

International Finance Discussion Papers

Number 311

August 1987

REALIGNMENT OF THE YEN-DOLLAR EXCHANGE RATE:
ASPECTS OF THE ADJUSTMENT PROCESS IN JAPAN

by

Bonnie E. Loopesko and Robert A. Johnson

NOTE: International Finance Discussion Papers are preliminary materials circulated to stimulate discussion and critical comment. References in publications to International Finance Discussion Papers (other than an acknowledgment by a writer that he has had access to unpublished material) should be cleared with the author or authors.

ABSTRACT

The paper first surveys recent estimates of the appropriate yen-dollar exchange rate that have been proposed in the literature. Most of the more careful estimates suggest that the yen was substantially undervalued against the dollar in early 1985 when it began its steep ascent and some of the estimates suggest that further appreciation from today's strong level is warranted.

We then turn to the adjustment process. First, we present evidence that a narrowing of Japan's record trade surplus has already started to occur, particularly in real terms. Next, we show that external adjustment has been slower than would have been predicted by a simple econometric model of Japanese trade. We then explore several possible explanations for this predictive failure in the recent period, including the slower pass-through of exchange rate changes to Japanese export prices than in the past, and the slow pass-through of terms-of-trade gains to consumer prices. Evidence is also presented that Japanese exporters adjust prices asymmetrically in response to yen depreciations and appreciations.

Next, we use a simple model to analyze the oft-stated claim that too much yen appreciation in a short period of time may actually be counter-productive. The model shows that this outcome is possible, but we argue that for an economy with Japan's structure it is unlikely.

Finally, we analyze what role fiscal policy can play in the adjustment process. MCM simulation results suggest that a Japanese fiscal expansion would be much less effective in fostering a reduction in both the U.S. and Japanese trade imbalances than would a U.S. fiscal contraction. However, a Japanese fiscal expansion could have an important impact on domestic demand in Japan and on trade with the developing countries.

Realignment of the Yen-Dollar Exchange Rate:
Aspects of the Adjustment Process in Japan

by

Bonnie E. Loopesko and Robert A. Johnson*

1. Introduction

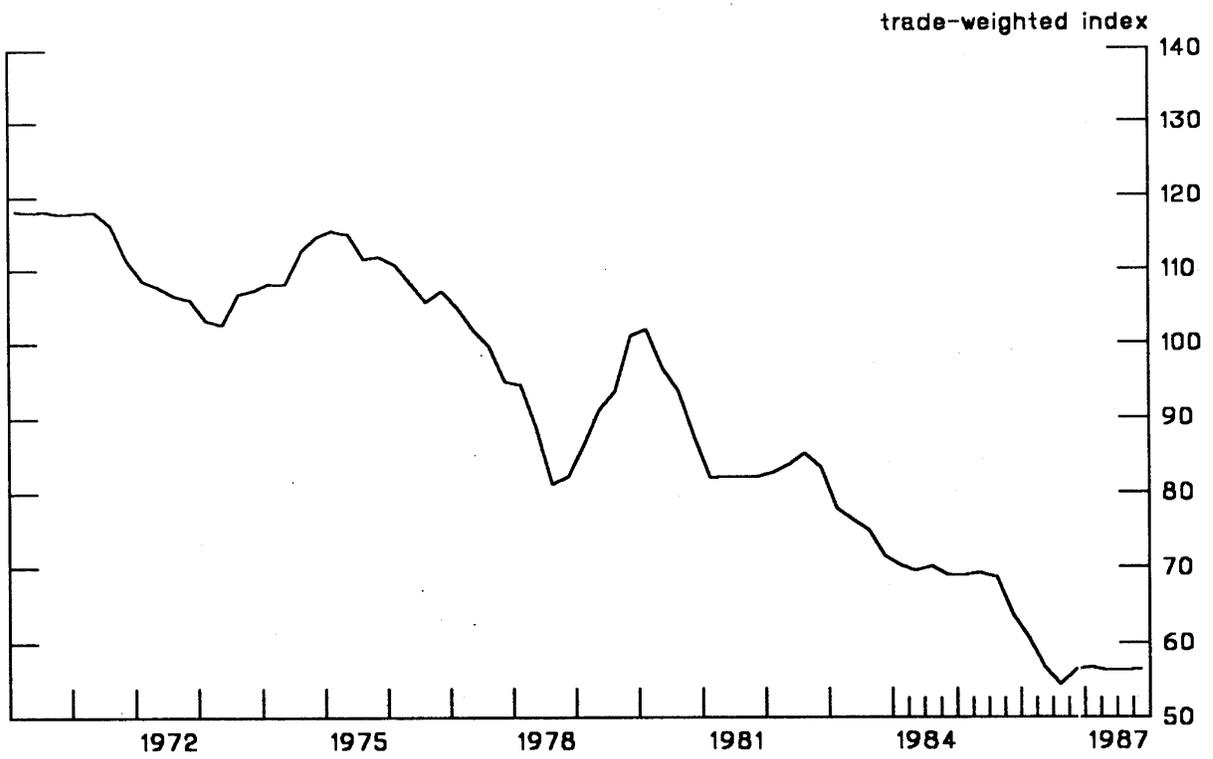
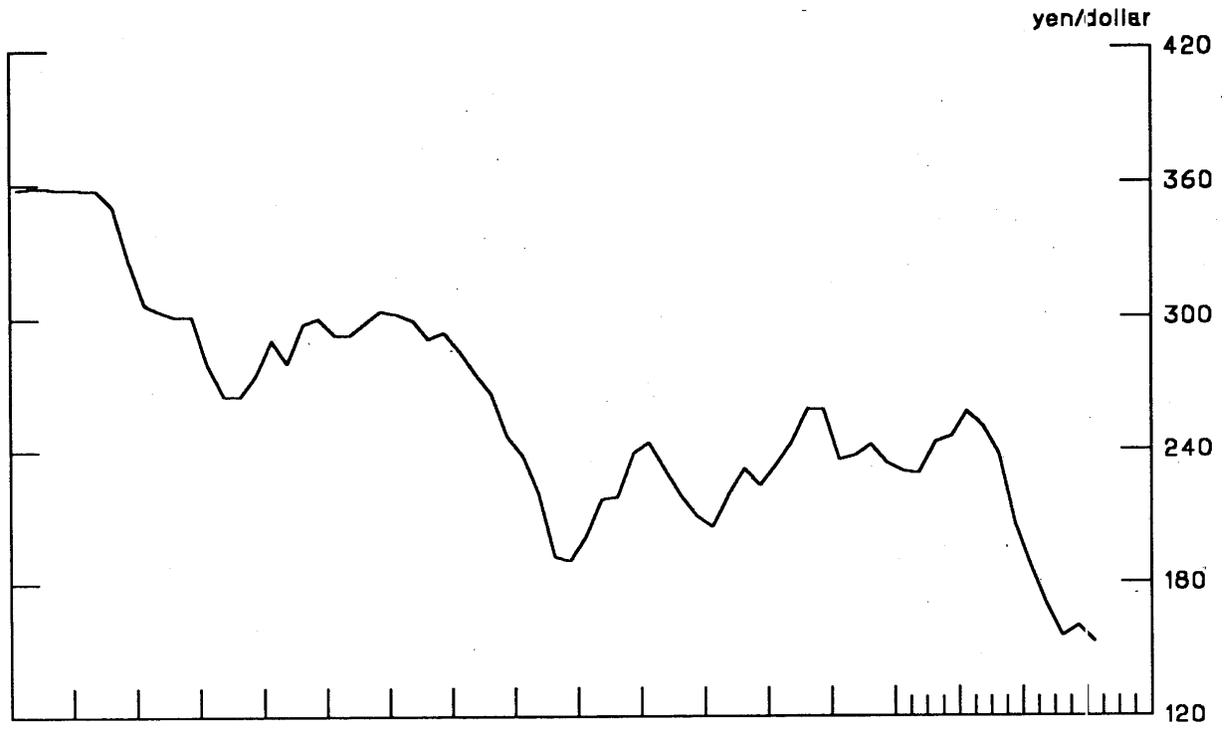
The 50 percent appreciation of the yen-dollar exchange rate in the last two years (or the 90 percent appreciation when expressed in dollar-yen terms) appears dramatic even when compared to the frequent sizable swings in exchange rates that have characterized the floating rate period. For Japan, as is evident in Chart 1, this is the largest unidirectional movement of its exchange rate since the advent of floating. (See Manuel Johnson and Bonnie Loopesko (1987) for an overview of the yen-dollar relationship during the floating exchange rate period.) In light of Japan's record external surpluses, it is widely agreed that the yen was substantially undervalued in early 1985 when it began its steep ascent. The only source of debate has been just how high the yen needs to go.

Faced with an unprecedented shift in its exchange rate and mounting domestic and international pressure to restructure its economy away from export-oriented growth, Japan has embarked on what may turn out to be a major transformation of its industrial structure. If the strong yen (termed "endaka" in Japanese) persists, and most analysts believe that it

*The authors are staff economists in the International Finance Division. This paper represents the views of the authors and should not be interpreted as reflecting those of the Board of Governors of the Federal Reserve System or other members of its staff. This paper was prepared for the NBER Conference "Misalignment of Exchange Rates: Effects on Trade and Industry," May 1987. We would like to thank Bill Helkie for invaluable assistance in modeling the Japanese trade sector; Karen Johnson, Sean Craig, Richard Marston, Jacob Frenkel and other participants at the NBER Conference and an IMF Research Department seminar for helpful comments, and Joerg Dittmer for excellent research assistance.

Chart 1

YEN EXCHANGE RATES



will, then steps already taken towards out-sourcing of production and shifting of investment away from the manufacturing sector likely will be accelerated in the future. This adjustment process could be the most profound in Japanese post-war history.

As this process gets under way, the costs of adjustment are already apparent throughout the Japanese economy. Unemployment, while still low by international standards, has touched a record 3 percent level in recent months and is expected to continue to rise this year. In addition to the rise in unemployment, there is more subtle evidence of a slackening of labor market conditions. A recent survey by the Keidanren (1987), the Japanese equivalent of the Business Roundtable, indicates that nearly 60 percent of companies surveyed have instituted tighter controls on overtime and a third have reduced bonuses and cut back employment of part-time employees. A quarter of the companies have increased transfers of employees to subsidiaries and commenced training for reassignment. On the production side, 40 percent of firms reported they had reduced production, while one-third reported increases in their imports of parts. Out-sourcing of production is also underway: the Keidanren survey indicates that a quarter of companies surveyed have already expanded off-shore production facilities and another 20 percent have plans to do so. Thus important changes appear to be underway in Japan, and this paper examines several aspects of the adjustment process to "endaka".

The next section provides a brief review of recent calculations of the appropriate level of the yen-dollar exchange rate. Evidence is then presented on the degree of trade balance adjustment that has occurred to date. The following section examines what econometric models of Japanese trade reveal about the traditional channels of trade adjustment, the income

and relative price elasticities. The forecasting performance of the trade equations presented suggests that, while the model fits reasonably well over the floating rate sample period through 1984, it predicts stonger adjustment in Japanese trade than has actually occurred in the past two years. The next sections look at possible reasons why Japanese trade is adjusting more slowly to the yen's recent sharp rise than would be indicated by historical experience. Evidence on pass-through of the yen's appreciation to export and consumer prices suggests two possible explanations. Next, a model is presented to highlight the spillover effects of a recession in the export sector (resulting from the yen's sharp appreciation) to the entire economy. The danger of an economy-wide recession in Japan and its implications for trade adjustment are addressed. Finally, the role of fiscal policy in fostering external adjustment is explored. Evidence from the Federal Reserve Board staff's Multi-Country Model indicates that Japanese fiscal expansion would make a smaller contribution than U.S. fiscal contraction to the reduction of external imbalances between the two countries, but that potentially important third-country effects should not be ignored.

Purchasing Power Parity Calculations

The relative version of purchasing power parity (PPP) states that the movement in the exchange rate from some base period is determined by the inflation differential over the same period. There is a long history of debate over which price index is appropriate for PPP calculations (see Frenkel (1978), pp. 3-4), although most recent calculations are based on prices of homogeneous and internationally-traded goods expressed in a common currency. The base year (or weighted average of years) is usually chosen to represent a period of approximate external balance. Despite the

many well-recognized problems with PPP as a notion of the equilibrium exchange rate, calculations of the deviation from PPP are often cited in discussions of exchange rate misalignment.

Table 1 shows several recent PPP calculations for the yen-dollar exchange rate. While the differing calculation methods (e.g., selection of base year, type of price index used, other adjustments) yield quantitatively different PPP estimates, all of the simple (unadjusted) PPP calculations show the yen-dollar rate to be substantially overvalued at its recent level of about 140.

One important difficulty with the calculations shown in Table 1 is that, except for Krugman's (1986b) calculation, they do not take account of possible changes in the long-run equilibrium exchange rate. Particularly for the case of the yen-dollar exchange rate, the assumption that the long-run equilibrium exchange rate is constant appears implausible. Marston (1986) has shown that growth in productivity in the traded goods sector in Japan has exceeded that in the nontraded services sector by a substantial margin, so that PPP comparisons of prices that include services will misrepresent the gains in competitiveness. Krugman's calculation attempts to adjust for Japan's relatively rapid productivity growth in the traded goods sector, and this adjustment alone suggests that the yen-dollar rate would have to appreciate to 140.

A more general problem with the PPP calculations is that, in theory, PPP provides a guide to the appropriate level of the exchange rate only if all disturbances since the base period are monetary in nature. In light of the sizable real disturbances that have characterized the past 15 years (e.g., oil price changes and changes in government net saving), PPP calculations provide a poor guide to the appropriate level of the exchange

Table 1

Purchasing Power Parity Calculations
for the Yen-Dollar Exchange Rate

Morrison and Hale	203
McKinnon and Ohno	215
Krugman -adjusting for estimated divergence between manufacturing price and CPI	140

Notes:

-Morrison and Hale (1987): PPP calculations adjusted for "tradeability". Deflators for disaggregated GDP components (provided in OECD, 1987) are weighted by trade shares to obtain a PPP rate for 1980. Then, movements since 1980 in relative producer prices for manufacturing goods are used to update the calculation.

-McKinnon and Ohno (1987): Estimated by the "price pressure method", incorporating the effect of exchange rate misalignment (deviations from PPP) on prices. The resulting PPP is that exchange rate which exerts no upward or downward pressure on domestic prices relative to those abroad.

-Krugman (1986b): Taking the geometric average manufacturing real exchange rate over 1973-79 as the base period, he assumes that the manufacturing PPP rate has continued to fall relative to the ratio of CPIs at the same rate as during the 1973-83 period, i.e. 4.4 percent per year, and extrapolates using actual CPI inflation.

rate. If changes in real economic factors alter the equilibrium exchange rate after the base period, the PPP exchange rate may imply large and perhaps growing current account imbalances. In this case, there is nothing in PPP calculations to ensure that the current account imbalances associated with a given PPP exchange rate would be sustainable in terms of the accompanying capital flows required to finance the imbalances.

Sustainability Calculations

An alternative to PPP as an indication of the appropriate level of the exchange rate is the "underlying balance" or "sustainability" approach. An early formulation of this framework may be found in Nurkse (1945). In the 1970s, the International Monetary Fund further developed the approach (see Frenkel and Goldstein (1986) for a description of the IMF framework).

A recent contribution to this tradition was provided by Williamson (1983) who asked the following question: "What set of exchange rates would have been needed in a specific period... to induce a set of current account balances that matched 'underlying capital flows'?" (p. 22) The concept of underlying capital flows is meant to capture the notion that the equilibrium exchange rate will change in line with shifts in propensities to save and invest. For example, a country with a high savings rate may save in excess of its domestic investment opportunities and hence tend to export capital. Thus differential rates of savings and investment across countries are reflected in underlying capital flows and associated current account imbalances.

Williamson calculated the exchange rates consistent with underlying capital flows in 1976-77, extrapolated forward based on differential inflation (a PPP approach), and finally adjusted the calculation for substantial changes in real factors that have affected the equilibrium

exchange rate since the base period. The most recent calculation based on the Williamson approach, reported in Bergsten and Cline (1987, revised) and shown in Table 2, suggests an equilibrium yen-dollar rate of about 150 by the end of 1986, and of 140-145 in 1987.

Krugman (1985, 1987) developed a simple model to address a related but slightly different question: what exchange rate is consistent with a sustainable current account imbalance? In essence, Krugman looks at the change in the exchange rate implied by the current interest rate differential and asks whether that change would suffice to eliminate the non-interest current account imbalance and thus stabilize the level of foreign debt relative to GNP. If the exchange rate change implied by the current interest differential would lead to an accelerating rise in the debt-to-GNP ratio, then the current exchange rate is judged to be unsustainable. (Of course, this calculation assumes that no risk premium exists in the foreign exchange market.)

In September 1985, Krugman calculated that the dollar would have to decline 26 percent to restore U.S. current account balance. If the dollar declined equally against all currencies, this would imply a yen-dollar rate of about 175. He also calculated that if the dollar declined as slowly as the interest differential indicated at that time (1.6 percent per year), the U.S. debt to GNP ratio would rise for the next 30 years to a level of over 50 percent. This would bring U.S. external indebtedness relative to GNP to a level comparable to that of Brazil and Mexico, which, Krugman asserts, few people would find feasible. In 1987, Krugman revisited the sustainability issue, and concluded that if the dollar were to depreciate at the rate implied by the interest differential, external debt as a

Table 2

Sustainable Yen-Dollar Exchange Rates

Williamson/Bergsten/Cline (1987)	150 in 1986 140-145 in 1987
Krugman (September 1985)	26 percent dollar depreciation (a yen-dollar rate of about 175)
Morrison and Hale (1987)	135 yen-dollar
Krause (1986)	100 yen-dollar

Notes: see text for descriptions of each calculation.

percent of GNP would rise to 38.8 percent after 10 years, again a level he thought unsustainable.

Morrison and Hale (1987) used Krugman's methodology and asked how much further the dollar would need to decline if the entire remaining U.S. non-interest current account deficit were to be eliminated within 10 years by exchange rate changes alone. On the assumption that the dollar declines equally against all currencies, they calculate that a sustainable yen-dollar rate would be about 135.

Laurence Krause (1986) took a similar approach: what dollar exchange rate is consistent with a balanced U.S. current account by 1990 or 1991, and what is the implied value of the yen? This is a stronger condition than that imposed by Krugman or Morrison and Hale, so it is not surprising that Krause finds that more yen appreciation -- to 100 yen/dollar -- is required.

The underlying capital flows/sustainability approach has the virtue of attempting to take explicit account of the dynamic consistency of the implied exchange rate path. It also recognizes that some degree of persistent current account imbalance may be implied by differences in savings and investment propensities across countries. One limitation of this approach is that it requires as an input a number of parameter values that are difficult to specify with confidence. For example, one parameter in Krugman's calculations (assumed to be a constant) represents all factors other than the exchange rate change upon which the current account depends. Also, in the IMF/Williamson approach it is difficult to render concrete the notion of underlying capital flows.

A comparison of Tables 1 and 2 shows that the estimates of the "equilibrium" yen-dollar rate from PPP calculations tend to indicate that

the yen is currently overvalued, while some of the estimates derived from the sustainability/underlying capital flow approach indicate a need for further yen appreciation. This divergence occurs despite the fact that both approaches incorporate some notion of external balance as the anchor for the calculations. The most likely explanation for the discrepancy is the earlier-noted failure of the PPP calculations to take account of real factors that have shifted the equilibrium exchange rate since the base period. The sizable shifts in fiscal policy in Japan and the United States are one likely important factor. Also, as noted above, the difference in productivity growth between traded and nontraded goods sectors was substantial in the 1970s. If productivity in the nontraded goods sector has changed little, then the fact that productivity growth in the Japanese manufacturing sector has slowed markedly in recent years, as can be seen in Table 3, suggests that this factor may not continue to be an important source of secular appreciation of the yen. It is worth noting that the productivity differential between the United States and Japan in the manufacturing sector has narrowed in the 1980s, as can also be seen in Table 3.

Capital Account Considerations. The sustainability approach applied to the current U.S. situation asks whether a decline of the dollar at the rate implied by the interest differential would produce a sustainable path for U.S. net external indebtedness. Even if the debt-to-GNP ratio does not rise at an accelerating rate, it may still increase to very high levels in the medium term. The question then becomes: would foreign investors be willing to finance the implied path of current account imbalances? This turns attention to the capital account side of the balance of payments.

Table 3

Productivity Growth in the United States and Japan

(annual percentage growth in output per hour in manufacturing)

<u>Period</u>	<u>Japan</u>	<u>United States</u>
1950-59	11.4	2.1
1960-69	14.8	3.0
1970-79	7.7	2.5
1980-85	5.1	3.3

Source: Bureau of Labor Statistics (1986).

Some recent developments may shed light on this issue. Japanese and other foreign investors appeared to be adjusting their investment portfolios in response to large perceived dollar exchange risk in late 1986 and early 1987. This may have indicated that some investors came to believe the yen-dollar exchange rate to be unsustainable (i.e., that the dollar must decline faster than the small decline implied by the interest differential). This shift in beliefs would be reflected in changes in interest rates and exchange rates.

One important implication of this portfolio reshuffling by Japanese and other foreign investors is that it became more difficult for the United States to finance its fiscal deficit by private capital inflows at unchanged interest rates and exchange rates. Indeed, interest rates on U.S. Treasury bonds rose in late March 1987, accompanied by renewed downward pressure on the dollar. Data from the Federal Reserve Bulletin, shown in Table 4, indicate that for 1986 as a whole, Japanese purchases of Treasury notes and bonds fell 79 percent. Foreign purchases in 1986 were sustained by a 76 percent rise in purchases of Treasury securities by foreign official institutions, while "other foreign" purchases fell 46 percent. Since November 1986, total foreign purchases of Treasury securities have been negative (the total would have been even more negative if official purchases had not been positive).

Problems with this data, produced by the U.S. Treasury, are discussed by Drexler (1987) and Sargen and Schoenholtz (1987). The main difficulty is that data is gathered according to the geographic location of the investor, rather than nationality. Thus, purchases by Nomura Securities in London for eventual resale to Japanese residents would appear

Table 4

U.S. Treasury Bonds and Notes:
Foreign Transactions
(millions of dollars)

	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1986</u>			<u>1987</u>
Purchases by:				<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>	<u>Jan.</u>
-all foreign	16,496	28,768	25,210	2,778	-270	-543	353
-foreign official institutions	505	8,135	14,277	3,506	138	240	1,488
-other foreign	15,992	20,631	10,936	-727	-408	-783	-1,135
-Japan	6,289	17,909	3,916	-453	186	-2,086	-76

Source: Federal Reserve Bulletin, April 1987, Table 3.25.

as a sale to the United Kingdom (the eventual sale back to Japan would not be tracked by the U.S. data).

Still, these data on Treasury securities may be indicative of a general trend whereby official purchases of dollar securities are substituting for private purchases. However, if official purchases do not continue, higher U.S. interest rates and a lower dollar may result. A change in policy stance in either Japan or the United States could reverse this process, and draw Japanese and other foreign money back into the U.S. Treasury securities market. For example, a substantial shift towards fiscal ease in Japan or fiscal restraint in the United States would affect both PPP and sustainability calculations.

Adjusting to "Endaka"

The sustainability calculations of the appropriate yen-dollar exchange rate cited in the previous section suggest either that the current rate is close to a sustainable level, or that some further appreciation is required. These calculations thus indicate that the yen was dramatically undervalued prior to the appreciation that started in February 1985, and that the strong yen is likely to persist. This exchange rate adjustment will induce substantial trade balance adjustment and necessitate fundamental changes in the structure of industry in Japan. This section will look at the adjustment process currently under way in Japan, and discuss how the dynamics of adjustment are influenced by structural features of the Japanese economy.

Recent Adjustment of Japanese Trade The Japanese trade balance has already started to adjust to the sharp rise of the yen, as can be seen in Charts 2 through 4. In both dollar and yen terms, shown in Charts 2 and 3, the Japanese surplus has started to decline slightly. The decline is even

Chart 2 JAPANESE TRADE (IN DOLLARS)

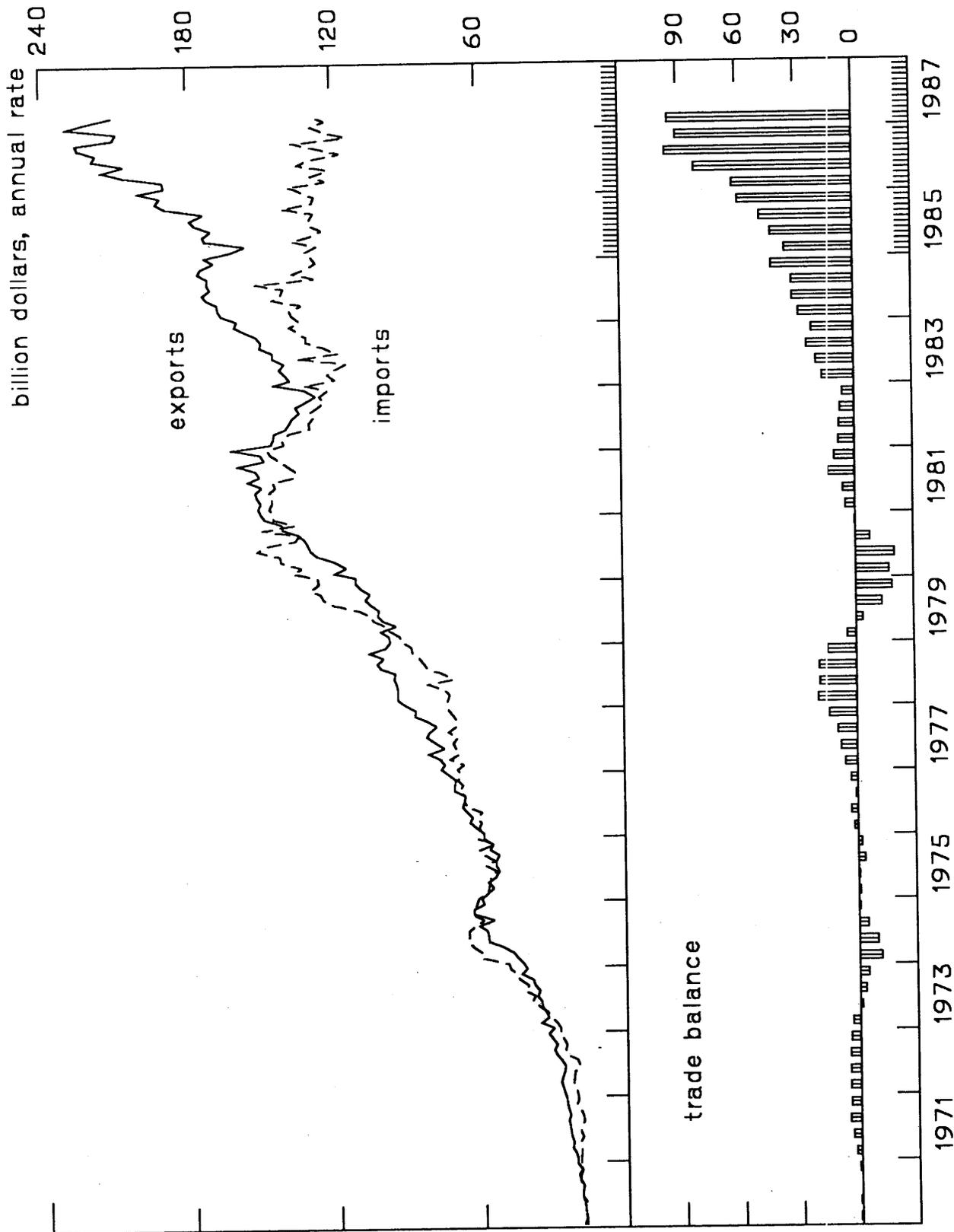


Chart 3
JAPANESE TRADE (IN YEN)

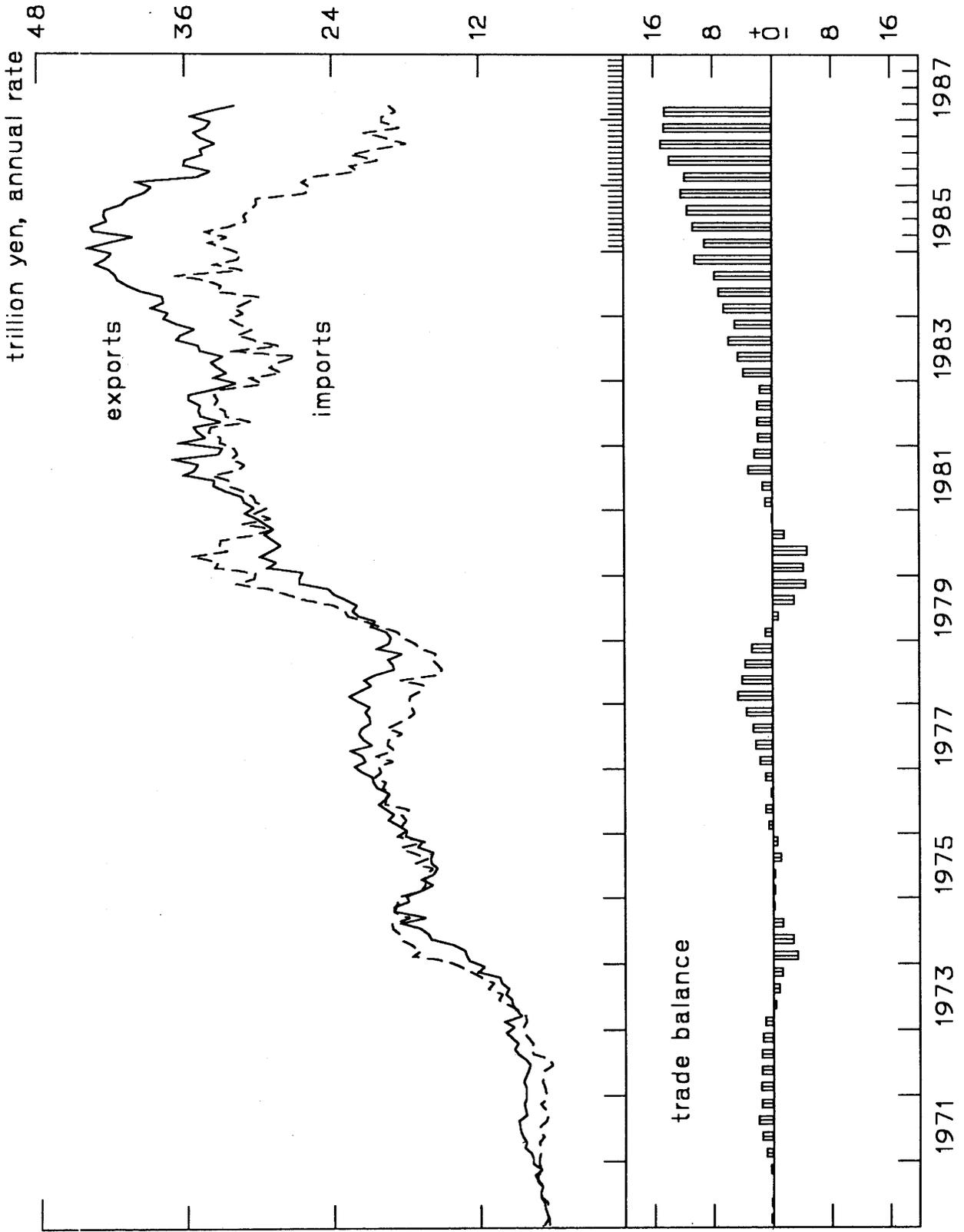
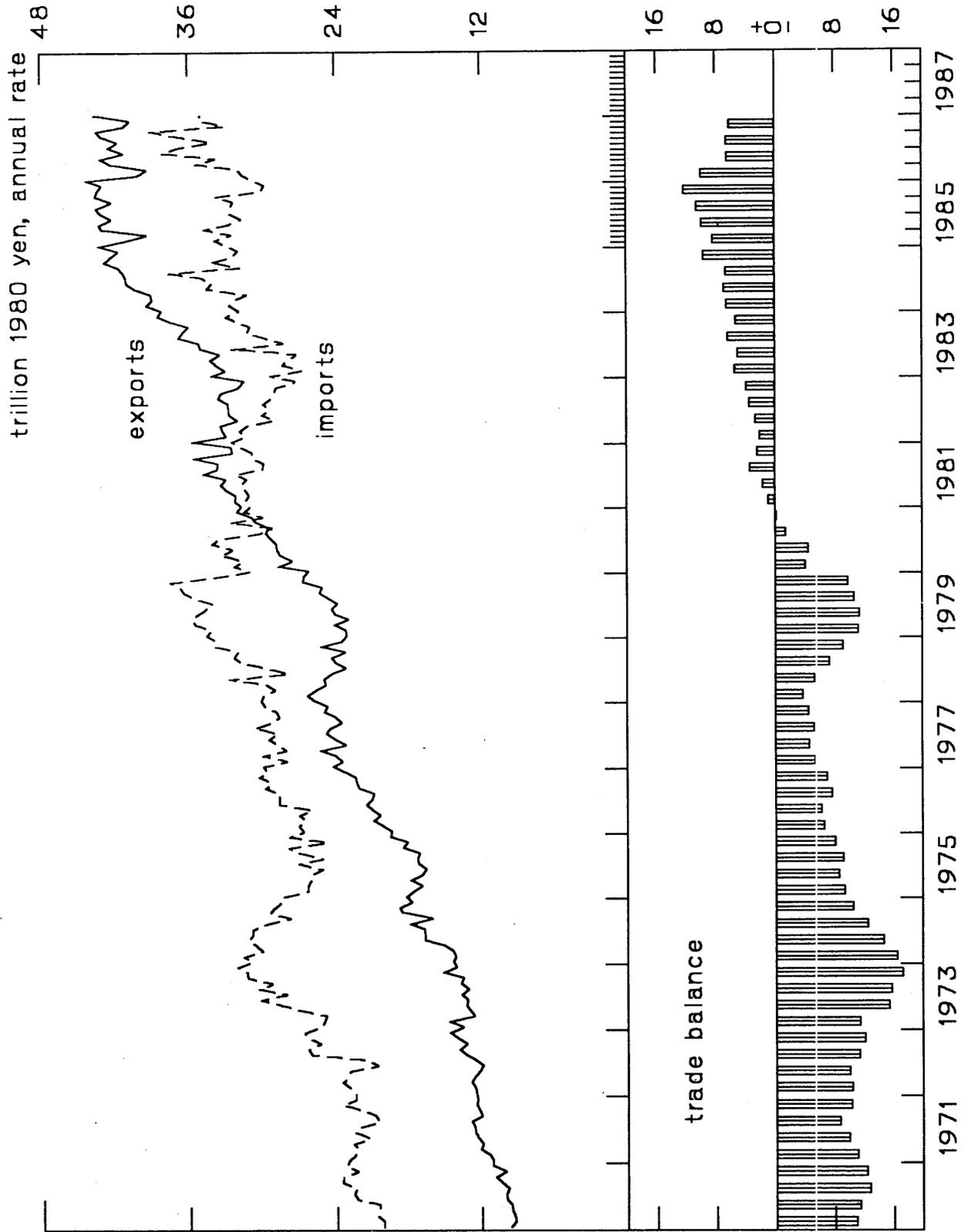


Chart 4 JAPANESE REAL TRADE (in 1980 yen)



more evident when the trade balance is expressed in real terms, shown in Chart 4. Nonetheless, a record surplus remains (in 1986, the trade surplus reached \$82.5 billion) and the arithmetic of adjustment of the trade imbalance implies that, over time, imports would have to grow about 80 percent faster than exports to attain balance (since exports are presently about 80 percent greater than imports).

Chart 5 highlights the growing importance of the bilateral trading relationship between Japan and the United States in Japan's overall trade pattern. Both Japanese exports to the United States and Japanese imports from the United States have grown in the 1980s. In 1986, the United States purchased 39 percent of Japan's exports and provided 23 percent of its imports.

Japan's trade imbalance vis-a-vis the United States measured in dollars, shown in Table 5, may have started to decline in 1987. The surplus for the first quarter of 1987 fell to \$11 billion dollars, compared to \$14.4 billion in the fourth quarter. However, since this data is reported on a seasonally unadjusted basis, and declines in the first quarter are common, it is too early to determine if the turning point has been reached. Calculations by the Bank of Japan of the real trade balance between the United States and Japan, shown in Chart 6, indicate that the decline in the real bilateral trade surplus started early in 1986. The Bank of Japan calculations also show declines in Japan's real surplus vis-a-vis Asia and the European Community.

Traditional Channels of Trade Balance Adjustment

It is interesting to investigate the channels through which this trade balance adjustment can be expected to occur in Japan. Much of the empirical literature on trade balance adjustment focuses on income and

CHART 5

DIRECTION OF JAPANESE TRADE

1980 AND 1986

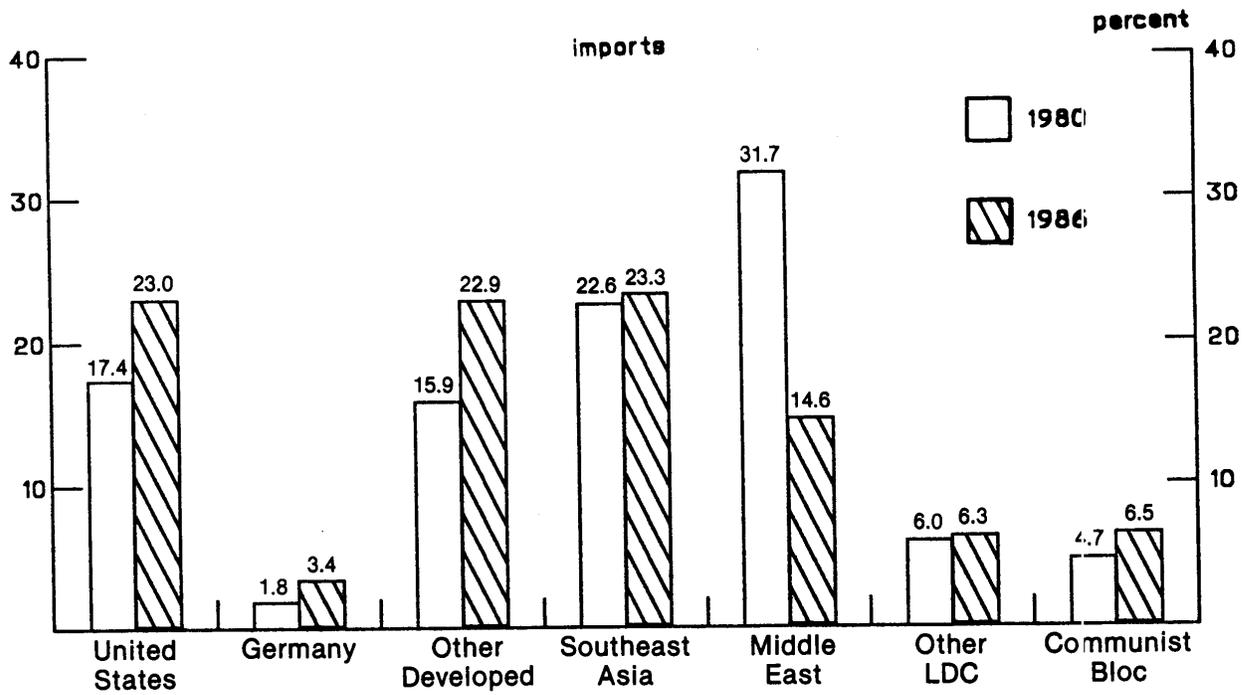
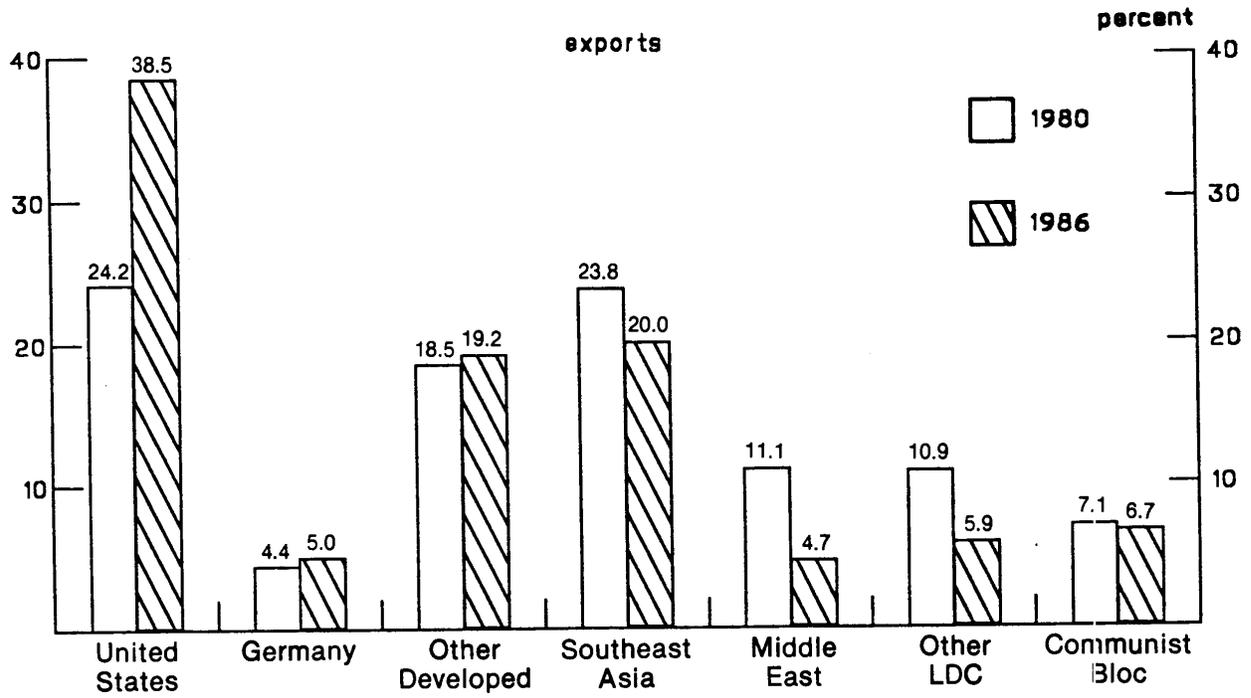


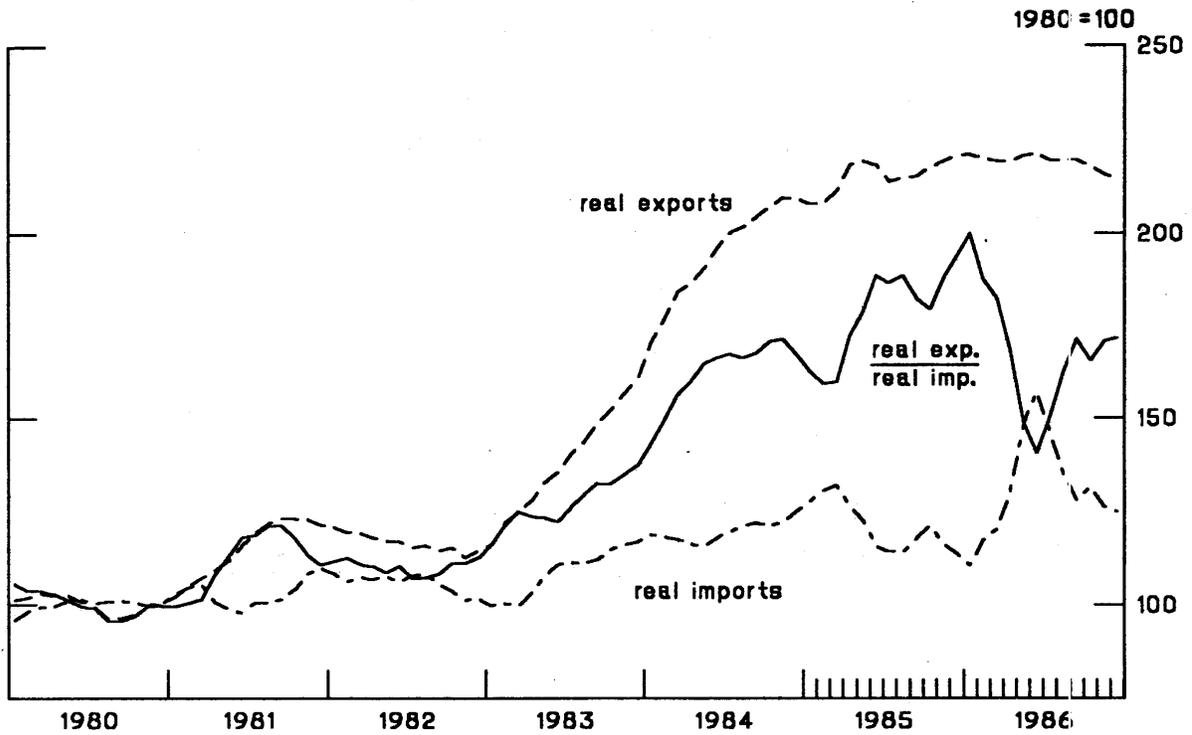
Table 5

	<u>Japan-U.S. Trade</u> (in millions of dollars)		
	<u>Exports</u> (f.o.b.)	<u>Imports</u> (c.i.f.)	<u>Trade balance</u>
1982	\$36,330	\$24,179	\$12,151
1983	42,829	24,648	18,181
1984	59,937	26,862	33,075
1985	65,278	25,793	39,485
1986	80,462	28,984	51,478
1986.I	16,706	6,275	10,431
.II	20,923	8,272	12,651
.III	21,281	7,518	13,764
.IV	21,552	6,920	14,632
1987.I	17,979	6,948	11,031

Source: Japan Tariff Association, Summary Report of Trade of Japan.

Chart 6

THE U.S.-JAPAN REAL TRADE BALANCE (in 1980 yen)



Source: Bank of Japan, Research and Statistics Department.

price elasticities in export and import demand equations. This section first reviews some of the estimates of Japanese trade equations provided by earlier research, and then presents some new estimates. The review considers both equations for bilateral trade between Japan and the United States and equations for Japanese multilateral trade. Because it is difficult to evaluate the role of macroeconomic policy in fostering trade adjustment in these partial equilibrium frameworks, the last section of this paper provides some empirical evidence based on simulations of the Federal Reserve Board staff's Multi-Country Model (MCM).

Bilateral Trade Equations. Trade between the United States and Japan has been modeled recently by Bergsten and Cline (1987, revised). Their elasticity estimates are summarized in Table 6. In the equation for Japanese exports to the United States, they estimate two income elasticities, one for the ratio of actual GNP to trend GNP to capture the cyclical position of the economy and another for real U.S. GNP. The cyclical income elasticities are reported in the table (the other income elasticity is 0.7 for Japanese exports, but it is not statistically significant, and 0.8 for Japanese imports). While the elasticity estimates reported in the table suggest a substantial responsiveness of Japanese exports and imports to fluctuations in both relative prices and cyclical fluctuations in real income, there appear to be some technical problems with the estimates. In particular, the income elasticity of U.S. demand for Japanese exports is arrived at using a peculiar estimation procedure. The authors take as given the relative price elasticity (using the elasticity estimated in a study by Petri (1984)) and then estimate the remainder of the equation. Clearly, by construction, the Petri elasticity is an estimate that is conditional on the other variables included in his

Table 6

Elasticity Estimates for U.S. - Japan Trade

	<u>Relative Price Elasticity</u>	<u>Income Elasticity</u>
(1) Bergsten and Cline (1987)		
1960-1984 (annual data)		
-Japanese exports	-2.12 ^{1/}	1.62 ^{2/}
-Japanese imports	-1.16	1.81 ^{3/}
(2) Craig (1986)		
1961.III - 1985 IV		
-Japanese exports	-1.14	3.57
-Japanese imports	-0.66	0.75

Sources: (1) C. Fred Bergsten and William R. Cline (1987, revised).
(2) Sean Craig (1986).

Notes:

- ^{1/} Constrained to equal 2.12, which is the elasticity estimated by Peter A. Petri (1984).
- ^{2/} Ratio of U.S. actual to trend GNP.
- ^{3/} Ratio of Japanese actual to trend GNP.

equation, and cannot simply be "transplanted" into another equation with a different functional form.

Because of these problems, the table also reports estimates by Craig (1986) which are derived from very simple equations incorporating a lagged dependent variable, a contemporaneous activity variable and a contemporaneous relative price term. These estimates suggest that the income and price elasticities of U.S. demand for Japanese exports are of a typical magnitude for a major industrial economy, but that those for Japanese demand for imports from the U.S. are quite low. Very substantial increases in Japanese real income would then be required to induce a significant change in Japanese imports.

Both sets of equations suggest that changes in relative prices are an important influence on Japanese exports to the United States. It is important to note, however, that in both sets of estimates, the relative price terms are not constructed to isolate the relative prices of goods traded between the United States and Japan. Instead, aggregate price indices are used which may be heavily influenced by prices of goods that are not involved in U.S.-Japanese trade. For this reason, the price estimates should be interpreted with caution.

Table 7 reports the full set of Japanese bilateral trade elasticities estimated by Craig. It is interesting to note that while Japanese income elasticities of demand for imports from all of the major industrial countries studied are quite low, the income elasticity is largest for imports from the developing countries. Japanese imports from industrial countries other than the United States are moderately price elastic, while Japanese exports to the industrial countries are quite responsive to changes in foreign real economic activity. Taken together,

Table 7

Japanese Bilateral Trade Elasticities
(1961.III - 1985.IV)
(standard errors in parentheses)

	<u>Japanese Imports</u>			<u>Japanese Exports</u>	
	<u>Price</u>	<u>Income</u>		<u>Price</u>	<u>Income</u>
United States	-0.66 (0.06)	0.75 (0.05)		-1.14 (0.10)	3.57 (0.31)
Canada	-1.12 (0.09)	0.61 (0.05)		-1.39 (0.19)	2.19 (0.20)
United Kingdom	-1.14 (0.18)	0.78 (0.10)		-1.06 (0.09)	5.90 (0.34)
Germany	-1.00 (0.08)	0.71 (0.06)		-0.50 (0.15)	4.80 (0.28)
Other O.E.C.D.	-1.08 (0.10)	0.92 (0.10)		-1.09 (0.08)	2.45 (0.20)
Developing Countries	-0.20 (0.08)	1.39 (0.14)		-0.71 (0.07)	0.74 (0.07)

Source: Sean Craig (1986).

these estimates suggest that quite different geographic patterns of bilateral trade adjustment would result from changes in relative prices versus changes in real economic activity.

Multilateral Trade Equations. Table 8 reports the average and the range of the elasticity estimates from recent studies of U.S. and Japanese multilateral trade equations surveyed in Goldstein and Khan (1985). As in the bilateral equations estimated by Craig, there appear to be some asymmetries between the Japanese and U.S. elasticity estimates. Both the average estimates and range of estimates for the Japanese import elasticities appear lower than those for the U.S. equations. In contrast, the average estimates and range of estimates for the Japanese export elasticities appear larger than those for the United States. This would suggest that efforts to stimulate the domestic economy in Japan would result in less trade adjustment than either changes in relative prices or a slowdown in domestic demand in the United States. The MCM simulations reported in the last section of the paper confirm this impression.

Table 9 takes another look at Japanese and U.S. trade equations. These estimates are from work with William Helkie at the Federal Reserve Board. Japan's aggregate import elasticities again appear relatively low, but these aggregate elasticities mask substantial differences in the elasticities of the components of imports, shown in the bottom panel. The disaggregated Japanese import equations indicate that fuel and raw materials have quite low income and price elasticities. Table 10 shows that fuel and raw materials accounted for about 43 percent of Japanese imports in 1986 but only 28 percent of U.S. imports, so that these low elasticity components are more important as a percentage of total imports for Japan. Japanese manufacturing imports, about 42 percent of total

Table 8

Survey of Estimates of Japanese and U.S.
Long-Run Income and Price Elasticities:
Average and Range of Estimates

	<u>Exports</u>		<u>Imports</u>	
	<u>Japan</u>	<u>U.S.</u>	<u>Japan</u>	<u>U.S.</u>
Long-run price elasticity	-1.4 (-3.0 to -0.5)	-1.2 (-2.3 to 0.3)	-1.0 (-1.2 to -0.7)	-1.3 (-1.7 to -1.0)
Long-run income elasticity	2.6 (1.5 to 4.2)	1.4 (0.9 to 2.2)	1.2 (0.8 to 1.7)	1.9 (0.8 to 4.0)

*/ From Goldstein and Khan (1985) who report representative estimates of income and price elasticities from recent studies. The entries in this table are the average of the estimates reported, and the range of estimates is in parentheses.

Table 9

Estimates of Japanese and U.S. Multilateral
Trade Elasticities^{1/}
(t-ratios in parentheses)

	<u>income</u> <u>elasticities</u>		<u>price</u> <u>elasticities</u>	
	<u>Japan</u>	<u>U.S.</u>	<u>Japan</u>	<u>U.S.</u>
Aggregate Trade Equations:				
-exports 1970.I-1986.IV	1.60 (9.10)	2.19 (5.46)	-1.14 (-3.57)	-0.83 (-6.11)
-imports 1968.I-1986.IV	1.07 (14.03)	2.11 (5.30)	-0.44 (-4.69)	-1.15 (-10.03)
Disaggregated Import Equations:				
-manufacturing 1975.I-1986.IV	1.86 (9.13)		-0.90 (-9.21)	
-fuel 1974.I-1986.IV	1.00 ^{2/}		-0.17 (-5.06)	
-raw materials 1974.I-1986.IV	0.97 (3.40)		-0.50 (-7.24)	

1/ For the U.S., the table reports Helkie and Hooper's (1987) estimates for nonagricultural exports and non-oil imports. The estimates for Japan are based on work with William Helkie at the Federal Reserve Board. Standard errors are reported in parentheses.

2/ Constrained to be unity.

Note: The dates refer to the estimation period for the Japanese equations. The U.S. equations were estimated over 1969.I to 1984.IV.

Table 10

Commodity Composition of Trade: 1986
The United States and Japan
(percentage shares)

	<u>Exports</u>	
	<u>U.S.</u>	<u>Japan</u>
Agricultural	12%	1%
Raw materials	25	1
Manufactured	63	98

	<u>Imports</u>	
	<u>U.S.</u>	<u>Japan</u>
Food and beverage	6%	15%
Raw materials excluding fuel	20	14
Fuel	8	29
Manufactured	67	42

imports, are more responsive to income and relative price movements. In fact, Japan's elasticities for manufacturing imports look more like the typical elasticities of major industrial economies. This evidence suggests that the differences in elasticities between the United States and Japan may derive in part from the different commodity composition of trade of the two countries.

The forecasting performance of these Japanese trade equations, shown in Charts 7 to 9, suggests that the current process of trade balance adjustment for Japan differs from that of recent historical experience. The total import volume equation tracks moderately well in sample, but predicts a more substantial rise in imports in 1985 and 1986 than actually materialized. This over-prediction of Japanese imports is a feature of all of the disaggregated import equations, although the root mean squared error of the post-sample forecast is largest for fuel. For aggregate Japanese exports, the equation again fits moderately well in sample, but predicts a more substantial decline in exports than has in fact occurred.

Based on these estimates, it would appear that Japanese trade has been less responsive to changes in income and relative prices in the last two years than would have been predicted based on recent historical experience. The next section of the paper explores some possible explanations for this slow adjustment of Japanese trade.

The Slow Adjustment of Japan's Trade Surplus

Slow Pass-through. One factor that has contributed to the sluggish adjustment of Japanese exports is slow pass-through of the yen's appreciation to export prices in foreign currency terms. Failure to adjust foreign-currency prices of exports by the amount of an exchange rate change may correspond to an attempt to maintain market share. The resulting

Chart 7

IMPORT VOLUMES

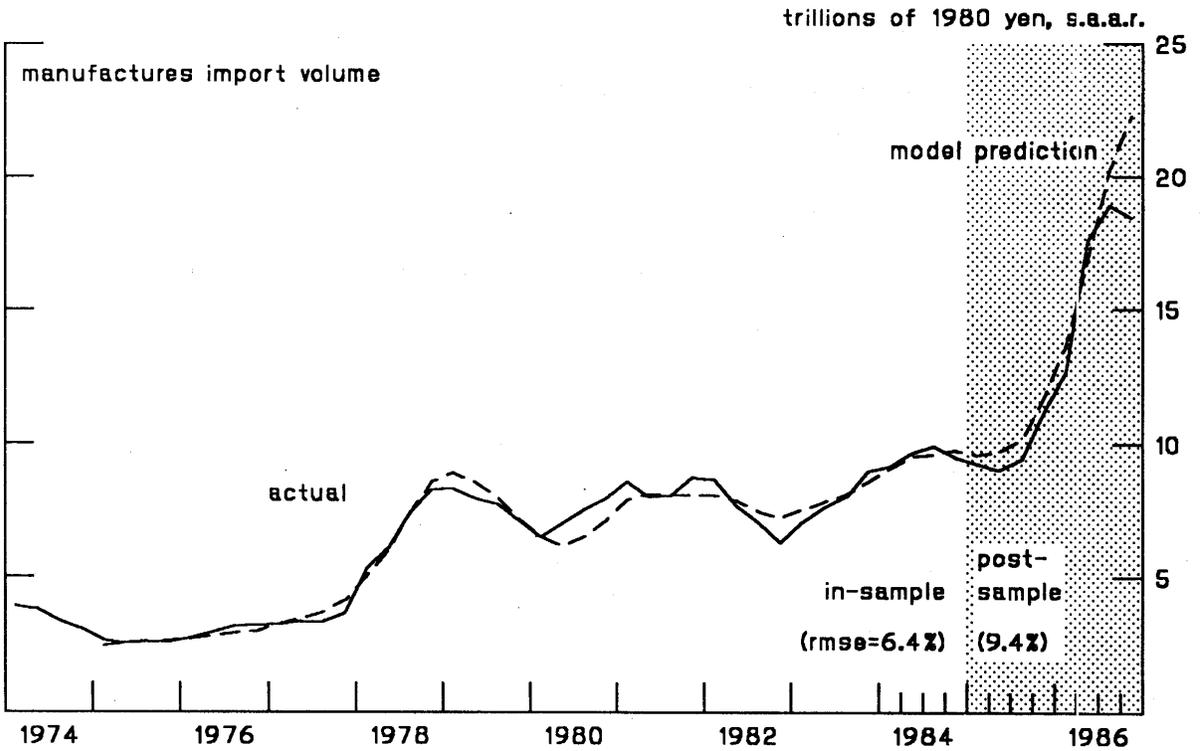
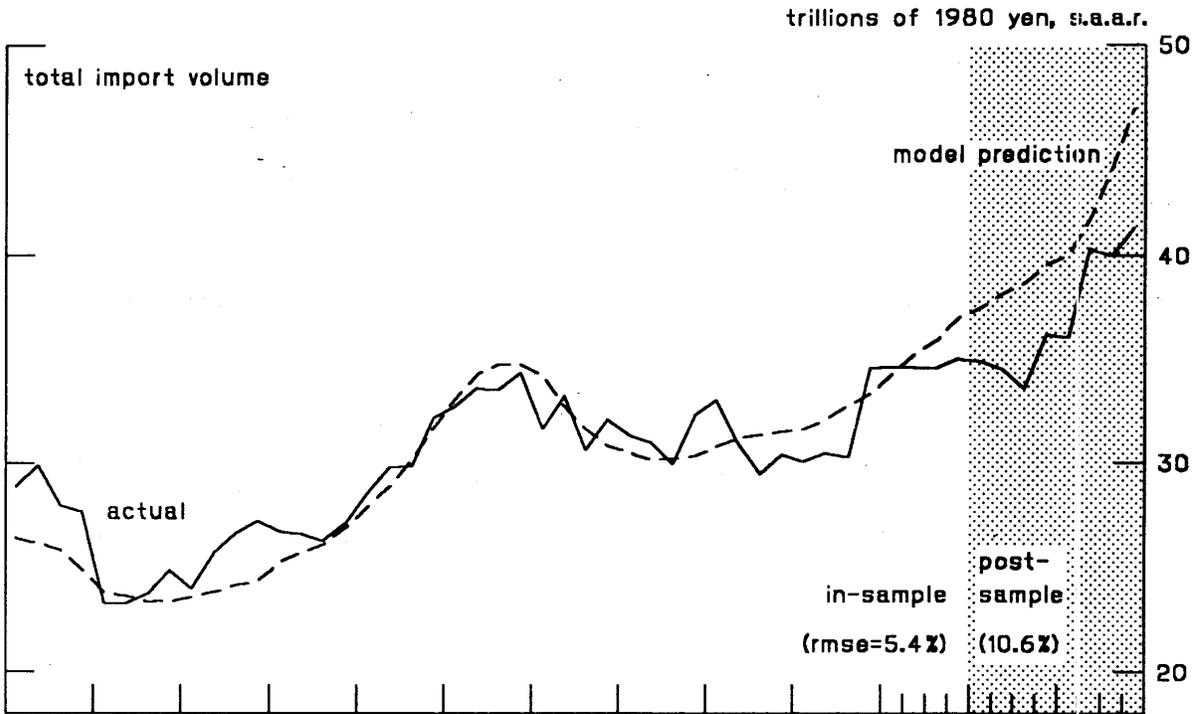


Chart 8
IMPORT VOLUMES

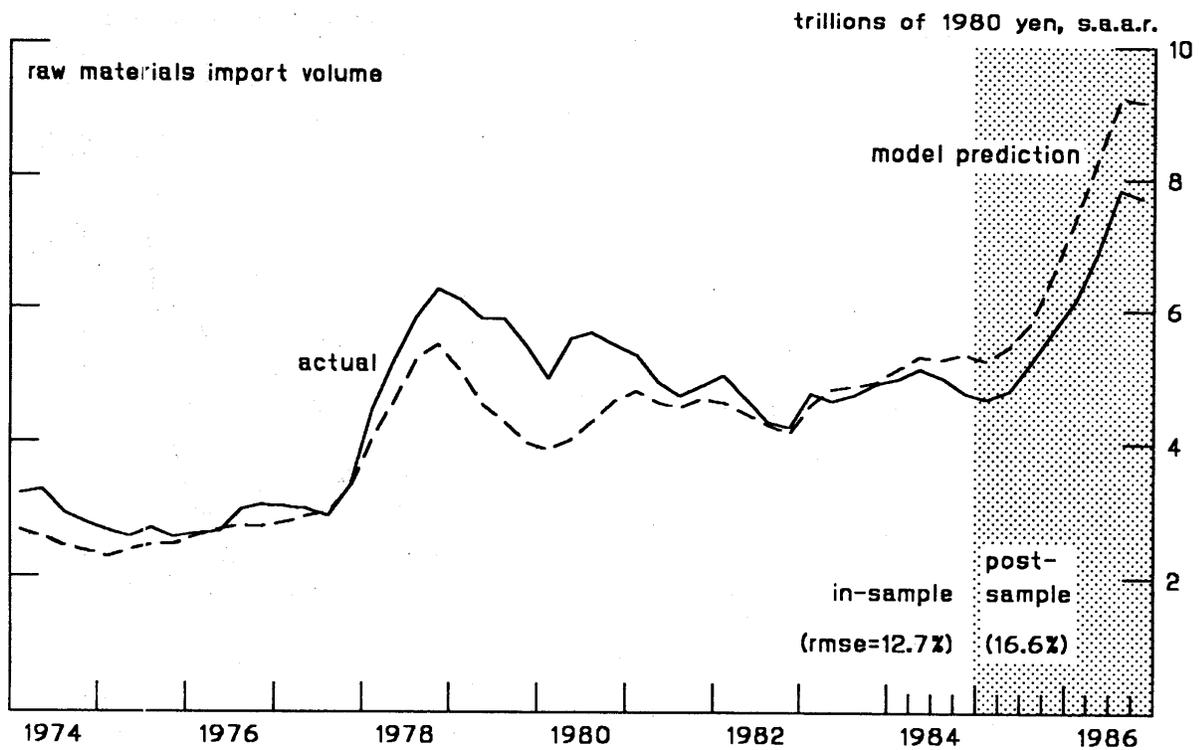
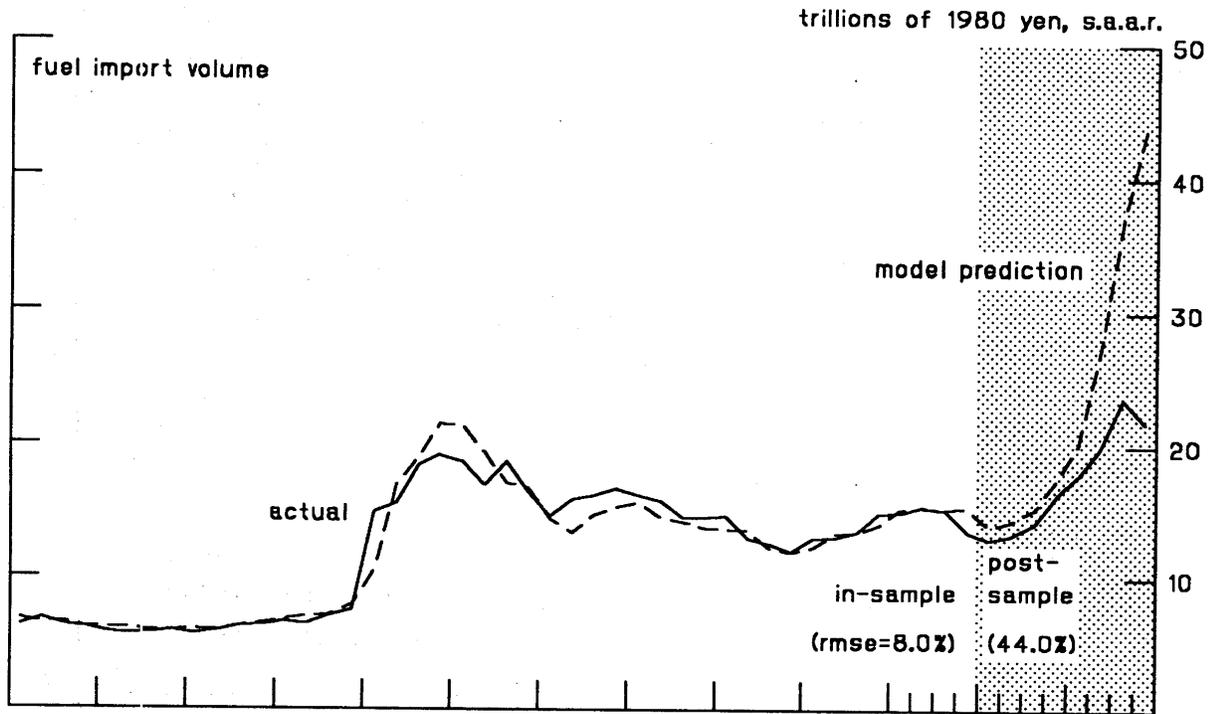
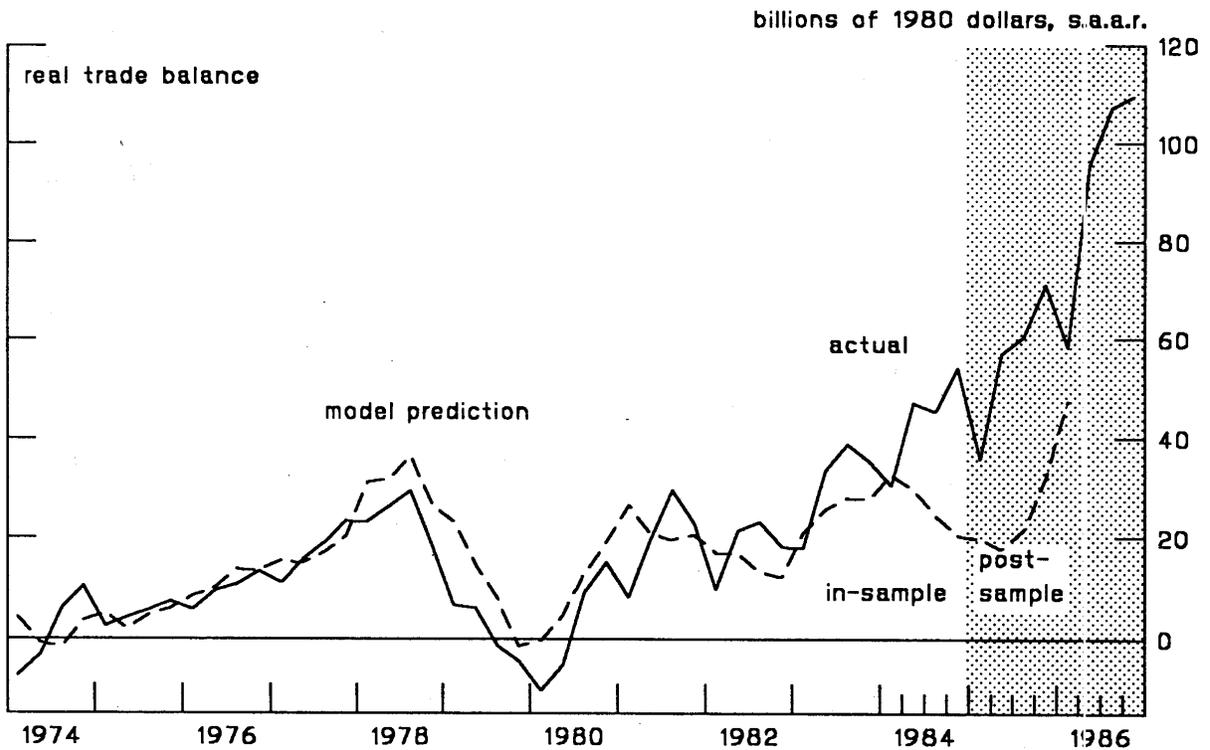
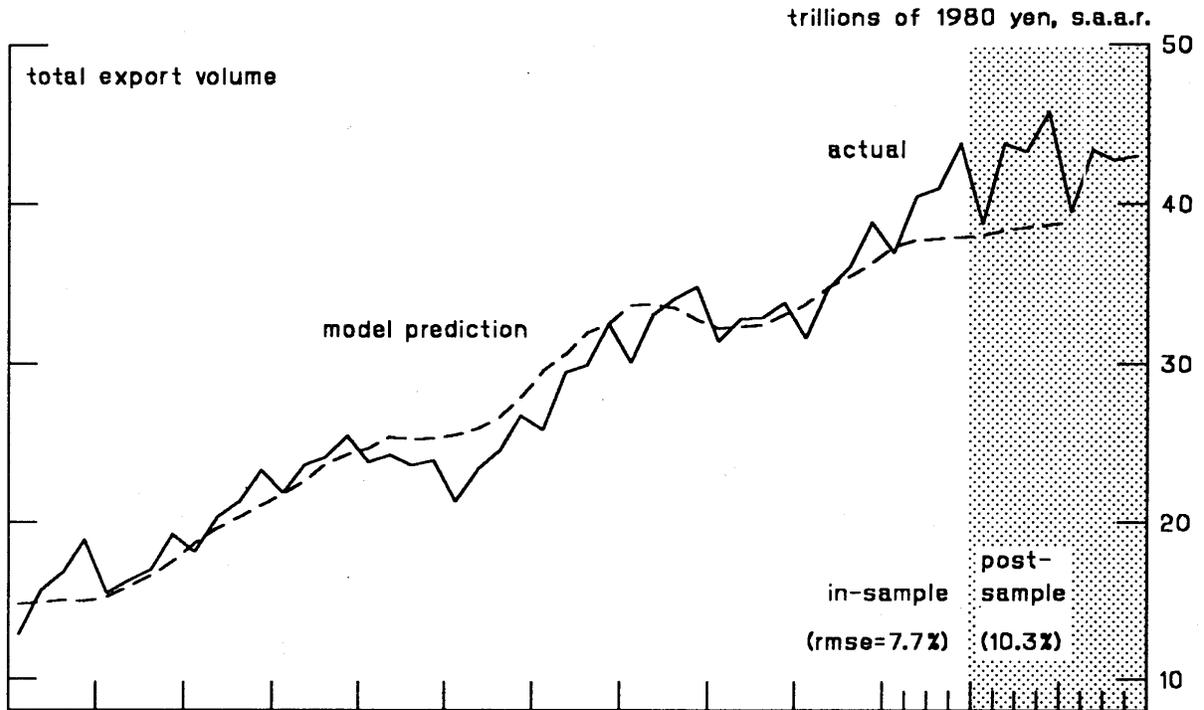


Chart 9

EXPORT VOLUME AND REAL TRADE BALANCE



squeeze on Japanese exporters' profit margins has been documented by Mann (1986) and Jones (1987). Recent theoretical explanations of pass-through and profit margin phenomena are provided by Dornbusch (1985) and Krugman (1986a). Fisher (1987) explores the dependence of the degree of pass-through on domestic and foreign market structures and the exchange rate regime.

Recent evidence on pass-through is presented in Table 11, which presents pass-through estimates for various categories of Japanese exports for the period since the start of the yen's rise in February 1985. The percentage of pass-through is calculated by comparing the actual yen export price to the yen export price that roughly corresponds to full pass-through of the yen's appreciation. Zero pass-through implies that yen export prices would fall by the amount of the yen's appreciation against the dollar in order to keep dollar prices constant, while full pass-through implies that yen export prices would remain constant. Under the assumption that the change in the yen's value was the only influence on the yen export price since February 1985, the export price in February 1985 provides a rough approximation of the full-pass-through export price in February 1987 (i.e., no change should have occurred in yen terms if profit margins were not being reduced in response to the yen's appreciation). Thus, the calculations in Table 11 compare the difference between the actual change in yen export prices from February 1985 to February 1987 to the exchange rate change over that same period.

The calculated rate of pass-through of the 41 percent appreciation of the yen-dollar exchange rate over that period (calculated from the conversion exchange rate used for customs-cleared exports) is 47.6 percent for total exports. This is low in comparison to the 66 percent average

Table 11

Pass-through of the Yen's Appreciation to Export Prices
February 1985 to February 1987

<u>Export industry</u>	<u>Pass-through</u>	
	<u>Nov. 76-Nov. 78</u>	<u>Feb. 85-Feb. 87</u>
<u>Total Exports</u>	65.8%	47.6 %
-chemicals	-25.4	9.5
-textiles	98.0	51.4
-metals and related products	50.8	20.0
-general machinery and precision instruments	105.1	66.1
-electrical machinery	93.4	46.8
-transportation equipment	61.6	64.2

Sources: Bank of Japan, Economic Statistics Monthly (export prices) and The Japan Tariff Association, The Summary Report of Trade (conversion exchange rate for custom-cleared exports).

pass-through of a roughly comparable (37 percent) yen appreciation that occurred in November 1976-November 1978.

Lower pass-through in the recent period may reflect a number of factors. One important change since the mid-seventies is the greater degree of competition for Japanese exporters from the Asian NICs (Hong Kong, Singapore, Korea, and Taiwan). The highest rates of pass-through in the recent period occurred in industries such as general machinery and precision instruments and transportation equipment, whereas the lowest rates of pass-through occurred in competitive industrial materials such as metals and chemicals. In the former areas, Japanese exporters now have a well-established reputation for high quality so that the new competition poses a less immediate threat to market share. It is interesting that the rate of pass-through is actually slightly higher in the recent period for the transportation industry, suggesting that the quality factor may have been particularly strong in this sector. In the latter (industrial materials) areas, international competition has been strong for many years, and even in the second half of the seventies, these sectors had relatively low rates of pass-through.

Another factor differentiating the recent period from the mid-seventies is that the most recent episode of yen appreciation coincided with a period of sharply declining commodity prices, including a steep fall in the price of oil (petroleum product imports account for more than one-third of Japanese imports). This decline in costs of imported intermediate inputs to production has permitted Japanese producers to reduce production costs, thereby limiting the extent to which prices of their exports in foreign-currency terms need to be increased with the yen's appreciation.

A final factor that may have influenced the rates of pass-through in the two periods is the state of profit margins at the start of the yen's appreciation. It is frequently alleged that profit margins of Japanese exporters were unusually large in early 1985 when the yen started its prolonged ascent, thereby providing a considerable cushion before prices in foreign currency terms had to be raised. It would be an interesting topic for further research to explore the importance of this factor in pricing behavior.

Several Japanese government agencies have recently done some pass-through calculations although, unfortunately, this work is only reported in Japanese language sources. A few highlights of this work are reported below.

The Economic Planning Agency (EPA) has done calculations comparing rates of pass-through for various time periods. In particular, the EPA reports pass-through rates for November 1977-October 1978 and for September 1985-January 1987. They find that the rate of pass-through has declined from 64 percent in the earlier period to 43 percent in the most recent period. They report pass-through rates by industry for only the most recent period. The EPA finds pass-through to be lowest in the chemical industry (35 percent) and metal industries (15 percent), but also (unlike in Table 11) in the textile industry (31 percent). The EPA also finds high rates of pass-through in the electrical machinery industry (74 percent) and in general machinery industries (55 percent). Most of these findings are qualitatively quite similar to the results in Table 11.

The Japanese Ministry of International Trade and Industry (MITI) has also done some research on pass-through by industry for roughly the same time periods. MITI compares pass-through rates by industry for the

June 1977-November 1978 and for the September 1985-February 1987 periods. The MITI findings again broadly support those in Table 11. (Approximate figures are reported below, since a only chart, and not data, was readily available.) For all industries, the rate of pass-through slowed from about 65 percent in the earlier period to about 55 percent in the recent period. The decline was most dramatic in the iron and steel industries (from 55 percent to 10 percent) where international competition has become particularly intense. The MITI results also show that pass-through was quite high in the recent period in those industries where Japan has a well-established reputation for high-quality products (60 percent for passenger cars, 80 percent for photocopying machines and 65 percent for machine tools).

MITI also has done some interesting calculations of the rates of pass-through adjusted for declines in raw materials costs for certain industries. As was noted above, the decline in prices of imported intermediate inputs to production has permitted lower pass-through rates in the recent period. After this adjustment is made, the overall pass-through rate for the two time periods appears to be quite similar (about 70 percent in both time periods). However, in the iron and steel and the passenger car industries, where international competition has been increasing, there was a sharp fall in even these adjusted rates of pass-through between the two time periods. Thus it would appear that the increase in international competition is a key factor explaining slower pass-through in a few industries; but in most industries, the slower pass-through is more strongly related to the recent sharp declines in raw material import costs.

The fact that pass-through has been slower in the past two years (for any of the above reasons) than in recent historical experience can

help explain why adjustment of export volume has been slower than predicted. The out-of-sample predicted value for export volume in Chart 9 is generated using predicted yen export prices, and the predicted yen export price has fallen less than the actual yen export price because of this weaker pass-through. Thus slow pass-through provides one explanation for the gap between the actual and predicted export volume.

The above evidence compares the response of Japanese export prices during two periods of yen appreciation. It is also interesting to ask whether an asymmetry exists in the adjustment process of Japanese export prices to yen appreciations and yen depreciations. Such an asymmetry might occur if, as is often alleged, Japanese exporters employ strategic pricing in order to maintain market share. In this case, they might attempt to keep the dollar price of exports constant in the face of a yen appreciation (i.e., reduce yen export prices), but would allow some decline in dollar export prices with yen depreciations (i.e., not increase yen export prices).

Table 12 reports a test of the particular strategic pricing hypothesis that yen export prices respond asymmetrically to a strengthening and weakening of the yen. The exchange rate enters a typical yen export price equation through its impact on the yen value of competitors' export prices. Thus the question of interest is whether Japan's export price responds differently to a rise in competitors' export prices (expressed in yen) than to a decline. More specifically, Japanese exporters are concerned about movements in competitors' export prices relative to their own export prices, so that the precise hypothesis test is in terms of the significance of a dummy variable (with coefficient α_6) that is unity when Japan's export price rises relative to competitors' export prices and zero

Table 12

A Test of Strategic Pricing by Japanese Exporters

The following equation was estimated over the period 1974.I - 1986.I:

$$\begin{aligned} \log(\text{PXY}/\text{PXY}_{-1}) = & a_1 + a_2 * \log(\text{PXY}_{-1}/\text{PXY}_{-2}) + a_3 * \log(\text{JWPI}/\text{JWPI}_{-1}) \\ & + a_4 * \log(\text{PCOM}/\text{PCOM}_{-1}) + a_5 * \log(\text{PXCOMP}/\text{PXCOMP}_{-1}) \\ & + a_6 * \text{DUM} * \log(\text{RPXCOMP}/\text{RPXCOMP}_{-1}) \end{aligned}$$

where: PXY = yen Japanese export price index
JWPI = Japanese wholesale price index for manufactures
PCOM = yen commodity price index
PXCOMP = weighted-average competitors' export price index
(expressed in yen)
RPXCOMP = PXY/PXCOMP
DUM = 1 when Japan's export prices rise relative to
competitors' export prices and 0 otherwise

The estimated coefficients are (t-ratios in parentheses):

a1 =	-0.01	(-2.14)
a2 =	-0.16	(-2.28)
a3 =	0.82	(4.42)
a4 =	0.05	(1.44)
a5 =	0.45	(5.95)
a6 =	-0.25	(-2.51)

R² = 0.76 DW = 1.89

Note: The hypothesis of strategic pricing -- that Japanese exporters respond asymmetrically to increases and decreases in competitors' export prices expressed in yen (relative to Japanese export prices) -- is a simple t-test of the null hypothesis that the coefficient a6 = 0. This is because it is equivalent to estimating an equation with two dummy variables multiplying the competitors' relative price variable: one isolating increases in Japanese export prices relative to competitors' prices and one isolating decreases. If the coefficients on the two dummy variables are b1 and b2, then it can be shown that the coefficient a6 in the equation above is equivalent to (b1-b2). Thus the null hypothesis a6 = 0 is equivalent to the hypothesis b1 = b2 (that increases and decreases in Japanese export prices relative to competitors' prices have the same impact on yen export prices). The null hypothesis is rejected at the 2 percent confidence level.

otherwise. Competitors' export prices in yen terms may fall relative to the Japanese export price because of a decline in competitors' export prices in foreign currency terms, or because of an appreciation of the yen. In either case, a Japanese exporter may choose to match declines in competitors' prices but not increases in order to maintain export share. The test is a simple variation on the profit margin theme.

Dummy variables that isolate appreciations and depreciations are entered multiplicatively with the competitors' export price variable. The null hypothesis that the coefficient on the appreciation dummy is equal to the coefficient on the depreciation dummy (or the equivalent test that the coefficient $a_6 = 0$) is rejected at the 2 percent confidence level. This is further evidence of strategic pricing on the part of Japanese exporters.

Distributor and Dealer Margins. Another factor that may help explain the deviation between actual and predicted values for imports and exports is the behavior of Japanese retail distributors of imported goods and foreign dealers for Japanese exports. It is very difficult to obtain data to document these phenomena, but anecdotal evidence abounds. For example, it is widely recognized in Japan that Japanese retail distributors of imported goods have not been passing on fully the benefits of the yen's appreciation to consumers in Japan. Indeed, the issue has attracted the attention of Japanese policymakers, and recent demand stimulus packages have all included promises to promote greater pass-through to consumers of terms-of-trade gains. Thus, even though precise data on the pass-through of exchange rate changes to consumers is difficult to obtain, the authorities clearly acknowledge that the pass-through has been slow.

One institutional factor is worth noting in this regard. In Japan, the same trading companies generally handle both exports and imports.

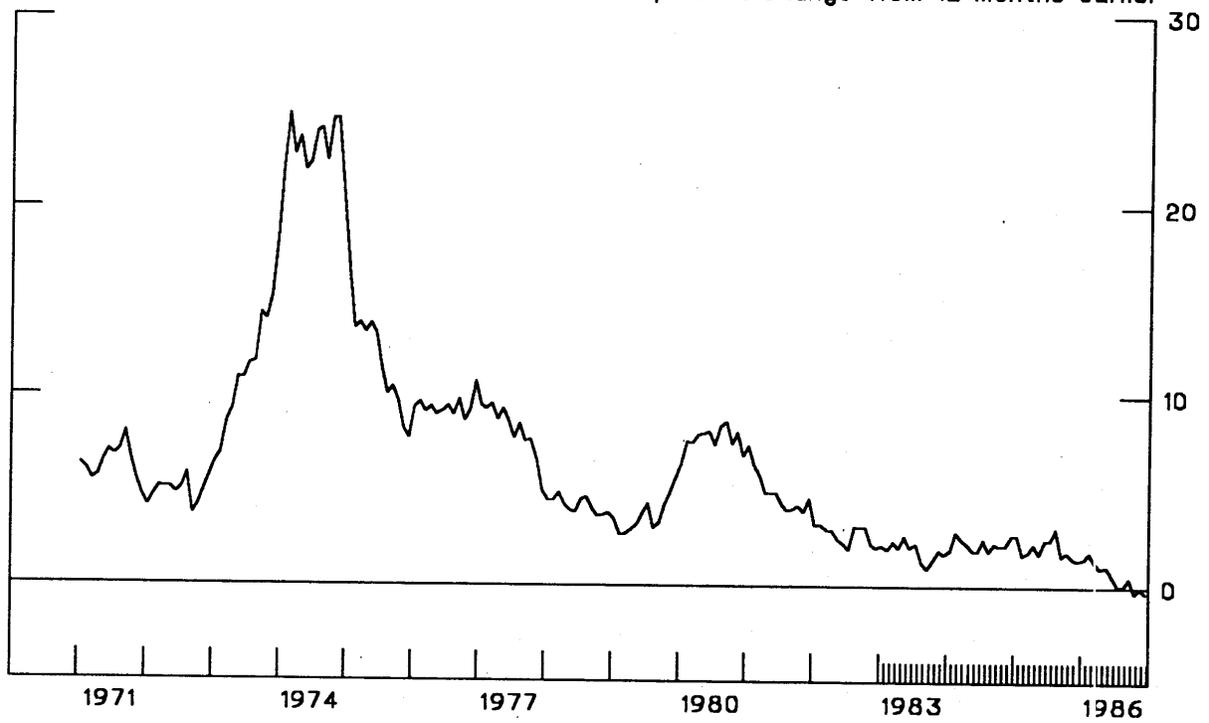
Thus, if Japanese trading companies' profit margins are being compressed to maintain export market shares, it is possible that some offset may be sought by slowing the pass-through of the yen's appreciations to domestic prices of imported goods. Again, it is not possible to find data to document whether this is in fact occurring, but numerous Japanese officials acknowledge that it is a reasonable hypothesis.

Most of the evidence of slow pass-through to consumer prices remains anecdotal, but it is reflected in the very modest decline in consumer prices relative to the sharp appreciation of the yen, shown in Chart 10. In the 12 months through March 1987 when the yen appreciated about 20 percent, the CPI declined just 0.3 percent while import prices fell 16 percent. The failure of consumer prices to fall further reduces the terms-of-trade gains to the consumer associated with the yen's appreciation (and with the recent decline in the price of oil as well).

The EPA has done some interesting work (again only available in Japanese) attempting to discern why consumer prices have declined less in the recent period than their model would have predicted. Their model would have predicted a 4.2 percent fall in consumer prices between September 1985 and September 1986, whereas a 0.2 percent increase actually occurred. They show that sluggish adjustment of administered prices (such as those of public utilities and state corporations) were one key factor inhibiting consumer price adjustment. Their results also suggest that factors relating to the distribution network between the wholesale and retail levels and perhaps supply and demand conditions in particular markets may have contributed to the sluggishness of retail price adjustment following the yen's recent rise.

Chart 10
CONSUMER PRICES

percent change from 12 months earlier



CPI = all Japan

On the export side, dealer margins may have affected the adjustment of Japanese exports. For example, in the United States many consumers who purchased a Toyota or other popular Japanese cars prior to the yen's appreciation had to pay a dealer mark-up over the list price reflecting excess demand (created by the existence of voluntary export restraints). In the Washington, D.C. area, these mark-ups often were on the order of \$1,000 to \$2,000. More recently, as Toyota's import price has risen and demand has accordingly waned, dealer mark-ups have generally been reduced or eliminated.

Thus, even though the dollar export price may rise, a concurrent decline in dealer mark-ups means that the effective price facing the U.S. consumer has not changed by the full amount of the yen's rise. As a result, the relative export price in the export demand equation does not fully capture the movements in prices facing consumers. Since these dealer mark-ups are a fairly recent phenomenon, they would not be captured in a stable manner by the coefficient on relative export prices in the reported equation. If such mark-ups were common for a wide variety of Japanese exports, they might be one source of the less-than-predicted decline in exports in the post-sample period. This could be a topic for further research.

A Model of the Adjustment Process in Japan

Beyond the issue of explaining the prediction errors in the forecasting equations above, there is the broader question of whether an over-reliance on exchange rate movements to correct external imbalance can actually turn out to be counterproductive. As the dollar has fallen relative to the yen, some observers have suggested that the rapid depreciation of the dollar may actually worsen the U.S. trade balance

(beyond temporary J-curve factors). They emphasize that the sharp rise of the yen will induce a recession in Japan and therefore reduce the demand for U.S. exports in the short to medium term. In essence they claim that the recession-induced income effects will dominate the substitution effects associated the change in the exchange rate. Those advocating this point of view do not necessarily argue that the dollar has overshot its equilibrium position. Rather they emphasize that the speed of the yen's appreciation has been too rapid to allow Japan to adjust without experiencing a sharp deceleration of economic activity.

It is difficult to believe that the induced income effects would dominate the substitution effects, given the small income elasticity of Japanese demand for U.S. exports of about 0.75 (see Table 7). Because of the small Japanese income elasticity, the induced recession effect on the bilateral trade balance between the United States and Japan is probably quite small even when Japan experiences a severe contraction of economic activity. Thus, one may desire to slow the descent of the dollar to alleviate the burden of adjustment on Japan or for other reasons; but if reducing the U.S. trade balance is the primary objective, a fall in the dollar will most likely bring about an improvement in the bilateral balance of trade.

However, there may be considerations other than the U.S.-Japan bilateral trade balance that could influence policymakers to try to reduce the adjustment costs borne by the Japanese economy. Quite simply, trade is multilateral and the evidence in Table 9 indicates that the Japanese multilateral income elasticity is not particularly small. As is shown in Table 7, the Japanese income elasticity of demand for imports from developing countries is the largest of the bilateral income

elasticities, so that Japanese income growth may bear heavily upon the ability of debt-burdened developing countries to service their external debt. A recession in Japan, given their dependence on imported raw materials, would increase the strain on some of these countries. This could occur despite the fact that the appreciation of the yen has made these inputs to production cheaper in Japan which may have helped raw materials exporters.

In light of these broader multilateral considerations, it seems fruitful to investigate the impact of a large exchange rate change on the Japanese domestic economy. This section will present a stylized model of the Japanese economy in the short run and analyze the impact of an exchange rate appreciation on output, employment, and the trade balance. The model emphasizes the interaction between the tradeable and nontraded goods sectors of the economy and also examines the influence of intermediate imports on sectoral adjustment and the trade balance when wages are rigid. We start with a slightly modified version of a model by Dornbusch (1980) and modify it to perform some different exercises which are particularly relevant to the recent Japanese experience. In this framework, one can illuminate some of the forces within the Japanese economy that might lead to a deceleration of economic activity in the short run as well as those elements of economic structure that would help mitigate the difficulties of adjustment to an exchange rate change.

We begin with a model that has two sectors, tradeable and nontraded goods. Each sector utilizes two inputs to production, labor and an imported factor of production. Each sector's production technology exhibits constant returns to scale. Therefore prices can be related to factor prices as follows:

$$(1) \quad P_T = a_T * w + b_T * (e * p_r)$$

$$(2) \quad P_N = a_N * w + b_N * (e * p_r)$$

where P_T = price of tradeable good.

P_N = price of nontraded good.

a_i = input of labor per unit of output in sector i .

b_i = input of imported factor per unit of output in sector i .

e = exchange rate (yen per unit of foreign currency).

p_r = world price of imported factor of production.

Taking the total differential of equations (1) and (2) yields

$$(3) \quad \hat{P}_T = \theta_{LT} * \hat{w} + (1 - \theta_{LT}) * (\hat{e} + \hat{p}_r)$$

$$(4) \quad \hat{P}_N = \theta_{LN} * \hat{w} + (1 - \theta_{LN}) * (\hat{e} + \hat{p}_r)$$

where θ_{ij} = factor i 's share in sector j ($\theta_{Lj} = a_j * w/P_j$).

" \hat{x} " denotes a percentage change of x .

The demand structure of the model consists of three components. The first two, the domestic demand for tradeable goods, D_T , and the domestic demand for nontraded goods, D_N , are both functions of real income, Y , and the relative price of tradeable and nontraded goods, P_{TN} .

$$(5) \quad D_T = D_T(Y, P_{TN}).$$

$$(6) \quad D_N = D_N(Y, P_{TN}).$$

where $P_{TN} = P_T/P_N$.

The third component of demand is the foreign demand for the home country's exportable goods, M^*

$$(7) \quad M^* = M^*(P_{TW}, Y^*)$$

where Y^* = exogenous foreign income

$$P_{TW} = P_T/(e * P_w)$$

P_w = the world price of exportable goods.

Define real income as

$$(8) \quad Y = (w * L)/Q$$

where $Q = P_T^\delta * P_N^{(1-\delta)}$, the weighted-average consumer price index, and δ = the share of tradeable goods in domestic consumption.

A change in real income can be expressed as

$$(9) \quad \hat{Y} = \hat{w} + \hat{L} - \delta * \hat{P}_T - (1-\delta) * \hat{P}_N.$$

Combining equations (3) and (4) and substituting into (9) yields

$$(10) \quad \hat{Y} = \hat{L} - \Omega * (\hat{e} + \hat{P}_T) - \alpha * \hat{w}.$$

where $\Omega = \delta * \theta_{MT} + (1 - \delta) * \theta_{MN}$.

$$\alpha = 1 - (1 - \delta) * \theta_{LN} - \delta * \theta_{LT}$$

To solve equation (10) for income or employment one must utilize another equilibrium condition. The derived demand for labor used in the production of both tradable and nontraded goods can be expressed as

$$(11) \quad L^d = a_T * [D_T + M^*] + a_N * D_N$$

When wages are fixed in the short run, employment is demand determined. Fixed wages in conjunction with the explicit incorporation of the effects of labor income on product demand implies a multiplier effect on demand. A fall in demand implies layoffs which reduce income and further reduce demand.

Taking the total differential of (11) and substituting in (10), one can produce an expression for \hat{L} .

$$(12) \quad \hat{L} = 1/(1-\tau) * (\lambda_{LM} * \epsilon_M^Y) * \hat{Y}^* + 1/(1-\tau) * [\lambda_{LM} * \epsilon_M^P] * \hat{P}_W$$

$$- 1/(1-\tau) * [\lambda_{LM} * \epsilon_M^P * (1 - \theta_{LT}) - \phi + \tau\Omega] * \hat{P}_r$$

$$+ 1/(1-\tau) * [\tau\alpha + \phi - \lambda_{LM} * \epsilon_M^P * \theta_{LT}] * \hat{w}$$

$$+ 1/(1-\tau) * [\lambda_{LM} * \epsilon_M^P * \theta_{LT} + \phi - \tau\Omega] * \hat{e}$$

where $\phi = (A/WL) * \epsilon_T^P * \delta * [\theta_{LT} - \theta_{LN}]^2$.

λ_{Li} = the proportion of total labor employed producing good i and

$$\lambda_{LM} + \lambda_{LT} + \lambda_{LN} = 1.$$

θ_{ij} = the income share of factor i in sector j

γ_i = the marginal propensity to consume good i

δ = the expenditure share of the traded good.

$$\tau = \theta_{LT} * \gamma_T + \theta_{LN} * \gamma_N$$

$$\alpha = 1 - (1 - \delta) * \theta_{LN} - \delta * \theta_{LT}.$$

ϵ_j^i = the elasticity of demand for j with respect to argument i.

[Defined as a positive quantity. For instance, if dD/dP is negative then the elasticity is defined as $-dD/dP * (P/D)$]

The expression for \hat{L} can be introduced into equation (9) to solve for the changes in real income in terms of the change in the various exogenous variables. We now turn to the model's implications when the only exogenous change is an appreciation of the exchange rate.

Effects of a Currency Appreciation

An exchange rate appreciation, holding wages, foreign income, and the world price of both factors and goods constant in the short run will transmit through the economy along several channels. The rise in the exchange rate will alter the domestic relative prices of tradeable and nontraded goods if the relative factor intensities of the two sectors

differ. If the tradeable goods sector is less labor intensive (more imported-factor intensive) than the nontraded sector, as is likely to be the case in Japan, the fall in the price of the imported factor will lead to a fall in the relative price of the tradeable goods. This can be seen by subtracting equation 4 from equation 3, while holding wages constant:

$$(13) \quad \hat{P}_T - \hat{P}_N = (\theta_{LN} - \theta_{LT}) * \hat{e} .$$

The implications of an appreciation for output and employment are somewhat more difficult to ascertain. The expression shown in equation 12 can serve as a guide to these effects. Equation (12) can be rewritten when the only shift in the exogenous variables is a change in the exchange rate:

$$(12a) \quad \hat{L} = 1/(1-\tau) * [\lambda_{LM} * \epsilon_M^P * \theta_{LT} + \phi - \tau\Omega] * \hat{e} .$$

where $\phi = (A/WL) * \epsilon_T^P * \delta * [\theta_{LT} - \theta_{LN}]^2$

$$A = (P_T * D_T + P_N * D_N) .$$

The first term in parentheses reflects the influence of the exchange rate on employment resulting from the change in foreign demand for the exportable good. An appreciation increases the price of exportables relative to the world price because of the increase in the labor costs in terms of foreign currency. This term implies a reduction in employment when the exchange rate appreciates.

The second term in parentheses represents the employment effects of demand substitution between tradeable and nontraded goods by domestic

consumers. An exchange rate appreciation reduces the relative price of the import-intensive sector which induces a demand shift toward the sector that is less labor intensive. Employment declines are sharper when the relative price elasticity of tradeable goods demand is high, the share of labor in the two sectors is greatly different, and when the trade surplus is small, or equivalently, domestic absorption, A , is large in relation to domestic income.

The third term in parentheses represents the stimulus to demand in both sectors resulting from the increase in real income created by the appreciation of the currency. That appreciation will lower prices and raise the real consumption wage. The stimulus to income will increase employment in both sectors. Overall, the combined effect of the three terms is ambiguous, so that the effect of an exchange rate change on employment will depend on the relative magnitudes of the three terms.

From equations (10) and (12a) one can also assess the impact of the appreciation on real income.

$$(10a) \quad \hat{Y} = [1/(1-\tau) * [\lambda_{LM} * \epsilon_M^P * \theta_{LT} + \phi - \tau\Omega] - \Omega] * \hat{e}.$$

Here the income effect terms enter twice, once because prices fall and raise income when the currency appreciates and a second time because that same effect raises employment and demand. Overall, however, the result is still ambiguous, although an appreciation will always increase real income by a greater percentage than the percentage increase in employment (or decrease it by a lesser percentage).

Also of interest is the impact of an exchange rate change on the trade balance. For simplicity in this model, the trade balance consists of manufactured exports and intermediate imports.

$$(14) \quad T = P_T^* M^* - p_r^* [b_T^* (D_T + M^*) + b_N^* D_N].$$

The change in the trade balance as a fraction of total earnings in response to an exchange rate change can be expressed as follows.

$$(15) \quad dT/wL = (1-\rho) * \hat{Y} + \Delta * \hat{e}.$$

where $\Delta = [\delta * (1 - \theta_{LN}) + (1 - \delta) * (1 - \theta_{LT})] * (T^*Q)/Y.$

Note that when trade is in balance this equation reduces to $dT/wL = (1-\rho) * \hat{Y}$, which is the result of Dornbusch (1980).

Using equations (10a) and (15), one can derive an expression for the change in the trade balance as a function of the exchange rate change.

$$(16) \quad dT/wL = ((1-\rho) * [1/(1-\tau) * [\lambda_{LM}^* \epsilon_M^P * \theta_{LT} + \phi - \tau\Omega] - \Omega] + \Delta) * \hat{e}$$

Alternatively, one can look at imports and exports separately.

$$(17) \quad dX = X * [(1-\theta_{LT}) + \epsilon_M^P * \theta_{LT}] * \hat{e}.$$

$$(18) \quad dM = M * [\lambda_{rT}^* \epsilon_T^Y + \lambda_{rN}^* \epsilon_N^Y] * \pi * \hat{e}$$

$$+ M * [1 - (\theta_{LN} - \theta_{LT})^2 * \epsilon_{DT}^P * \delta * M/(W*L) + \lambda_{rM}^* * \epsilon_M^P * \theta_{LT}] * \hat{e}$$

where $\pi = [1/(1-\tau) * [\lambda_{LM} * \epsilon_M^P * \theta_{LT} + \phi - \tau\Omega] - \Omega]$

X = exports

M = imports

λ_{ri} = the proportion of total imported materials used in
sector i

ϵ_i^Y = the income elasticity of demand in sector i

ϵ_i^P = the relative price elasticity of demand in sector i.

The effect of an appreciation on exports is negative. First, the rise in the exchange rate lowers the domestic currency price of exports because the lower price of raw materials is passed through to goods prices. Second, volume falls because exports become more expensive to foreigners because domestic labor costs do not fall along with materials costs as a result of the change in the exchange rate. An increase in the foreign relative price elasticity will increase the decline in exports associated with an appreciation. Also, if the export sector reduces its labor intensity, the effects will be offsetting. The greater pass through of the exchange rate change into prices will reduce prices by more but volume by less. The net effect will depend upon whether the magnitude of the foreign price elasticity is greater or less than one.

Equation (18) shows the expression for the change in intermediate imports. The first term represents the change in volume because of the change in derived demand resulting from the effects of the exchange rate on real income. If real income falls when the exchange

rate appreciates, $\pi > 0$, then demand will decline and factor imports will fall.

The second bracketed term represents three effects. First the value of imports falls directly because of the appreciation. Second, an appreciation will reduce the relative price of the sector that uses the imported factor most intensively. That will shift demand toward that sector and increase the volume of imports. Finally, the third term represents the decline in imports resulting from foreign consumers substituting away from domestic exports when the exchange change does not entirely pass through into prices because of the rigidity of wages in the short run.

Overall, the implications of an exchange rate change for the Japanese economy in the model above is ambiguous. The model predicts that: 1) exports will decline both in value and in volume terms; 2) if real income falls, imports of the intermediate input will also decline in both value and volume terms; 3) employment will decline on net if the propensity to consume is low and/or the share of intermediate imports in production is small; and 4) if real income falls, the trade balance will worsen if the income elasticity of demand for imports is large.

From this discussion, it is clear that the effect of the yen's appreciation on real income and the Japanese trade balance is ambiguous. However, as noted earlier, even if real income declines in Japan, this would probably translate into a relatively small increase in imports from the United States given the small Japanese income elasticity of demand for U.S. imports. Thus it is unlikely that even a strong yen appreciation would have a recessionary impact large enough to actually cause a widening of Japan's trade surplus with the United States.

While this model captures many of the structural links affecting the Japanese economy it does not address some of the other elements of economic structure that would affect performance in the short to medium run. First of all, it does not include an imported final good. An appreciation would lower the price of a final good import and provide another channel for terms-of-trade gains to reach consumers. The pass through, or lack thereof, would influence real income, demand, and employment growth.

Second, capital accumulation is neglected. A model such as the one presented by Mussa (1974) which emphasizes the role of sector-specific capital in the adjustment process would further illuminate the impact of an exchange rate change on economic activity in Japan. Such a specification would highlight that the appreciation of the yen would reduce capital in the traded goods sector while either stimulating or retarding investment demand in the nontraded sector in the short run. The compression of profits in the export part of the tradeable goods sector would also constitute a source of income deterioration that would reduce domestic demand for both tradeable and nontraded goods.

Finally, there is no attempt to incorporate the effects of macroeconomic policy into this framework. If domestic demand stagnation and unemployment resulted from exchange rate appreciation, then domestic macroeconomic stimulus could alleviate some of the costs of transition. To explore the role of policy in the adjustment process, the next section employs the Federal Reserve Board staff's Multi-Country Model to evaluate the impact of fiscal policy on the trade adjustment process.

Asymmetries in the Impact of U.S. and Japanese Fiscal Policy on External Adjustment

The spillover effects described in the theoretical model above highlight the danger of a recession in Japan from the effects of the yen's appreciation. Japanese growth has already slowed dramatically, with real GNP increasing only 2 percent in 1986 on a fourth-quarter-over-fourth-quarter basis. As a result, domestic and international pressure has been mounting on Japan to relax fiscal policy. The Japanese government (the Ministry of Finance in particular) has been reluctant to abandon its policy of fiscal restraint adopted in 1979 to reverse the sharp rise in the debt-to-GNP ratio. The authorities have repeatedly expressed concern over the unfunded liabilities of the social security system in Japan in light of the rapid aging of the population. Nonetheless, temporary fiscal stimulus is currently being instituted through the so-called "Emergency Economic Measures" entailing about 6 trillion yen (about 1.8 percent of GNP) of supplementary government spending and tax measures for FY 1987 (ending March 31, 1988).

There are at least three issues in the debate over the effectiveness of temporary fiscal stimulus in Japan: the ability of Japanese fiscal policy to offset the deflationary impact on the domestic economy of the yen's rise; the potential for Japanese fiscal policy to offset the recessionary impact on the world economy of the withdrawal of stimulus implied by the (even partial implementation of the) Gramm-Rudman-Hollings Act in the United States; and the ability of Japanese fiscal actions to foster a reduction in Japan's trade surplus. The first two issues are the least controversial, while the third issue is disputed. For example, U.S. authorities have strongly urged Japanese

fiscal stimulus as an antidote to trade imbalances, while some Japanese authorities and also Masaru Yoshitomi (1987), using the O.E.C.D. Interlink model, have argued that Japanese fiscal policy can have little impact on Japan's trade imbalance.

These issues are evaluated below using the Federal Reserve Board staff's Multi-Country Model (MCM). (See Edison et al for a description of the model.) Table 13 reports the results of simulations on the MCM of the impact of a permanent standardized fiscal shock equal to 1 percent of GNP for the United States and Japan (about 3 trillion yen for Japan and \$40 billion for the United States). The complete set of simulation results is analyzed in Craig and Loopesko (1986) (which also reports similar results for Germany). The baseline for the simulations is derived from a recent O.E.C.D. forecast. Exchange rates are flexible and monetary policy is assumed to be non-accomodative in the sense that the path for the targeted monetary aggregate is unchanged.

A Japanese fiscal expansion causes the Japanese current account to worsen as expected, but by a relatively small amount (\$5.9 billion after 5 years). The U.S. current account improves by a smaller amount (\$0.9 billion after 5 years). The U.S.-Japan bilateral trade balance improves by yet a smaller amount indicating that other foreign economies benefit more. Thus Japanese fiscal stimulus does little to foster a reduction in the U.S. current account or in the U.S. - Japan bilateral trade imbalance.

It has a more powerful impact, however, on domestic and foreign (defined as the 4 other industrialized economies included in the MCM) growth. Japanese real GNP rises by more than 1 percent over the forecast

Table 13

Asymmetries in the Effects of U.S. and Japanese Fiscal Policy^{1/}

<u>Impact on:</u>	<u>Japanese</u> <u>fiscal expansion</u>		<u>U.S.</u> <u>fiscal contraction</u>	
	<u>after</u> <u>1 year</u>	<u>after</u> <u>5 years</u>	<u>after</u> <u>1 year</u>	<u>after</u> <u>5 years</u>
U.S. current account ^{2/}	2.0	0.9	13.7	41.9
Japanese current account ^{2/}	-3.1	-5.9	-2.0	-10.7
U.S.-Japan bilateral imbalance ^{3/}	0.2	0.1	1.7	2.9
U.S. real GNP	0.1	0.0	-1.9	-0.5
Japanese real GNP	1.3	1.1	-0.7	-1.3
Foreign real GNP ^{4/}	0.4	0.3	-0.4	-0.5

Source: Craig and Loopesko (1986)

- Notes: ^{1/} The U.S. fiscal contraction equals one percent of U.S. real GNP and the Japanese fiscal expansion equals one percent of Japanese real GNP. Both shocks are permanent.
^{2/} Absolute deviations from baseline.
^{3/} A positive entry indicates an improvement for the United States.
^{4/} Defined as a weighted-average of the four other MCM countries (The MCM includes the United States, Japan, Germany, the United Kingdom, and Canada).

horizon, and although the impact on U.S. GNP is negligible, that on foreign GNP is just under 1/2 percent.

A U.S. fiscal contraction has a much more powerful impact on external imbalances, causing a \$41.9 billion improvement in the U.S. current account after 5 years and a \$10.7 billion narrowing in the Japanese current account surplus over the same time period. The U.S. fiscal contraction initially has a strong deflationary impact on the domestic economy (U.S. real GNP falls by almost 2 percent), but that effect declines over the forecast horizon. The associated decline in the U.S. demand for imports translates into a sharp decline in real activity in Japan and other foreign economies as well.

These simulations suggest that an asymmetry exists between the effects of U.S. and Japanese fiscal policy on external imbalances. A U.S. fiscal contraction makes an important contribution to the reduction of U.S. and Japanese current account imbalances, while a Japanese fiscal expansion fosters less external adjustment. Similarly, while Japanese fiscal policy has little impact on the U.S. current account, U.S. fiscal policy exerts a powerful influence on Japan's current account.

The effect of fiscal policy on income is the primary source of the differences between the two policy experiments. There are three facets of the income transmission channel of fiscal impulses which contribute to the asymmetry. First, in the MCM the income elasticity of Japanese demand for imports from the United States (0.8) is less than half that of U.S demand for imports from Japan (1.8). Second, Japan's exports are substantially greater than its imports while the opposite is true for the United States. For both of these reasons, the policy experiment that has the greatest impact on U.S. income (i.e., a U.S.

fiscal contraction) has the greatest impact on the U.S. and Japanese current accounts. Finally, the dollar value of the impact of the two shocks on the current account is influenced by the absolute size of the two shocks: the standardized shocks are each one percent of the country's real GNP, but the mean level of U.S. GNP is approximately twice that of Japan's over the baseline forecast horizon. Taken together, these three influences on the magnitude of the income effects of fiscal policy account for most of the observed asymmetry.

Even though Japanese fiscal policy does not provide a strong impetus towards external balance in the MCM simulations, it still has substantial effects both on domestic growth and on growth abroad. Although the MCM only explicitly models five major industrialized economies (the United States, Japan, Germany, the United Kingdom and Canada), growth in the developing world is generally thought to be quite sensitive to growth in the industrialized economies. Thus the positive impact of Japanese fiscal stimulus on these industrialized economies implies that a Japanese fiscal expansion could provide an important impetus to growth in the developing world. Moreover, the evidence in Table 7 showing that the income elasticity of Japanese demand for imports from the developing countries is the largest of the bilateral elasticities reported suggests the potential for Japanese fiscal stimulus to help growth prospects in the developing world. Thus Japanese fiscal stimulus could be particularly valuable as an offset to the deflationary impact of a U.S. fiscal contraction on the developing countries.

Concluding Remarks

Calculations of the appropriate yen-dollar exchange rate based on the sustainability of the implied path of the non-interest current

account indicate that the substantial appreciation of the yen that has occurred to date is warranted, and that even further appreciation may be required. Some of the difficulties associated with the perception of an unsustainable yen-dollar rate may have been evident recently in the U.S. Treasury bill market, when foreign private purchases declined (particularly Japanese private purchases) and foreign official purchases rose. The latter may prove to be temporary, however, and a reduction in foreign official purchases could cause higher bond yields and a lower dollar. The recent rise of interest rates in the United States in conjunction with the lowering of interest rates in Japan may help prevent this in the near term at least.

In Japan, a major restructuring of production away from export-oriented growth is currently under way in response to the yen's rise. This paper has examined several aspects of this adjustment process, focusing particularly on factors affecting Japan's record external surplus. Evidence is provided that, at least in real terms, the Japanese trade surplus has started to decline, both on a multilateral basis and on a bilateral basis vis-a-vis the United States.

We find that an econometric model of Japanese trade that tracks moderately well through 1984 veers substantially off track in forecasting both exports and imports over the 1985-86 period. In particular, actual adjustment in both export and import volumes are less than that predicted by the model. Possible reasons for this slower-than-predicted adjustment in trade volumes were examined. Evidence that the pass-through of the effects of the yen's appreciation to export prices is slower than in the past provides one explanation. Also, we find econometric evidence supporting the notion that Japanese export prices in yen respond

asymmetrically to yen appreciations and depreciations. This is consistent with the hypothesis that Japanese exporters have been squeezing their profit margins during the yen's recent appreciation in order to preserve market share. On the import side, the slow pass-through of the fall in import prices to consumer prices may be a factor.

A theoretical model of the adjustment process in Japan is used to examine the claim frequently made by policymakers both here and abroad that a very sharp rise in the yen can induce a recession in Japan that, in turn, can frustrate the process of trade adjustment. While this is shown to be a theoretical possibility, it is argued that this is unlikely for an economy with Japan's structure.

Finally, evidence from the Federal Reserve Board Staff's Multi-Country Model suggests that a fiscal expansion in Japan will have little impact on the U.S. current account, but that it can have a greater impact on domestic demand in Japan and on growth and trade in the developing economies. This in itself may justify a Japanese fiscal expansion, particularly in light of the recessionary impact on the world economy of the U.S. fiscal contraction implied by the Gramm-Rudman-Hollings Act.

Footnotes for Figures

Chart 1

Source: Board of Governors.

Note: The top panel plots the monthly-average value of the yen-dollar exchange rate. The bottom panel plots a weighted-average yen exchange rate index based on bilateral exchange rates for 16 major trading partners, i.e., the 10 major industrial economies plus South Korea, the Philippines, Taiwan, Hong Kong, Singapore and Malaysia. The weights are based on average multilateral trade in 1978-83.

Chart 2

Source: Board of Governors database.

Note: Based on customs-basis trade data.

Chart 3

Source: Board of Governors database.

Note: Based on customs-basis trade data.

Chart 4

Source: Board of Governors database and Bank of Japan.

Note: Customs-basis data on nominal exports and imports in current yen were deflated by export and import price indices that are reported in the Bank of Japan, Economic Statistics Monthly, Table 120.

Chart 5

Source: Japan Tariff Association, The Summary Report on Trade of Japan.

Chart 6

Source: Bank of Japan.

Note: Real exports and imports vis-a-vis the United States have been estimated based on the commodity composition of exports and imports between the United States and Japan.

Charts 7-9

Source: Board of Governors for actual data.

Note: Detailed descriptions of the trade equations underlying the model prediction are available from the authors by request.

Chart 10

Source: Board of Governors database.

References

- Bank of Japan. 1987. Adjustment of the Japanese Economy under the Strong Yen. Research and Statistics Department, Special Paper Number 149. Tokyo.
- Bergsten, C. Fred, and William R. Cline. 1987 (revised from 1985). The United States-Japan Economic Problem. Policy Analyses in International Economics, Number 13. Washington, D.C.: Institute for International Economics.
- Bureau of Labor Statistics. 1986. International Trends in Productivity and Unit Labor Costs in Manufacturing. Monthly Labor Review, December. Washington, D.C.: Bureau of Labor Statistics.
- Craig, Sean. 1986. Japanese Bilateral Trade Elasticities. Memorandum, Division of International Finance, Federal Reserve Board. Washington, D.C.
- Craig, Sean, and Bonnie Loopesko. 1986. Asymmetries in the effects of U.S., Japanese and German fiscal policy. Memorandum, Division of International Finance, Federal Reserve Board. Washington, D.C.
- Dornbusch, Rudiger. 1980. Open Economy Macroeconomics, 82-116. New York: Basic Books Inc. Publishers.
- _____. 1985. Exchange Rates and Prices. Manuscript, Massachusetts Institute of Technology.
- Drexler, Paul H. 1987. Japanese Capital: The Growing Role of U.S. Financial Markets. International Comment, January 28. New York: Brown Brothers Harriman and Co.
- Edison, Hali J., Jaime R. Marquez and Ralph W. Tryon. 1987. The Structure and Properties of the Federal Reserve Board Multicountry Model. In Economic Modeling, Vol. 4, No. 2. London: Butterworth and Co.
- Fisher, Eric O'N. 1987. A Model of Exchange Rate Pass-Through. International Finance Discussion Papers, Number 302. Federal Reserve Board. Washington, D.C.
- Frenkel, Jacob A. 1978. A Monetary Approach to the Exchange Rate: Doctrinal Aspects and Empirical Evidence. In The Economics of Exchange Rates, edited by Jacob A. Frenkel and Harry J. Johnson, 1-25. Reading, Massachusetts: Addison-Wesley Publishing Company.
- Frenkel, Jacob A. and Morris Goldstein. 1986. A Guide to Target Zones. International Monetary Fund Staff Papers, 33: 633-673. Washington, D.C.
- Goldstein, Morris and Mohsin S. Khan. 1985. Income and Price Effects in Foreign Trade. In Handbook of International Economics, Volume II, edited by R. W. Jones and P.B. Kenen, 1041-1105. Amsterdam: Elsevier Science Publishers B.V.

- Helkie, William L. and Peter Hooper. 1987. The U.S. External Deficit in the 1980s: An Empirical Analysis. International Finance Discussion Papers, Number 304, Federal Reserve Board. Washington, D.C.
- Johnson, Manuel H. and Bonnie E. Loopesko. 1987. The Yen-Dollar Relationship: A Recent Historical Perspective. In Japan and the United States Today: Exchange Rates, Macroeconomic Policies and Financial Market Innovations, edited by Hugh Patrick and Ryuichiro Tachi, 95-116. New York: Columbia University Center on Japanese Economy and Business.
- Jones, Randall. 1987. Yen Appreciation Taking Effect. In Japan Economic Survey, April. Washington, D.C.: Japan Economic Institute.
- Keizai Koho Center. 1986. Struggling with Endaka: Japanese Business Grapples with the High Yen. KKC Brief, Number 37, November. Tokyo: Keidanren (Japan Federation of Economic Organizations).
- Krause, Lawrence B. 1986. Does a Yen Valued At 100 per Dollar Make Any Sense? Manuscript. Washington, D.C.: Brookings Institution.
- Krugman, Paul. 1985. Is the Strong Dollar Sustainable? In The U.S. Dollar: Prospects and Policy Opeions, Federal Reserve Bank of Kansas City.
- _____. 1986a. Pricing to Market when the Exchange Rate Changes. Manuscript, Massachusetts Institute of Technology.
- _____. 1986b. Is the Japan Problem Over? Manuscript. Conference on Trade Frictions, NYU Center for Japan-U.S. Business and Economic Studies, April.
- _____. 1987. Has the Dollar Fallen Enough? Manuscript. Brookings Workshop on the U.S. Current Account Deficit. Washington D.C.
- McKinnon, Ronald I. and Kenichi Ohno. 1987. Getting the Exchange Rate Right: Insular versus Open Economies. Manuscript, Conference on U.S.-Canadian Trade and Investment Relations with Japan, University of Michigan, April.
- Mann, Catherine L. 1986. Prices, Profit Margins and Exchange Rates. Federal Reserve Bulletin, 366-379. June. Washington, D.C.: Federal Reserve Board.
- Marston, Richard C. 1986. Real Exchange Rates and Productivity Growth in the United States and Japan. Manuscript, American Enterprise Institute Conference on Real-Financial Linkages, January.
- Morrison, David and Jeremy Hale. 1987. The Search for Equilibrium Exchange Rates. New York: Goldman, Sachs.

- Mussa, Michael. 1974. Tariffs and the Distribution of Income: The Importance of Factor Specificity, Substitutability, and Intensity in the Short and Long Run. Journal of Political Economy, vol. 82, no. 6, 1191-1203.
- Nurkse, Ragnar. 1945. Conditions of International Monetary Equilibrium. Essays in International Finance, Number 4. Princeton, New Jersey: Princeton University Press.
- Petri, Peter A. 1984. Modeling Japanese-American Trade: A Study of Asymmetric Interdependence, 52-71. Cambridge, Mass.: Harvard University Press.
- O.E.C.D. 1987. Purchasing Power Parities and International Comparisons of Price Levels and Real Per Capita GDP in OECD Countries. Paris, France: OECD.
- Sargen, Nicholas and Kermit L. Schoenholtz. 1987. Are Japanese Investors Diversifying? Salomon Brothers Bond Market Research, February. New York: Salomon Brothers Inc.
- Williamson, John. 1983. The Exchange Rate System. Policy Analyses in International Economics, Number 5. Washington, D.C.: Institute for International Economics.
- Yoshitomi, Masaru. 1987. Growth Gaps, Exchange Rates and Asymmetry: Is it Possible to Unwind Current Account Imbalances without Fiscal Expansion in Japan? In Japan and the United States Today: Exchange Rates, Macroeconomic Policies and Financial Market Innovations, edited by Hugh Patrick and Ryuichiro Tachi, 18-29. New York: Columbia University Center on Japanese Economy and Business.

International Finance Discussion Papers

<u>IFDP NUMBER</u>	<u>TITLES</u>	<u>AUTHOR(s)</u>
	<u>1987</u>	
312	The Pricing of Forward Exchange Rates	Ross Levine
311	Realignment of the Yen-Dollar Exchange Rate: Aspects of the Adjustment Process in Japan	Bonnie E. Loopesko Robert A. Johnson
310	The Effect of Multilateral Trade Clearinghouses on the Demand for International Reserves	Ellen E. Meade
309	Protection and Retaliation: Changing the Rules of the Game	Catherine L. Mann
308	International Duopoly with Tariffs	Eric O'N. Fisher Charles A. Wilson
307	A Simple Simulation Model of International Bank Lending	Henry S. Terrell Robert S. Dohner
306	A Reassessment of Measures of the Dollar's Effective Exchange Value	B. Dianne Pauls William L. Helkie
305	Macroeconomic Instability of the Less Developed Country Economy when Bank Credit is Rationed	David F. Spigelman
304	The U.S. External Deficit in the 1980s: An Empirical Analysis	William L. Helkie Peter Hooper
303	An Analogue Model of Phase-Averaging Procedures	Julia Campos Neil R. Ericsson David F. Hendry
302	A Model of Exchange Rate Pass-Through	Eric O'N. Fisher
301	The Out-of-Sample Forecasting Performance of Exchange Rate Models When Coefficients are Allowed to Change	Garry J. Schinasi P.A.V.B. Swamy
300	Financial Concentration and Development: An Empirical Analysis of the Venezuelan Case	Jaime Marquez Janice Shack-Marquez

Please address requests for copies to International Finance Discussion Papers, Division of International Finance, Stop 24, Board of Governors of the Federal Reserve System, Washington, D.C. 20551.

International Finance Discussion Papers

<u>IFDP NUMBER</u>	<u>TITLES</u>	<u>AUTHOR(s)</u>
	<u>1986</u>	
299	Deposit Insurance Assessments on Deposits at Foreign Branches of U.S. Banks	Jeffrey C. Marquardt
298	The International Debt Situation	Edwin M. Truman
297	The Cost Competitiveness of the Europaper Market	Rodney H. Mills
296	Germany and the European Disease	John Davis Patrick Minford
295	The United States International Asset and Liability Position: A Comparison of Flow of Funds and Commerce Department	Guido E. van der Ven John E. Wilson
294	An International Arbitrage Pricing Model with PPP Deviations	Ross Levine
293	The Structure and Properties of the FRB Multicountry Model	Hali J. Edison Jaime R. Marquez Ralph W. Tryon
292	Short-term and Long-term Expectations of the Yen/Dollar Exchange Rate: Evidence from Survey Data	Jeffrey A. Frankel Kenneth A. Froot
291	Anticipated Fiscal Contraction: The Economic Consequences of the Announcement of Gramm-Rudman-Hollings	Robert A. Johnson
290	Tests of the Foreign Exchange Risk Premium Using the Expected Second Moments Implied by Option Pricing	Richard K. Lyons
289	Deposit Risk Pooling, Irreversible Investment, and Financial Intermediation	Robert A. Johnson
288	The Yen-Dollar Relationship: A Recent Historical Perspective	Manuel H. Johnson Bonnie E. Loopesko
287	Should Fixed Coefficients be Reestimated Every Period for Extrapolation?	P.A.V.B. Swamy Garry J. Schinasi
286	An Empirical Analysis of Policy Coordination in the U.S., Japan and Europe	Hali J. Edison Ralph Tryon
285	Comovements in Aggregate and Relative Prices: Some Evidence on Neutrality	B. Dianne Pauls