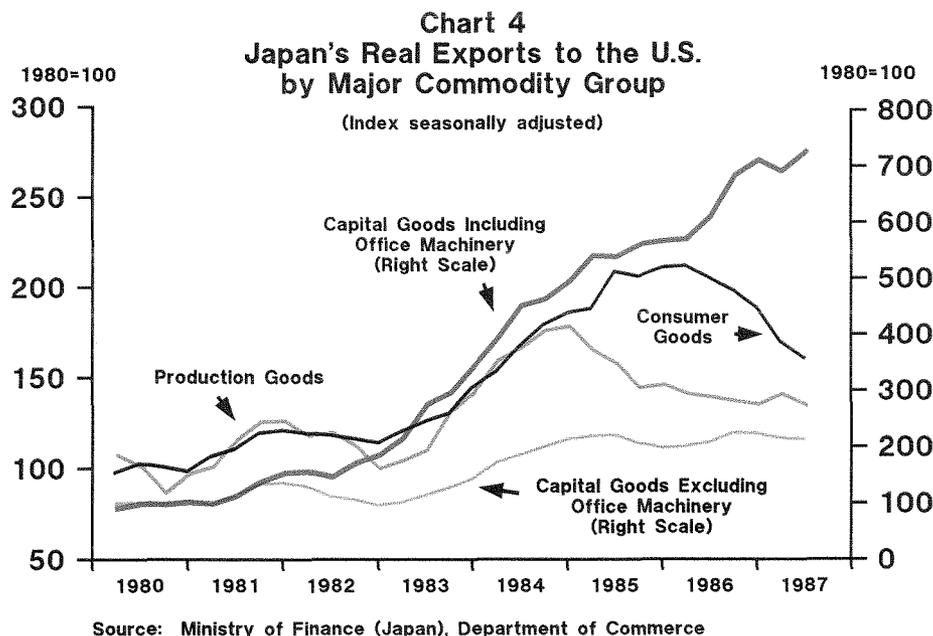
Real exports of production goods, which ballooned in 1983 and 1984 in response to the pick-up in U.S. industrial output, began to decline in the first half of 1985 and have continued to decline through the first part of 1987. The decline was, to a certain extent, due to the stagnant business climate surrounding the worldwide electronics industry. It also may have been due to the voluntary export restraint on steel and iron introduced in October 1984, since the export quantity of production goods exclusive of these commodities has followed a slightly upward trend.

Finally, real exports of capital goods *including* office machinery have increased quite rapidly in spite of the yen's steep rise (the current level is about seven times higher than in 1980), while the export volume of capital goods *excluding* office machinery has remained virtually unchanged since 1985 (the present level is about twice as high as in 1980). These observations suggest that exports of office machinery have played a major role in sustaining Japan's overall exports despite the yen's rapid appreciation.[12]

The strong growth of office machinery exports is related to changes in the structure of U.S. import demand. U.S. private nonresidential fixed investment recovered quite vigorously after 1983, fueled by tax reduction measures. In the process, U.S. investment demand shifted toward information processing machinery and related peripheral equipment, partly because advances in electronic technology made such equipment considerably less expensive. Office machinery and related equipment doubled its share in total nonresidential equipment investment from 16.1 percent in the 1970s to 35.4 percent in 1985. The higher relative price of U.S.-produced office equipment[13] allowed imports of these items to flood in (more than a 30 percent increase at an annual rate). Its share in U.S. total imports more than tripled in the last six years from 1.2 percent in 1980 to 3.9 percent in 1986.

A rapid response by Japan's exporters to changes in foreign demand, supported by technological advances and competitive prices, and Japan's subsequent penetration of the U.S. market[14] have kept the income elasticity of Japan's exports at a fairly high level. This high income elasticity, together with sustained U.S. growth, have partially offset the export quantity adjustment effect of the yen's appreciation.

Chart 4
Japan's Real Exports to the U.S.
by Major Commodity Group

Source: Ministry of Finance (Japan), Department of Commerce

III. Factors Affecting Japan's Real Imports

The Commodity Composition of Japan's Imports

As mentioned earlier, the growth in Japan's imports of U.S. goods has been relatively moderate to date compared with its imports from other trading partners. As a result, the U.S. share of Japan's total imports, excluding those from the Middle East, has fallen from 38.4 percent in 1960 to 26.9 percent in 1986, in sharp contrast to the sizable gains by Asian NICs (+7.6 percent points in the 26 years) and the European Community (+7.1 percent).
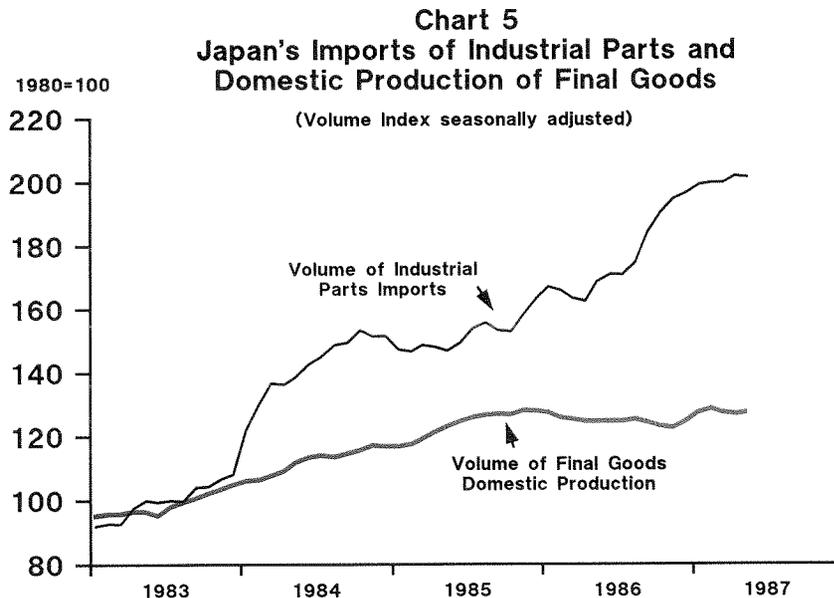
Japan's aggregate real imports recorded seasonally adjusted growth of 12.8 percent between the third quarter of 1985 and the first quarter of 1987. This increase was dominated by accelerated imports of manufactured goods (an increase of 23.0 percent). During the same period, Japan's real imports of raw materials showed practically no gain (a meager increase of 1.8 percent) and imports of foodstuffs did not increase as fast as those of manufactured goods (an increase of 14.0 percent).

These developments reflect structural changes that have been occurring in the Japanese economy. As illustrated in Chart 5, imports of various kinds of industrial parts and equipment (including those for general machinery, tele-communication equipment, electric household appliances, automobiles, and computers) have been increasing steadily, while the growth of domestic production of these final goods has been lackluster. Between

September 1985 and February 1987, the aggregate import volume of these items increased by more than 20 percent annually, while domestic industries' output increased only slightly (+0.9 percent at an annual rate). Concurrently, in materials-processing industries such as metals, petroleum, chemicals, and textiles, a similar shift from domestic production using imports of raw materials to imports of semi-finished products is evident as a long-run trend. Imports of semi-finished products increased by about 50 percent between the end of 1979 and March 1987, while domestic production of those semi-finished goods remained virtually unchanged, and imports of raw materials gradually declined.

Thus, a steady increase in imports of intermediate products generally has been evident in Japanese manufacturing industries. Moreover, imports of final products, especially of consumer goods, also have grown rapidly as a result of an increase in overseas production by Japanese firms.[15] In this regard, it is significant to note that such changes can be interpreted as a substitution of imports for domestic production. This shift was encouraged not only by changes in relative prices but also by technological advances and increased supply capacity abroad.

With this structural shift in mind, a comparison of the commodity composition of U.S. exports to Japan with that of the European Community is useful. The combined

Chart 5
Japan's Imports of Industrial Parts and Domestic Production of Final Goods

1980=100

(Volume Index seasonally adjusted)

Source: Ministry of Finance and Ministry of International Trade and Industry (Japan)

1. Japan's import volume of industrial parts is a weighted sum of import quantities of 76 commodities (such as, parts of electric machinery and transportation machinery).

2. Domestic production of final goods is a weighted sum of production indices of electric machinery, transportation machinery, and general machinery.

share of foodstuffs and raw materials in U.S. exports to Japan (39.2 percent) is more than twice as large as that in EC exports (14.8 percent), whereas the share of manufactured goods in U.S. exports (60.7 percent) is much smaller than that in EC exports (85.5 percent). Thus, EC exports have more of what Japan wants. This partly accounts for the much faster growth in imports from the EC than from the U.S. In sum, given the structural changes in the Japanese economy, the countries whose exports comprise more manufactured products have obvious advantages.

The structural composition of U.S. exports helps to explain why *overall* U.S. exports to Japan have grown more slowly. However, this alone cannot explain why the growth in U.S. exports of *individual* commodity categories also has lagged behind the same commodities exported by other nations. The data on commodity imports in Table 3 implies that the primary cause of the slower growth in U.S. exports does not lie in import barriers since the barriers apply to all exporting countries in the same way. In the next section, we examine another factor that may account for the divergent behavior — the adjustment of U.S. relative export prices.

Adjustment of U.S. Relative Export Prices

An historical comparison of United States producers' pass-through ratios during the past three periods of dollar depreciation (Table 4) shows that the ratio of exchange rate depreciation to a fall in foreign currency export prices (106 percent) in the present weak dollar phase is far higher than those in previous periods. In other words, the prices of U.S. exports in foreign currency terms have dropped by more than the depreciation in the exchange value of the dollar.

As a result of this change in U.S. exporters' pricing behavior, U.S. export unit value *in dollar terms* in 1986 remained practically unchanged from the previous year (+0.3 percent), and its unit value *expressed in yen terms* declined by 29.2 percent. Although this improvement was partially offset by more stable prices in Japan, U.S. relative export prices declined by 25.6 percent against Japan's domestic prices and returned to the pre-1980 level (Table 5).

However, this improvement in the price competitiveness of U.S. exports to Japan must be weighed against other competing countries' export price behavior as well, since U.S. exporters compete with other countries in the Japanese import market. An examination of major competitors' export prices relative to Japan's domestic prices reveals that the improvement in U.S. relative export prices is not all that dramatic. In fact, according to Table 5, U.S. export prices relative to those of its major competitors still are relatively unfavorable. Thus, the degree of the overall

Table 3

Japan's Imports by Commodity and by Region
(in 1986; percent changes over the previous year; in U.S. dollar terms)

Commodity	Total	United States	European Community	Asian NICs
Grand total	− 2.4	+ 12.6	+ 57.3	+ 27.2
Foodstuffs	+ 23.4	+ 4.8	+ 43.4	+ 51.6
Textile materials	− 13.5	− 42.9	− 0.1	+ 5.7
Metal ores and scrap	− 7.5	− 2.9	− 1.2	− 13.1
Other raw materials	+ 2.6	+ 5.4	+ 40.3	+ 19.5
Mineral fuels	− 33.9	− 18.2	+ 140.0	− 31.9
Chemicals	+ 20.6	+ 5.0	+ 36.9	+ 52.2
Machinery and equipment	+ 18.8	+ 3.8	+ 57.2	+ 32.7
Other	+ 43.8	+ 89.3	+ 77.9	+ 36.7

Source: Ministry of Finance (Japan)

Table 4

Historical Comparison of Pass-Through in Three Phases of Dollar Depreciation

Phase	Pass-Through*	Percent Change in Foreign Currency Export Price***	Percent Change in Exchange Rate**
1970Q4-1973Q3	45.9	− 10.0	− 21.8
1977Q1-1978Q4	32.5	− 5.4	− 16.6
1985Q1-1987Q2	106.3	− 40.4	− 38.0

* Pass-through defined as percent change in foreign currency export price divided by the percent change in exchange rate

** Percent change in multilateral trade-weighted value of dollar

*** The dollar export price is translated into foreign currency terms by the multilateral trade-weighted value of dollar.

Source: Federal Reserve Board, Department of Commerce

Table 5

Improvement of U.S. Relative Export Price

Export unit value of country/Domestic WPI of Japan (1980 = 100)

Year	United States	West Germany	United Kingdom	Italy	Korea
1980	100.0	100.0	100.0	100.0	100.0
1985	117.4	78.1	82.9	84.3	100.0
1986	87.4	76.0	72.0	76.4	75.2
Percent change 1986-1985	− 25.6	− 2.7	− 13.1	− 9.4	− 24.8

Export unit value of the U.S./Export unit value of country (1980 = 100)

Year	West Germany	United Kingdom	Italy	Korea
1980	100.0	100.0	100.0	100.0
1985	150.4	141.2	139.4	117.5
1986	115.0	121.4	114.4	116.1
Percent change 1986-1985	− 23.5	− 14.0	− 17.9	− 1.2

Source: International Monetary Fund and Bank of Japan

improvement has been much smaller than the change in the nominal dollar/yen exchange rate (29.4 percent in 1986 over the previous year) or the change in the dollar's real bilateral exchange rate against the yen (25.6 percent).

In this connection, it is worth noting that U.S. export prices relative to those of its competitors still are about 15 to 20 percentage points higher than they were in 1980 when the U.S. trade account was roughly in balance. In other words, U.S. exporters have not yet restored their lost price competitiveness following the dollar's appreciation through 1985. It is also significant that the cumulative change in relative export prices against Japan's domestic prices since 1980 still is far more advantageous to other countries.

These facts are important because the differences in the *levels* of relative export prices may influence the growth in each countries' exports to Japan, given the structural changes in the Japanese economy. The growth of new Japanese import demands likely alters the historical rela-tionship between imports and other variables, such as export prices and income growth.

As we have seen in Sections II and III, various factors have influenced the adjustment of the bilateral trade imbalance between Japan and the U.S. The change in the commodity composition of Japan's exports in response to changes in U.S. demand and the structural features of U.S. exports have played important roles in trade flows between the two nations. In addition, the delayed adjust-ment of Japan's export prices due to the restrained pass-through and the inadequate improvement of U.S. export prices relative to competing exporters' prices have weak-ened adjustment to the currency realignment. However, these factors cannot fully account for the relatively moder-ate correction of the trade imbalance. For instance, contro-versial microeconomic factors such as the effect of export restraints on Japan's exports and the nonprice competitive-ness of U.S. exports are not studied in this paper. These points will have to be addressed in future studies.

IV. Summary and Conclusions

The currency realignment in foreign exchange markets since the meeting of G-5 nations in September 1985 has contributed appreciably to the adjustment of international trade imbalances. The improvement of the bilateral imbalance between Japan and the U.S., however, has been somewhat limited by structural factors and other elements that have diminished the impact of the adjustment of relative prices. Exchange rate changes alone are not suffi-cient to eliminate the bilateral trade imbalance. In addi-tion, restructuring the Japanese economy for less depend-ence on external demand as well as restoring U.S. competitiveness through heightened productivity growth and restrained unit labor costs are both indispensable for redressing the bilateral trade imbalance in the long run.

Japanese manufacturing industries are already moving their production abroad through foreign direct investment and by expanding imports of manufactured commodities to substitute for domestic production. Moreover, many Japanese industries such as iron and steel, chemicals, and construction machinery are now placing more emphasis on domestic business since domestic demand is robust and domestic sales have become more profitable. Such developments should make Japan's imports more respon-sive to growth in domestic demand and its exports less elastic with respect to growth in foreign demand.[17] In the meantime, improvement in such fundamental determi-nants of U.S. competitiveness as productivity growth and reduced unit labor costs has been observed along with advantageous shifts in U.S. exporters' pricing behavior.

These trends suggest that the structural changes required for further reductions in the bilateral trade imbalance are emerging on both sides of the Pacific. Structural changes will redress the imbalance in the long run, not measures that focus on curbing Japan's exports since these exports still have high income elasticities and U.S. income still is growing. Even if it were possible to reduce Japan's exports to the U.S. so steeply as to restore balance, foreign economies would suffer from the impact of this policy because of the resultant contraction in Japan's import demand.

Accordingly, the best solution to the bilateral trade imbalance should focus on durable growth in Japan's imports from the U.S. In this regard, the most important issue is whether the current strong growth in Japan's manufactured imports can be sustained or not. The issue of Japan's barriers to agricultural imports is secondary in the sense that the effect of removing these barriers on bilateral trade is fairly small in comparison to the effect of growth in Japan's manufactured imports.[18]

With a view to supporting the economic restructuring process indirectly, Japanese policymakers have been implementing measures to stimulate domestic demand and stabilize exchange rates in cooperation with other major developed countries. Correcting the current external

imbalance requires sustained growth in Japan's domestic demand, not only because it induces more imports, but also because it is conducive to minimizing the frictional costs that accompany economic restructuring. Yet, it is hardly possible to eliminate Japan's huge nominal trade surplus in a year or two, because of the still-high income elasticity of Japan's exports and the existing wide gap between exports and imports. The conclusion that most clearly emerges from this analysis is that Japanese policy authorities have to achieve sustained growth in domestic demand and maintain price stability over a fairly prolonged period.

The United States can contribute to reducing its trade deficit by improving U.S. relative prices. As shown in the text, this has been achieved so far by the dollar's decline against major currencies. However, since the exchange value of the dollar has already declined sharply, further improvement of U.S. relative prices must be achieved through productivity growth and reduced production costs. At the same time, since inflationary pressure has been mounting from the import side as a result of the dollar's depreciation and there are some signs of tightening supply/demand conditions in the U.S. economy, fiscal and monetary policies aimed at future noninflationary economic growth also are needed.

FOOTNOTES

1. Weighted-average exchange value of the U.S. dollar against the currencies of other G-10 countries plus Switzerland, published by the Federal Reserve Board. Weights come from the 1972-1976 global trade of each country.

2. Japan's real exports and imports with the U.S. can be obtained by deflating dollar values of exports to, and imports from, the U.S. by export and import price indices. In this paper, the export and import price indices with respect to the U.S. have been calculated as follows:

   a) Calculate the commodity composition of exports to, and imports from, the U.S., using the "Summary of Report, Trade of Japan," Japan Tariff Association.
   b) Find the export (or import) price index in yen terms of each goods category in the same data source.
   c) Obtain the price index of total exports (or imports) with respect to the U.S. by making a weighted average of the price indices of goods, the weight being the share of each goods category in total exports (or imports) with respect to the U.S.
   d) Translate the yen-denominated price indices thus calculated into those in dollar terms by the prevailing dollar/yen exchange rate.

3. In fiscal 1986, Japan imported gold from the U.S. on several occasions for the purpose of coining gold coins in commemoration of the 60th anniversary of the current emperor's reign.

4. Japan's real trade balance with its major trading partners, including the U.S., is measured by a ratio of Japan's real exports to its real imports.

5. In 1986, U.S. exports of industrial supplies and materials to the European Community (EC) and Asian countries increased substantially (+9.5 percent and +11.9 percent over the previous year, respectively). Accordingly, there is the possibility that some of these exports ultimately went to Japan in the form of final products exported from the EC and Asian countries to Japan.

6. Japanese exports currently subject to U.S. trade restraints (in fiscal 1986) and their shares in Japan's total exports to the U.S. are as follows:

Shares in Japan's Total Exports to the U.S.
(Percent)

Export Quantity Restraints		
Passenger cars	25.6	
Steel and iron	2.5	
Textiles	1.4	
Metalworking machinery	0.9	
Subtotal		30.4
Export Price Restraints		
Metalworking machinery	0.9	
Integrated circuits	1.2	
Cameras	0.8	
Subtotal		2.9
Import Restraints		
Cellular telephones	0.1	
Pagers	0.03	
Light trucks	4.7	
Motor cycles	0.6	
Subtotal		5.4
Grand total		37.8

7. It should be noted that the regression analysis employed here implicitly assumes that income and price elasticities have not changed over time.

8. Although the aggregated cumulative pass-through ratio for Japan's exports between September 1985 and April 1987 was 54.9 percent, there is considerable variance among individual commodities:

Foodstuffs	34.7%
Textiles and textile products	35.7
Chemicals	36.1
Non-metallic mineral products	43.9
Metals and metal products	26.1
Machinery	63.2
Miscellaneous manufactures	40.9

9. Although such an assumption was introduced in this paper for the sake of simplicity, it should be noted that in reality Japan's export prices also affect its competitors' export prices.

10. It should be borne in mind that the swollen profit margins that had been attained during the last weak yen period enabled Japanese exporters to squeeze their profits in this process and, in this sense, cushioned the impact of the yen's appreciation. The ratio of current profit to sales in principal manufacturing industries climbed to 4.65 percent in the first half of 1984 and stayed at that level through the first half of 1985. Subsequently, it declined sharply to the recent trough of 2.85 percent in the first half of 1986, reflecting profit-squeezing in exports. The relationship between U.S. import prices and profit margins from the U.S. perspective has been analyzed by Catherine L. Mann in "Prices, Profit Margins, and Exchange Rates", *Federal Reserve Bulletin*, June 1986.

11. Japan's real exports to the U.S. of individual commodities can be obtained by deflating the dollar value of exports of the commodity by its export price index. Real exports of each commodity category (for example, consumer goods) are calculated by aggregating real dollar values of individual commodities in accordance with the definitions of commodity categories given below:

a) Consumer goods
   foodstuffs, television sets, automobiles, motor cycles, cameras, watches, tape recorders, shoes, toys

b) Production goods
   chemicals, textiles, metals, tires, integrated circuits, non-metallic mineral products

c) Capital goods
   power generating machinery, office machinery, metal-working machinery, electrical machinery

12. This viewpoint was first raised by Daniel E. Nolle and Charles Pigott in the *Quarterly Review*, Federal Reserve Bank of New York, Spring 1986.

13. Actually the U.S. producer price of office machinery rose 8.2 percent between 1980 and 1986 while Japan's export price of office machinery in dollar terms fell by about 20 percent. Accordingly, U.S. relative prices deteriorated by about 35 percent during the period.

14. "Import penetration" is defined as the ratio of imports of manufactured goods to domestic absorption (namely, GDP + imports − exports). This ratio shows that Japan has rapidly penetrated the U.S. market in recent years (0.6 percent in 1970; 1.2 percent in 1980; 2.0 percent in 1986).

15. For instance, as a result of foreign direct investment, the so-called "boomerang effect" is evident in Japan's imports of household appliances from Asian NICs as depicted in the table below. This effect may be partly responsible for a rapid increase in Japan's manufactured imports from Asian countries.

Import Volume by Commodity and by Region
(Percent change in fiscal 1986 over the previous year)

Portable stereos	(Korea)	+ 230
Personal stereos	(")	+ 230
Electric fans	(")	+ 330
Refrigerators	(")	+ 230
Television sets	(Taiwan)	+ 650
Calculators	(")	+ 250
Washing machines	(")	+83.4
Sewing machines	(")	+59.9

16. In this paper, a variable weight export deflator was used to calculate the pass-through ratio.

17. Although the extent to which the structural economic changes have affected Japan's balance of payments cannot be quantified exactly, an attempt was made by the Bank of Japan to estimate changes in the income elasticities of Japan's exports and imports by means of Kalman filtering models. According to those estimates, the income elasticity of Japan's exports has declined gradually while that of its imports has risen sharply since early 1986 (see *Special Paper No. 155*, "Quarterly Economic Outlook", Autumn 1987).

18. According to a paper by Dick K. Nanto (submitted to the Subcommittee on Economic Goals and Intergovernmental Policy of the Joint Economic Committee of the U.S. Congress on December 9, 1985), Japan's liberalization of agricultural imports will increase U.S. exports to Japan by $1.7 to $5.3 billion. However, the effect is of a once-and-for-all nature and, once Japan's agricultural imports are liberalized, such an increase cannot be expected to last. In contrast, the increase in U.S. manufactured exports to Japan by $12.6 billion in 1986 does represent a trend given the structural changes in the Japanese economy. Such exports may even grow if U.S. competitiveness improves further.