

THE LONG-RUN BEHAVIOR OF THE YEN AND THE DOLLAR

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SUMMARY

Why has the yen appreciated more than 400 percent against the dollar since floating exchange rates were introduced in 1973? Why has the dollar depreciated? And why has neither change seemed to have eliminated Japan's large, persistent overall trade surplus and the U.S. trade deficit? Higher rates of inflation in the United States than in Japan account for about 65 percent of the change in the dollar-yen relationship over time. Against the currencies of 17 of the world's major trading countries the yen appreciated an inflation-adjusted 2.8 percent annually from 1975 through May 1995, while the dollar depreciated at a real 1.2 percent rate.

In the long run these changes in real currency values are the effects of each country's persistent current account imbalances. In other words, the mismatch between a country's aggregate consumption — by its households, businesses and government — and its total national production (or the income earned in that production) results in either a trade deficit or a surplus. A country that runs a trade deficit does not earn enough to pay for all its imports; nor does it have sufficient savings to finance its investments. Chronic trade deficits then lead to a buildup of foreign debt on which interest or other payments must be made. In order to make these payments the borrowing country has to export more and import less. That requires its national currency to drop in value.

Once trade figures are adjusted for changes in inflation and exchange rate differences the picture is in some contrast to that usually painted by American and Japanese export and import statistics. Because of changes in real exchange rates, the volume of American exports has grown at a rapid 4.9 percent a year since 1985 whereas Japanese exports have experienced stagnant growth at 1.1 percent. Yet Americans receive less for what they sell abroad in real terms, while the Japanese benefit from less expensive imports.

Setting The Stage

Exchange rates are one of the more confusing subjects of international economic affairs — with good reason. The character of exchange rates changes over the immediate, medium and long terms. Relationships can reverse direction over time, from being positively to negatively related. Exchange rates can go from cause to effect — from independent to dependent variable. The effect of exchange rates on other variables depends on what, in turn, affects an exchange rate. In thinking about exchange rates, therefore, it is necessary to consider the context: the time period under consideration — a month, a year or several years; whether exchange rates are independent or dependent; and what other factors are changing or are presumed to remain constant. This report addresses these issues, using the concrete examples of the yen and the dollar.

Three central questions lie at the core of the report. Why has the yen appreciated more than 400 percent against the dollar since floating rates were introduced in 1973? Why has the dollar depreciated? And with the yen's higher value and the dollar's lower one, why do the big Japanese trade surplus and the equally large U.S. trade deficit persist year after year?

A Postwar View Of Exchange Rates

In the 1930s the yen traded against the dollar in single digits. In the immediate aftermath of World War II American occupation authorities prohibited trading in the yen. Following two years of inflation of several hundred percent, prices stabilized in 1949. Occupation authorities subsequently sought to place a value on the yen in order for Japan to resume foreign trade on its own. They had only a limited number of transactions and black market prices on which to base their exchange rate estimate. Recognizing that any precise number was arbitrary within the broad range they had estimated as appropriate, American financial experts chose the figure of 360 yen to the dollar. This number was selected in part because it deliberately was undervalued from the best guess of ¥330 but also because a circle has 360 degrees and ¥360 would have some rough symbolic significance. The value of 360 yen per dollar lasted for more than 20 years until the postwar fixed exchange rate regime began to break down in 1971. At a December 1971 Smithsonian Institution meeting the Group of 10 — Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, the United Kingdom and the United States — assigned a new yen rate of 308 to the dollar. A general collapse of the fixed exchange rate regime occurred in March 1973, with the currencies of most leading economies moving to a floating system.

An exchange rate that was fixed for almost a quarter century, a period that encompassed extraordinary Japanese economic growth, could not have been the rate that free markets would have dictated, except by accident. Toward the latter part of the fixed exchange rate period an undervalued yen contributed to the expansion of Japanese exports. However, even when floating rates came into play, the corrective process did not wholly succeed in adjusting the misalignment, as would have been expected, because Tokyo continued to exercise tight controls over capital flows into and out of the country. The distortions to the whole economy from a low exchange rate, however, were minimized because exports represented a relatively small proportion of national output — not exceeding 10 percent of gross national product until the mid-1970s. One group of economists estimated the equilibrium exchange rate at 277 yen to the dollar in 1970, just before the end of fixed rates.¹ (Alternative assumptions produce a range of estimates from ¥259 to ¥310 — all considerably below the old parity.) After a year under the floating system the rate in 1973 was ¥272=\$1.00. Although this 25 percent appreciation shocked Japan's exporters, which had grown accustomed to the stability of fixed rates and the profits of an undervalued currency, in retrospect the new rate did not seem out of line with the underlying economic fundamentals.

In the 25 years since 1970 the yen appreciated 425 percent (5.9 percent per year), reaching a high of ¥80=\$1.00 just this past April. The yen-dollar relationship, though, is not the only one affecting markets. Despite the importance of the United States as a trading partner to Japan and the centrality of the dollar in the international economy, other nations and their currencies are of more than passing interest to Japan. A broader issue, therefore, is the relationship of the yen to an array of its counterparts. Is the yen-dollar exchange rate trend unique or does it share elements in common with other currencies?

To address multilateral exchange rate issues the International Monetary Fund has calculated trade-weighted indexes for 17 industrial countries, including Japan, with estimates going back to 1975. From 1975 through the latest data in May 1995 the yen appreciated 300 percent or 5.8 percent annually against the currencies of the 16 other countries on the IMF list, somewhat less than its 6.5 percent yearly rise in value against the dollar over the same period (see Figure 1). In contrast, the dollar depreciated against the currencies of America's 16 trading partners at a trade-weighted 1.4 percent annual rate — considerably less than its sharp decline of 6.1 percent against the yen. In a multilateral context the yen-dollar connection obviously is more central to the overall value of the Japanese currency than the yen is to the dollar.

Effect Of Inflation On Exchange Rates

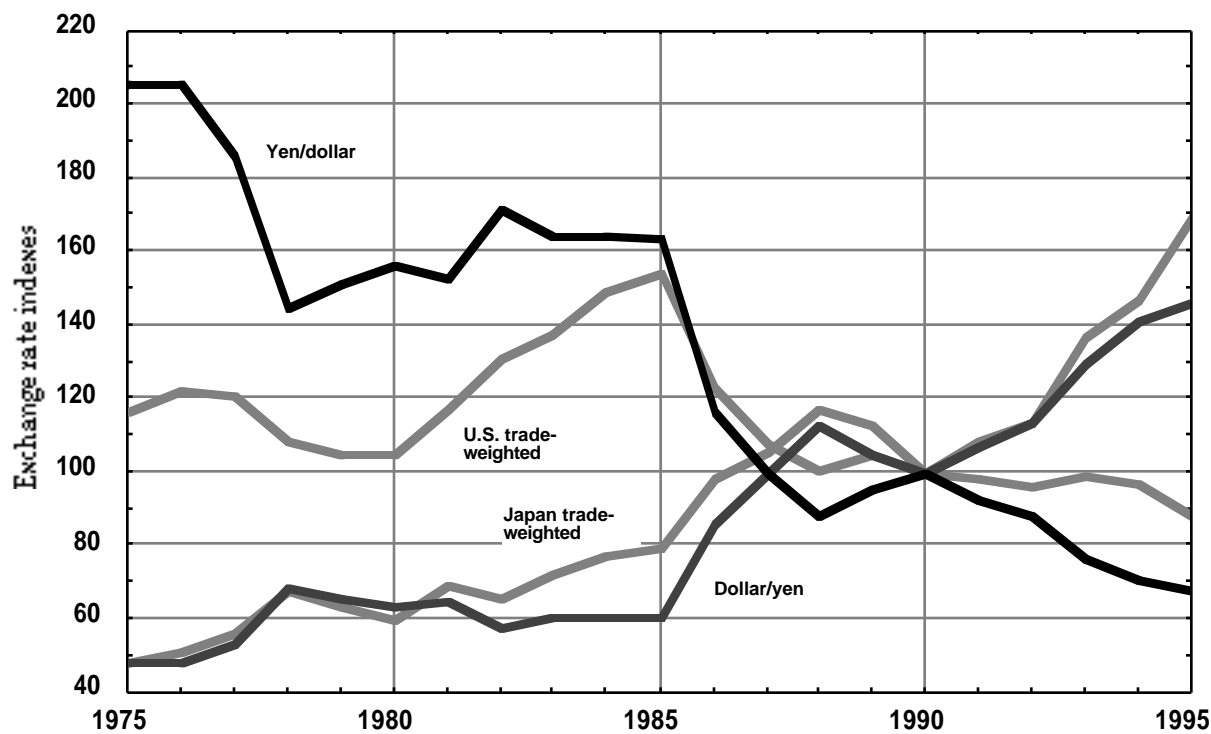
How does inflation influence currency values, and what are the resulting changes? This question is especially important in an era of floating rates. Exchange rates have the job of balancing or bringing into equilibrium not only the international flow of goods and services but the movement of international financial assets as well. Since exchange rates essentially measure the value of one currency relative to another and currencies are used to buy goods and services, exchange rates adjust to relative price changes in different countries as a way of maintaining the relative sizes of the bundles of goods and services that can be purchased. If exchange rates do not adjust to differences in inflation, traders can — and do — profit by buying goods cheaply in one market and selling them in another. The possibility of arbitrage insures that in a free market exchange rates dance to the tune played by inflation, with the invisible hand beating out the tempo.²

In accounting for the influence of inflationary trends the main issue is determining just what price index or bundle of goods best reflects markets. The price index or deflator of gross domestic product

¹Tamim Bayoumi, Peter Clark, Steve Symansky and Mark Taylor, "The Robustness of Equilibrium Exchange Rate Calculations to Alternative Assumptions and Methodologies," in John Williamson (ed.), *Estimating Equilibrium Exchange Rates* (Washington, D.C.: Institute for International Economics, 1994), p. 29.

²This simplified treatment assumes the presence of profit-motivated actors and ignores transportation costs, differentiated products, monopolized markets, trade barriers (visible and invisible) and other impediments to free trade.

Figure 1: Indexes of trade-weighted exchange rates and Japan-U.S. nominal rates (1990=100)



is a good place to begin. Since exchange rates measure the relative values of currencies and currencies are used to buy the output of an economy — the gross domestic product — many analysts turn to the GDP deflator. This broad index, however, has the major drawback that foreign exchange is not used to buy all of GDP, only the portion of it that enters into international trade. Exchange rates, therefore, are likely to respond to a narrower price index than the GDP deflator, something more like a measure of the prices of those products sold on world markets.

An index of actual export prices might seem like just what is needed. This index, too, has deficiencies. It is too narrow, both theoretically and empirically. A theoretically appropriate price index recognizes that tradable goods not only compete in foreign markets but also contend with nontradables in the domestic market and compete for inputs like labor and capital. Both the terms of trade in international markets and the relative prices of tradables and nontradables at home enter into such a price index.³ In addition, narrow export price measures tell little about the price and the cost experience of the entire tradable goods sector — all those companies and products that might enter world markets if the returns were sufficiently profitable.⁴ This broader set of potential market entrants generates competitive forces that act on prices and exchange rates. Therefore, they also are important for considering the relevant group of products and industries that affect exchange rates.

Without these additional variables being considered, the prices of just those products that actually are exported produce biased estimates of price trends in tradable goods. The bias is especially severe for economies that experience persistent appreciation of their currency. Consider, for example, a country like Japan, which has experienced a rise in the value of its currency for 15 years. A typical

³These relations are described by Polly Reynolds Allen, “The Economic and Policy Implications of the NATREX (Natural Real Exchange) Approach,” in Jerome L. Stein (ed.), *Fundamental Determinants of Exchange Rates* (Oxford, England: Oxford University Press, 1995). Recent price trends for the United States and Japan, inserted in the Allen equation, yield an inflation-adjusted annual appreciation of the yen against the dollar of roughly 2.5 percent.

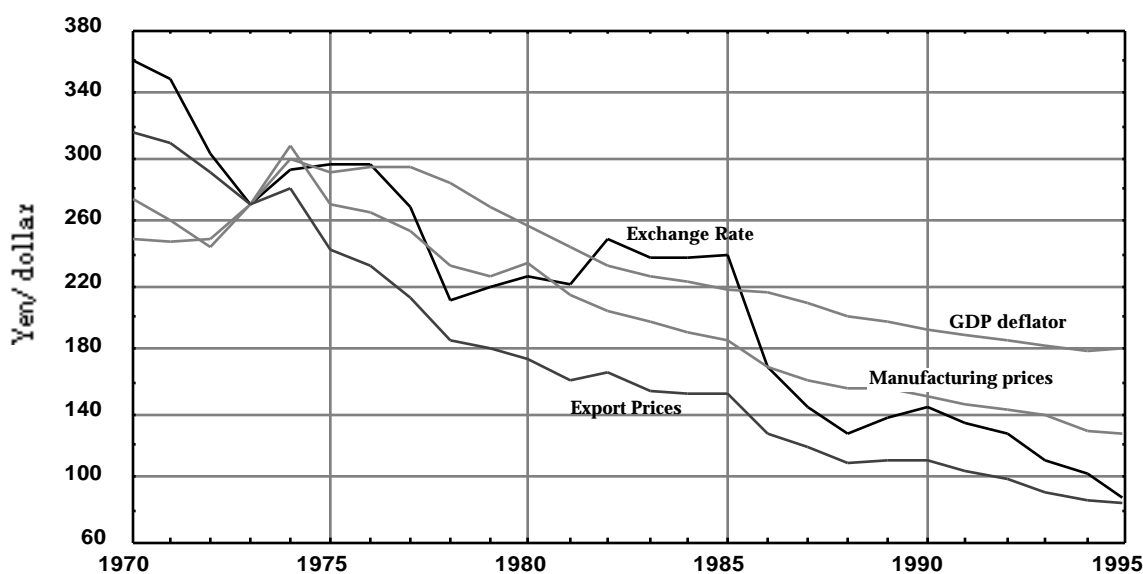
⁴The concept of contestable markets describes the competitive situation as including potential competitors as well as those actually in the market, all acting to determine prices.

industry includes producers with a range of efficiencies in the production of those goods or services entering international markets. As the yen appreciates, companies receive fewer yen for the same foreign price. Because of competitive price pressures, sellers would be reluctant to raise their foreign prices too high for fear of losing market share. Although some companies may be able to absorb the reduction in their revenues for a time by accepting lower profits or live with the reduced sales that follow higher foreign prices, eventually unprofitable firms would leave the market or close down their most inefficient lines.⁵ If this process continued for several years, only the most efficient producers would remain active in the relevant export market. Measures of prices, costs or productivities of this slowly declining group would demonstrate falling costs and prices along with rapidly growing productivity — even though the cost structure and the productivity of each remaining individual company continued unchanged.

It is hard enough to come up with a definition of “tradable” goods and a measure of their prices; including the relative prices of nontradables in an export price index is a task that official agencies have not tackled. The IMF, however, has estimated several alternative price indexes to deflate exchange rates. The one favored by most experts is based on unit labor costs in manufacturing, partly because a large proportion of exports are manufactured goods but also because unit labor costs are a rough approximation of productivity. It is this index that is used below.

Figure 2 shows the nominal U.S.-Japan exchange rate and three adjustments by different methods to account for inflation. A base year of 1973, when the yen traded on average at 272 to the dollar, is used. This year was chosen for several reasons. Major trading nations went to a flexible exchange rate regime at the beginning of 1973 following two years of official revaluations. Moreover, the yen faced competitive pressures for the first time since the end of the immediate postwar period and was settling into a market equilibrium. Also, the current accounts of the United States and Japan were close to balance in 1973, indicating a rough equilibrium in the external sector. Furthermore, data presented by the Paris-based Organization for Economic Cooperation and Development, which estimates a broad measure of purchasing power parity by comparing the prices of comparable bundles of goods in various member countries, indicated that the U.S.-Japan exchange rate and the purchasing

Figure 2: U.S.-Japan Exchange Rate Adjusted by Alternative Inflation Indexes
(yen/dollar, base year =1973)



⁵It also is possible that firms under such competitive pressure would be particularly well-motivated to seek greater efficiencies. In addition to the selection bias described above, some firms may exhibit real efficiency gains that are higher than in less pressured firms.

power parity index in 1973 were nearly equal.⁶

Several points emerge from Figure 2. The transpacific exchange rate has deviated progressively from the GDP deflator-adjusted figure, primarily because of the relatively poor productivity performance of the nontradables sector in the Japanese economy. If productivity growth is greater in the tradable goods sector than in the nontradables area and if these differences are not the same in other countries, GDP-type deflators can generate significant deviations from those estimates based on indexes of tradable goods prices. One study, for example, found that between 1973 and 1983 the yen *depreciated* 0.3 percent against the dollar when the exchange rate was adjusted by the GDP deflator but *appreciated* 26.7 percent when a tradable goods price index was used.⁷ This variation was attributed to a difference in productivity growth between tradables and nontradables of 73 percent in Japan relative to only a 13 percent gap in the United States.

Since manufactures account for most of Japan's exports and more than two-thirds of America's, the exchange rate as adjusted by manufacturing prices tracks the actual exchange rate quite closely. Indeed, about two-thirds of the yen-dollar appreciation since 1973 is explained by relative price inflation in manufacturing.⁸ As expected, export prices adjust more than the alternatives because of competitive price pressures on goods sold abroad as well as the bias attributable to the selection of the remaining firms in the export market. These effects are more pronounced in Japan than in the United States. IMF research has shown that Japanese export prices are tied much more closely to competitors' prices than are U.S. export prices.⁹

Figure 3 traces the IMF's trade-weighted real exchange rate indexes for the United States and Japan against each other and 15 other trading partners using manufacturing costs to adjust for price changes. The bubble in the dollar's value in the 1980s is clear in this retrospective view. The longer term trends show a persistent depreciation of the dollar and an equally sustained appreciation of the yen, at least since 1980 for the latter. From 1975 to May 1995 the yen appreciated in real terms against the currencies of Japan's major trading partners 2.8 percent annually on average, whereas the dollar depreciated 1.2 percent, with spikes of overvaluation in between. Although the cumulative changes depicted are important and even dramatic, they are significantly less extensive than the nominal yen-dollar rate. The main question is the source of these real exchange rate movements.

Explaining Real Exchange Rate Movements

Currencies as Assets - The role of exchange rates in the balancing of capital markets has grown in importance in recent decades with the gradual removal of restrictions on international capital flows and vastly enlarged global capital transactions combined with the increased flexibility of exchange rates. Since money itself is an asset, its value responds to the same factors and forces that influence the price of any other type of financial asset. The most important are interest rates. With exchange rates linking the currencies of separate countries, differences in the rates of return that can be earned in national economies account for much of the short-term variation in exchange rates.

The reason for this linkage is simple. If exchange rates do not respond to changes in interest rates, market arbitragers can make a lot of money. Consider, for example, a hypothetical situation.

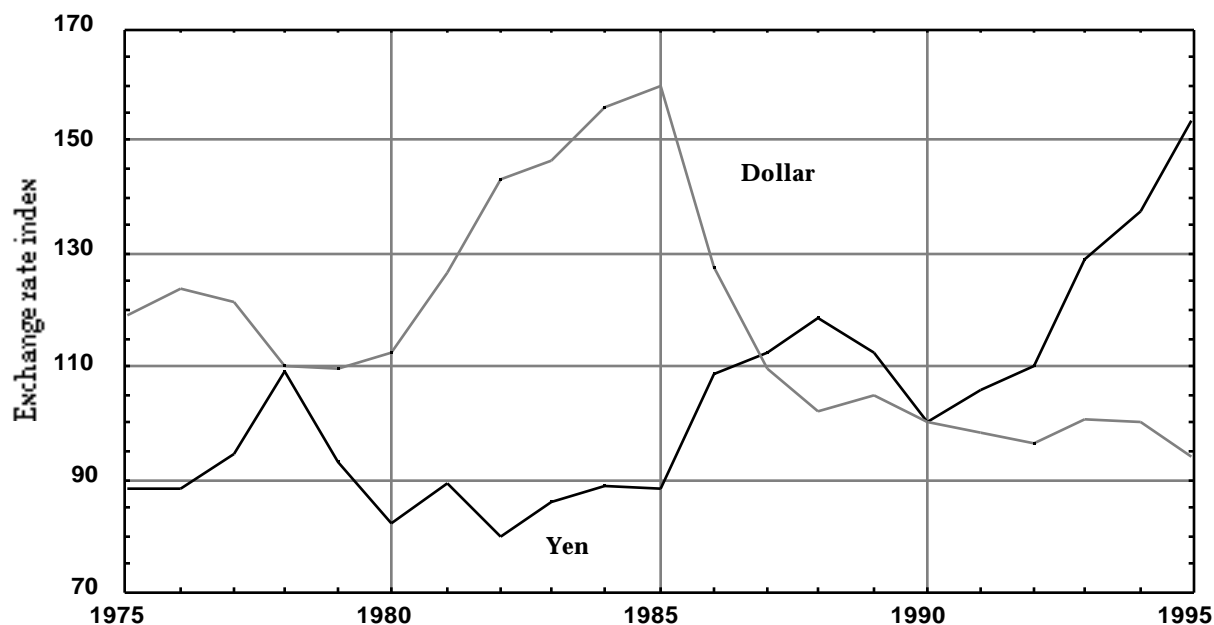
⁶However, 1973 is a poor choice from the domestic viewpoints of the United States and Japan alike because of high rates of money growth and inflation as well as very low economic growth the following year. The problem is to find any "normal" year to use as a base when the criteria involve both external and internal balances. The apparent balance in foreign economic activities in 1973 commends its use despite obvious internal disequilibria.

⁷Richard C. Marston, "Real Exchange Rates and Productivity Growth in the United States and Japan," in Sven W. Arndt and J. David Richardson (eds.), *Real Financial Linkages among Open Economies* (Cambridge, Massachusetts: MIT Press, 1987), p. 80.

⁸If the 1973 value of the yen is multiplied by the percentage change in Japanese manufacturing prices from 1973 to 1995 and that result is divided by the change in U.S. manufacturing prices, the estimated price-adjusted exchange rate for 1995 is 128 yen to the dollar — representing about 64 percent of the actual appreciation to ¥85 per dollar.

⁹Bayoumi et al., *op. cit.*, p. 45.

Figure 3: Real, trade-weighted exchange rates
(index: 1990=100)



Suppose the Japanese currency was trading at 200 yen per dollar and real interest rates (after subtracting expected inflation rates) were 10 percent in both Japan and the United States. If a Japanese investor converted yen into dollars, invested the proceeds in the United States and reconverted them back into yen at the end of the year, he or she would be as well off as if the money had been left in yen (ignoring transactions costs). Consequently, there would be little incentive to engage in such transactions. Now, if interest rates in Japan were to fall to 4 percent, the Japanese investor could make a bundle (or at least a guaranteed 6 percent) by borrowing yen, buying dollars today, selling them next year after receiving the 10 percent interest payment and finally buying yen to repay the loan. Under these conditions there would be a flood of money flowing out of yen and into dollars. Under the pressures of supply and demand the plentiful yen would be bid down and the much-in-demand dollar bid up.

Calculations of the expected rates of return involved in such transactions are not as simple as the example suggests since the figures also have to take into account the expected longer term exchange rate changes produced by the interest rate differentials and the induced capital flows. Especially of concern is the possibility that, after the currency is bid up in value, it will depreciate in a long-run march toward a lower equilibrium. Over an extended time frame some analysts have found a tendency for long-term interest rates to converge due to the ability of capital to move easily across national borders.¹⁰ Because of the relative size of the U.S. economy and the huge stock of dollars, it turns out that interest rates in Japan (and the rest of the G-10 countries) are more sensitive to activity in the American economy than vice versa.

The above scenario explains much of the bubble in dollar exchange rates in the 1980s. The U.S. budget deficit rose from 0.6 percent of GDP in 1979 to more than 5 percent four years later. The enormous demand for borrowing required by this deficit drove up real interest rates, which led to the appreciation of the dollar. Similarly, the demand for capital for rebuilding after the Kobe-Osaka

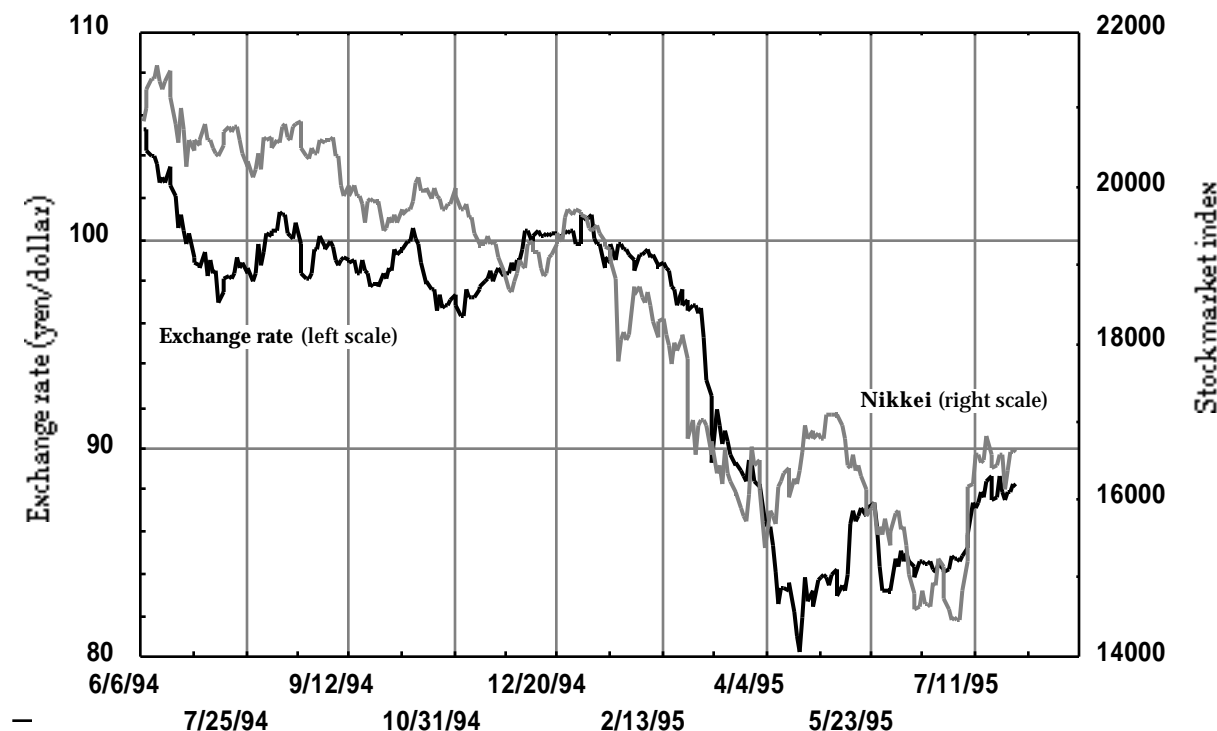
¹⁰ According to one estimate, half of the difference in real interest rates (adjusted for inflation) between the United States and the other G-10 countries is eliminated in six quarters. See Jerome L. Stein, "The Natural Real Exchange Rate of the US Dollar and Determinants of Capital Flows," in John Williamson (ed.), *Estimating Equilibrium Exchange Rates* (Washington, D.C.: Institute for International Economics, 1994), p. 153.

earthquake in January 1995 was a likely cause of the appreciation of the yen and the sharp decline of share prices on the Tokyo Stock Exchange, both being driven by expectations of higher real interest rates. (See Figure 4 for daily exchange rates and closing prices of the Nikkei 225 stock index from mid-1994 to August 1995.)

Interest rates are the key variables in the market that link current to future exchange rates. Two theories that establish relationships between the present and the future are the so-called covered and uncovered interest rate parities. The idea of covered interest rate parity is that the difference between the spot exchange rate and a forward exchange rate is simply the difference between the interest rates in the two countries on instruments of equal risk and of the same maturity as the future contract.¹¹ Again, the reason is arbitrage. If spot and future exchange rates varied from the interest rate differential, traders could make money by buying one or the other currency, collecting the interest and selling back the currency at a future date at the prespecified price. Most research on covered interest parities shows that the concept has worked for the currencies of most leading economies most of the time since the mid-1980s when barriers to capital flows fell.¹²

The concept behind uncovered interest rate parity is that the difference between the spot rate today and the spot rate at a future date also should be equal to the interest rate differential. Essentially, the idea of uncovered interest rate parity asserts that today's interest rates should predict tomorrow's exchange rates. This theory is almost always inconsistent with the evidence. Not only do interest rates fail to predict future exchange rates, but even the direction of predicted change usually is wrong.¹³

Figure 4: Daily Closing Prices of the Yen/Dollar Exchange Rate and the Nikkei 225 Index on the Tokyo Stock Exchange



delivery at a specified future date at a price determined today.

¹²Daniel L. Thornton, "Tests of Covered Interest Rate Parity," *Federal Reserve Bank of St. Louis Review*, July-August, 1989, p. 65; Charles Pigott, "International Interest Rate Convergence: A Survey of the Issues and Evidence," *Federal Reserve Bank of New York Quarterly Review*, Winter 1993-94, p. 27.

¹³These points are discussed in a recent review article. See Mark P. Taylor, "The Economics of Exchange Rates," *Journal of Economic Literature*, March 1995, pp. 14-15.

The predictive failure of the uncovered interest rate hypothesis stems from an important characteristic of the short-term movement of exchange rates. Exchange rates vary according to a random walk — more or less. (This last qualifier is important because if random walks completely governed behavior, no prediction or explanations of trends would be possible. That is not the case.) A variable exhibits random walk properties when its change is not related to its previous level. The fact that it may be high (or low) today yields no information about what it may do tomorrow. Random events and shocks hit exchange rates minute by minute, each of which is independent from what transpired minutes, days or weeks earlier. Exchange rates are not unique in this regard; many other economic variables, including stock market prices, exhibit random walk behavior. One implication of this observation is that a random number generator predicts short-term movements as well as any analyst or economic model.

Even though exchange rates and stock prices both move according to random walks, they do not change completely independently of each other. In fact, on a daily basis the dollar value of the yen is statistically related to the Nikkei index of 225 first-section companies on the Tokyo Stock Exchange.¹⁴ One possible explanation for this relationship is that both sets of prices respond to the same random shocks (plus others); in particular, movements of the Nikkei index reflect underlying rates of return in the Japanese economy, which also should affect the value of the yen in its role as the price of a capital asset.¹⁵

Despite the short-run unpredictability of exchange rates, a growing volume of research shows that movements over the longer run are more satisfactorily explained. Depending on the particular exchange rate and explanatory model, the long run can be one to four years before predictability emerges. In one recent study of four exchange rates the average error from a standard model on the yen-dollar rate was 20 percent less than a naive random number prediction over a two-year horizon, 30 percent better over three years and more than 40 percent better over a four-year time frame.¹⁶ The conclusions of this study are consistent with findings from other scholars: "While short-run horizon changes tend to be dominated by noise, this noise is apparently averaged out over time, thus revealing systematic exchange-rate movements that are determined by economic fundamentals. These findings are noteworthy because it has long been thought that exchange rates are unpredictable."¹⁷ Jerome Stein of Brown University models the U.S. exchange rate as responding to a 12-quarter moving average of the fundamental factors; over the moving three-year period the short-term disequilibrium of the several variables work themselves out. Mr. Stein writes, "Although in the short run the exchange rate does not reflect the fundamentals, it does so in the longer run. As the time horizon lengthens, market pressures push the real exchange rate toward the NATREX (natural real exchange rate) ... and produce equilibrium in the basic balance of payments."¹⁸

Foreign exchange experts in Japan seem not to base their predictions on the findings noted above. Analysis of Ministry of Finance-sponsored bimonthly surveys from 1985 to 1993 of 44 experts working for banks, brokerage houses and other private financial companies indicated that they expect recent exchange rate changes to continue for about three months and then reverse in six months to what is felt to be a long-term norm. Because of their failure to look at fundamental forces, however, their expectations have been "spectacularly wrong" on occasion.¹⁹

¹⁴In econometric terms the two series are cointegrated.

¹⁵Share prices respond to discounted returns; they tend to react positively to expected future earnings and negatively to higher expected interest rates. The fall in Japanese share prices in the past few years probably was due to miserable corporate earnings. The decline in January 1995 could be explained by higher rate of return expectations produced by the massive construction needs after the Kobe-Osaka earthquake.

¹⁶Nelson C. Mark, "Exchange Rates and Fundamentals: Evidence on Long-Horizon Predictability," *American Economic Review*, March 1995, pp. 213-214.

¹⁷*Ibid.*, p. 215.

¹⁸Stein, *op. cit.*, p. 137.

¹⁹Takatoshi Ito, "Short-Run and Long-Run Expectations of the Yen/Dollar Exchange Rate," *Journal of the Japanese and International Economies*, June 1994, p. 127.

Trade Balances and Capital Flows: Their Dependence on Macroeconomic Conditions and Exchange Rates - Over the medium run of a year or two (the vagueness of the time horizon is deliberate) exchange rates affect trade flows because the rates determine the prices of foreign goods in domestic markets. Typically it takes from 12 to 24 months for exchange rate changes to work themselves out in altered trade flows. At first, in fact, the effects are in the “wrong” direction because of the familiar J-curve path of adjustment.²⁰ Trade responds to exchange rates. The other main influence on trade in the medium term is national income. As income rises at home, imports increase; conversely, exports expand with rising foreign incomes. Thus, the chief medium-run determinants of trade are real exchange rates and income levels.

The factors that determine trade balances (more precisely, current account balances) are often independent of the export and import relationships described above, especially over a longer time frame of several years. Care must be taken, therefore, when making projections of exports and imports to assure their consistency with the longer run determinants of the balance between goods and services flowing out of a country and into it.

Under what conditions do trade deficits arise and what, in turn, are their effects on exchange rates? When the aggregate consumption of households, businesses and government is greater than total national production (or the income earned in that production), a trade deficit arises. If a country consumes more than it produces, the products and services have to come from somewhere; foreign trade is the only alternative short of miracles.

Moreover, when a country consumes in aggregate more than it has earned in income, someone somewhere must finance this excess consumption — as long as sellers demand compensation. Therefore, a trade deficit is accompanied by a capital inflow because the deficit country does not earn enough to pay for all its imports; other nations volunteer to finance the difference by providing loans, acquiring IOUs in the form of debt or otherwise investing in the country.

The immediate connection of trade imbalances to exchange rates arises when foreign lenders (or investors) put their money into the borrower’s economy. The lenders first must convert their money into the currency of the borrowing country, typically by going into the foreign exchange market and buying the borrower’s currency. This demand drives up the price of the borrower’s currency. (The argument is reversed for a country running a trade surplus; that excess is associated with a capital outflow and a depreciated currency.) Note that, according to this story, the exchange rate is determined by net trade flows; it is dependent or endogenous.

Persistent trade deficits lead to a buildup of foreign debt on which interest or other payment must be made. In order to make these payments the borrowing country either has to export more, import less or engage in some combination of these actions in sufficient amount to pay the costs of its borrowing. In order to export more or import less the value of the nation’s currency must depreciate.²¹ In short, what started out as a higher value currency ends up being worth less. Note that it is not necessary for a country with foreign holdings to completely reverse its position and become a net debtor for these effects

²⁰The J-curve describes the long time it takes (up to about two years) for quantities of goods to respond to exchange rate-generated price changes because of long-term contracts, habit and other factors that contribute to the persistence of past patterns. Immediately, though, buyers in a country with a depreciated currency face higher prices, which increase the value of the old quantity of foreign goods purchased. After a while, when consumers have had time to adjust their purchasing decisions, both the quantity of purchases and the values decline. Thus, the J-curve: first in one direction and then in the other.

²¹The importance of the long-run development of the foreign asset position on exchange rates has been a central part of the research on the “natural real exchange rate.” See Stein (1994), *op. cit.*, p. 143.

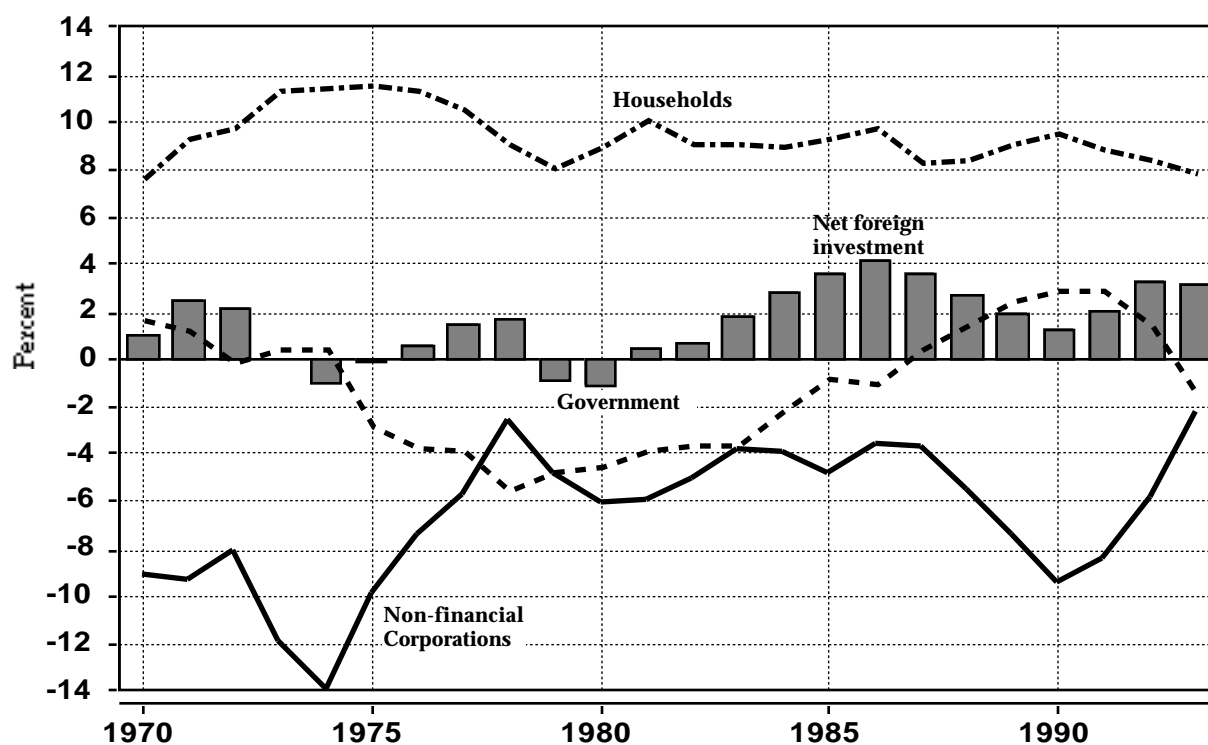
to occur. It only is necessary to move in the indicated direction.²²

Stating that a nation consumes more than it produces and borrows from the rest of the world is equivalent to saying that the country has net negative savings. That is, when the gross savings of households, businesses and government are applied to domestic investment (including budget deficits), the nation comes up short; there is not enough to go around. Again, the reverse is true for a surplus country; it has more than enough savings to finance its domestic investments and invest the surplus around the world. This is a different way of saying that a country with a current account surplus exports capital and one with a deficit is a capital importer. This also is the rationale behind the statement that a current account imbalance arises from a gap between savings and investment.

Since 1981 Japan has run a consistent current account surplus. Examination of the country's sectoral savings-investment balance (see Figure 5) indicates that the chief reason is that business absorption of national savings dropped sharply in the early 1970s as the slowdown of economic growth reduced the need for capital spending. Households continued to maintain quite high savings rates. For a time in the mid-1970s the savings freed up by lower business investment fed a large government budget deficit. As this was reduced, aggregate Japanese savings went into the plus column. Japan began running a trade surplus, accompanied by an outflow of capital (see Figure 6).

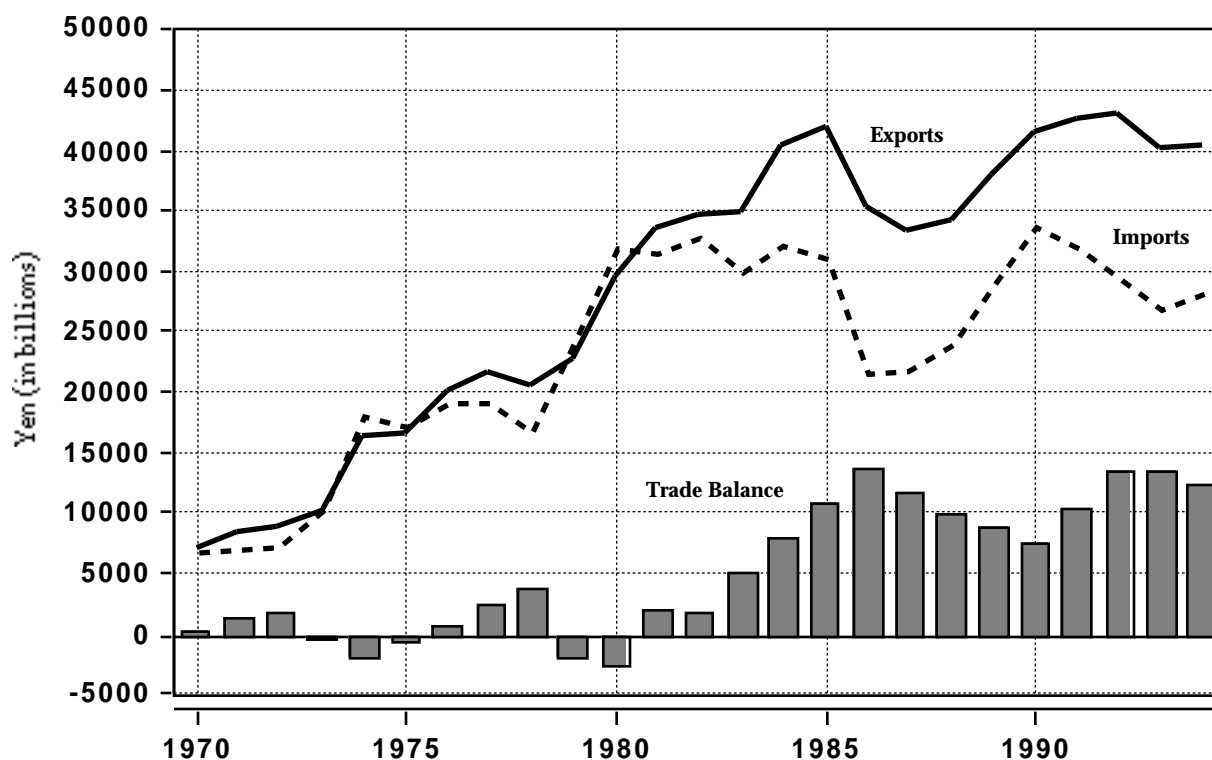
The United States started running a persistent trade deficit with the rest of the world in the

Fig. 5: Japan Net Saving by Sector, 1970-93
(percent of gross national product)



²²The required change in the real exchange rate can be estimated in a rough way with the following equation: $e = (r CA) / (aX - bM)$, where e is the percentage change in real exchange rates, r is the real interest rate, CA is the current account, a is the export price elasticity, X is exports, b is the import price elasticity and M is imports. Using elasticities as reported in Bayoumi et al., *op. cit.*, p. 26, and current values for trade and interest rates, the dollar is estimated to depreciate at an annual rate of 1.1 percent and the yen to appreciate 11 percent. The greater change for the yen is driven mainly by the assumed insensitivity of imports in Japan to exchange rate changes. (Export elasticities for both countries are 0.71. The U.S. import elasticity is 1.1, and the Japanese figure is 0.77.)

Fig. 6: Japanese Trade, 1970-94
(in billions of yen)



early 1980s when government savings turned sharply negative with the dramatic increase in the federal budget deficit and household savings drifted downward — from 6 percent of GDP to under 4 percent in the late 1980s.²³ Although the nation’s investment also slowed down, savings fell at an even faster pace. The result was a trade deficit and accompanying capital inflows (see Figures 7 and 8).²⁴

While it must be true that aggregate consumption minus aggregate income (or savings minus investment) equals the current account imbalance because of accounting definitions, some writers object to the line of causation laid out above. Their argument runs in the other direction: trade imbalances cause the macroeconomic disequilibrium. Sometimes this is taken even further by the assertion that closed markets overseas and open markets in the United States have caused the American trade deficit, especially with Japan.

There are several responses to this line of reasoning. First, the aggregate macroeconomic relationship says nothing about a bilateral trade relationship but only about the total. Given its shortage of savings, the United States will have a trade deficit with some country — which one is not specified by the theory. However, a less-than-rigorous argument with respect to Japan suggests that, if the United States has a large trade deficit and Japan runs a large trade surplus and the pair is among each other’s largest trade partners, then the United States is likely to have a trade deficit with Japan. A second argument against the notion that closed markets, especially in Japan, cause the American export-import gap is that since the early 1980s Japanese markets (and most others around the world) have opened in numerous ways even as the U.S. markets have become more closed through a variety of

²³ Sectoral estimates of net savings comparable to what is available for Japan are not reported in the U.S. GDP statistics.

²⁴ The small positive current account surplus in 1991 resulted from foreign government transfers covering the costs of the Persian Gulf War. The item “U.S. Government Grants” in the international transactions statistics went from minus \$17.6 billion in 1990 to a positive \$24.5 billion in 1991 and back down to a minus \$13.8 billion in 1992.

Fig. 7: U.S. Savings and Investment
(gross percent of GDP)

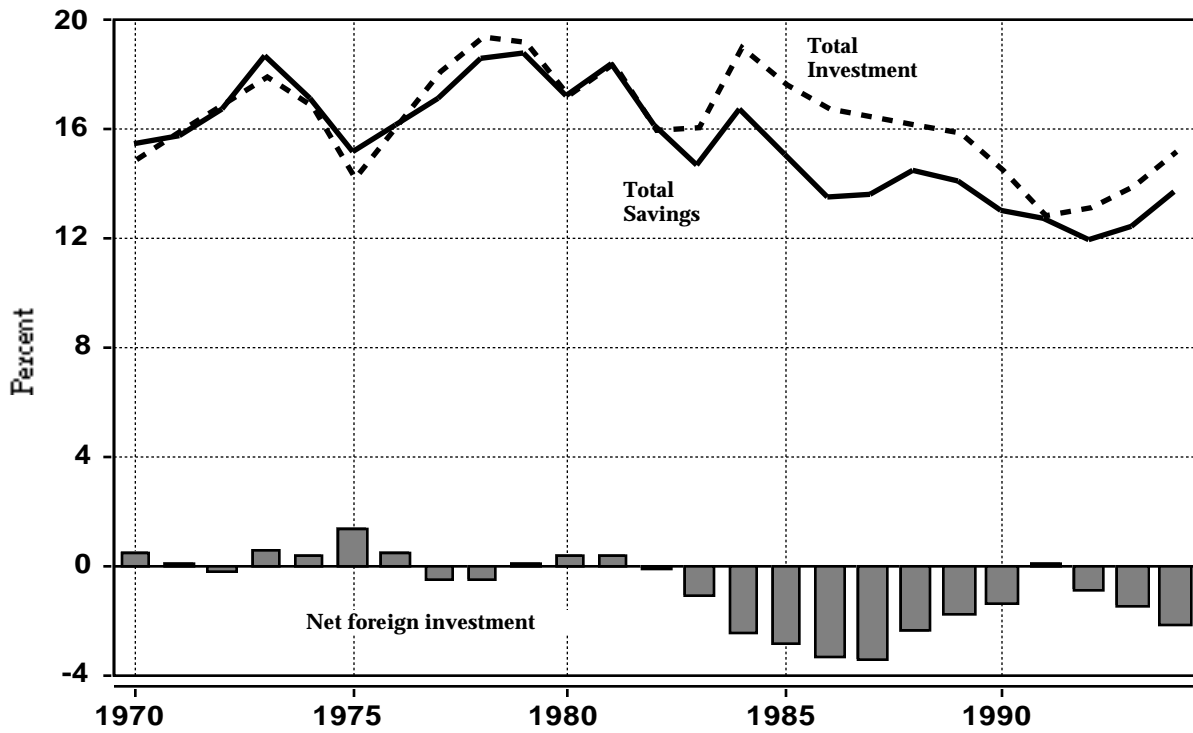
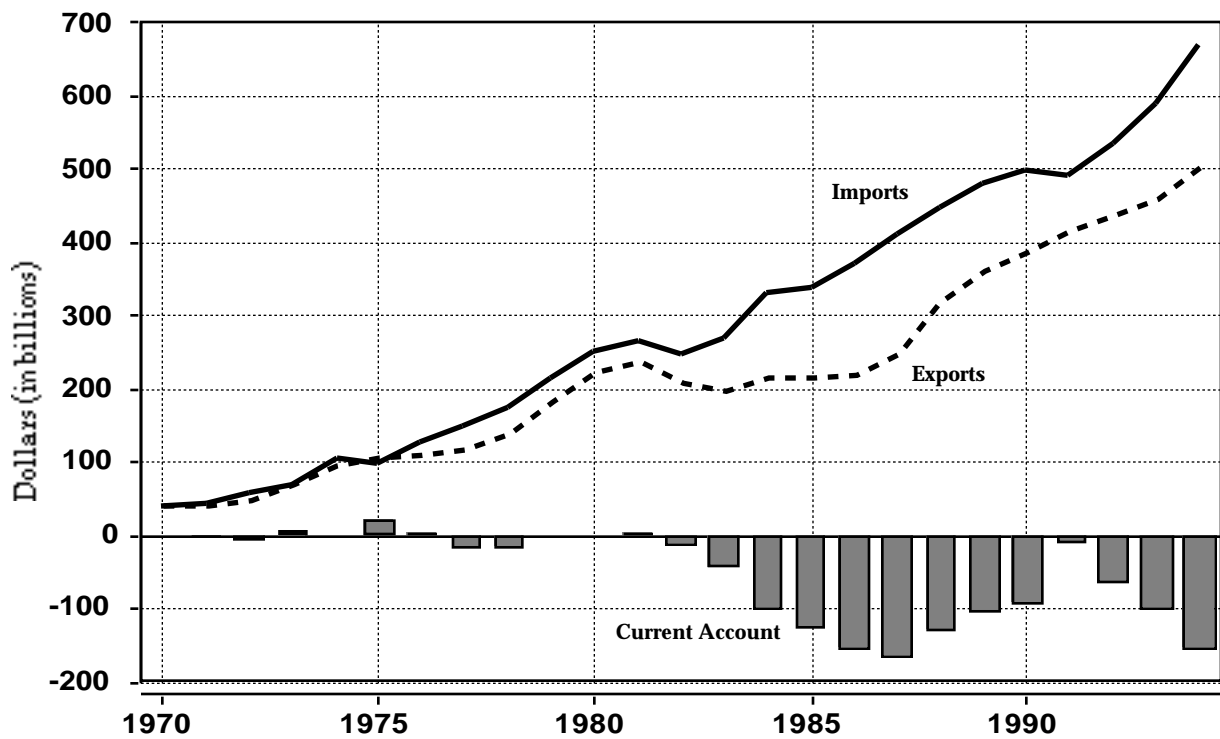


Fig. 8: U.S. Trade
(in billions of dollars)



protectionist measures, including the so-called voluntary restraint agreements in the 1980s covering cars, machine tools and other products.

There may be occasions in the very short run of a few months that causation runs in the other direction — from trade flows to savings and investment. For example, a decline in the price of petroleum will have the effect of reducing the value of Japanese imports and increasing its trade surplus. The falling prices of gasoline and other refined petroleum products will allow companies and consumers to spend less on consumption than they had anticipated; savings will increase. However, over the long term these savings are unlikely to persist as people recognize their good fortune. With consumption rising and absorbing the excess savings, Japan's trade surplus will decline to its long-term equilibrium level based on the nation's desired savings-investment pattern.

The central issue of whether a trade imbalance is the cause of a savings-investment imbalance, or vice versa, is whether exchange rates affect domestic savings and investment or whether the relationship runs in the other direction. A survey of the research literature suggests that for the United States and other large countries, including Japan, savings and investment are “either independent of the real exchange rate or relatively unresponsive to it.”²⁵ Conversely, exports, imports and the current account do respond to real exchange rate changes.

Since the early 1980s, therefore, the inflation-adjusted appreciation of the yen has reflected the persistence of excess savings in the Japanese economy, the buildup among Japanese investors of substantial foreign assets and consequent net payments from these investments, which require a reduction of exports or an increase in imports to bring about equilibrium in capital flows.²⁶ The reverse situation occurred in the United States. Figure 9 shows net investment income from abroad for both countries. Japan went from zero net payments in 1981 to roughly \$40 billion in receipts in 1994. In contrast, the United States, which ran a \$33 billion surplus in its foreign investment receipts in 1981, saw that figure plunge to a negative \$10 billion in 1994.

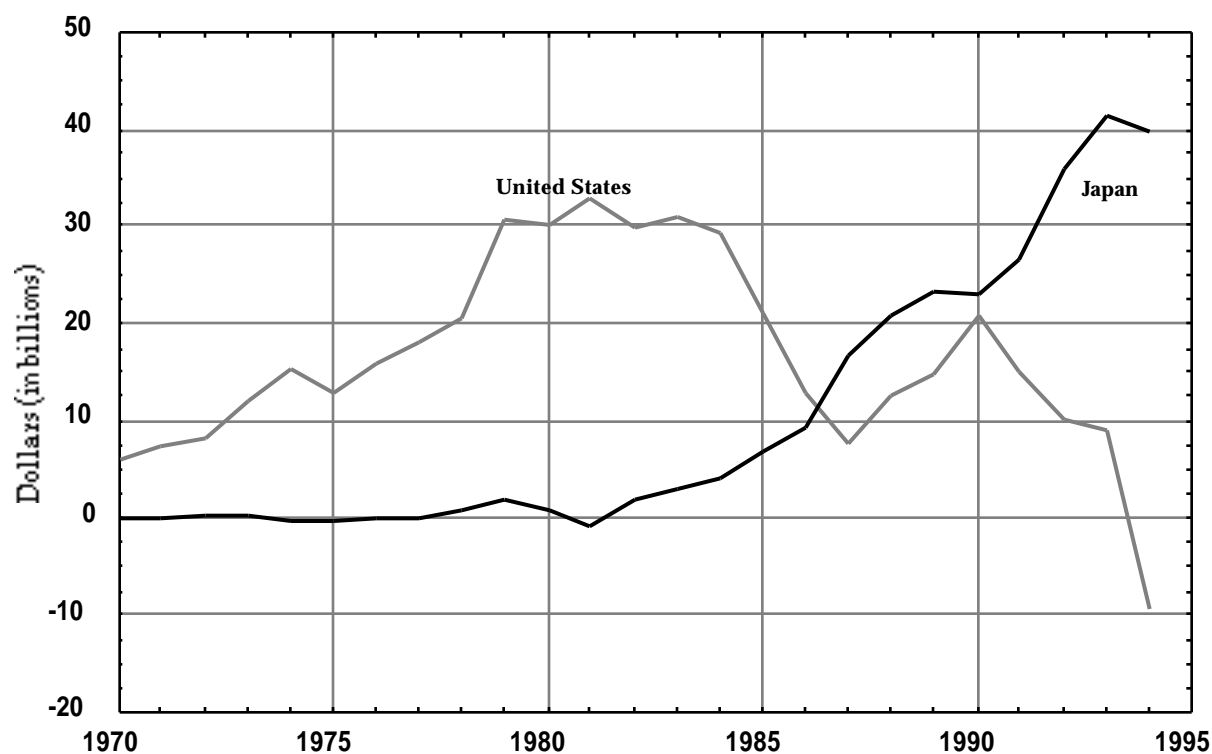
Answering the Central Questions - With this background, the questions posed at the beginning of the report can be seen to have a web of interlocking responses. In review the questions are: What has caused the persistent real appreciation of the yen and the parallel depreciation of the dollar and what is behind the continuing trade imbalances of the United States and Japan? Answering the latter question first, savings-investment imbalances (or consumption-income differences) lead to trade imbalances; these are financed by capital flows that generate holdings of foreign assets. The latter, in turn, produce property income and that requires exchange rate revaluation to induce the corresponding shifts in imports and exports and thus keep trade and capital flows in equilibrium. Rather than being paradoxical, trade imbalances and long-run shifts in exchange rate values are related as cause and effect. The yen has appreciated in value and the dollar has fallen *because* of the respective trade surplus and deficit of Japan and the United States — that and the different inflation rates in the two countries.

Trade Volumes: Removing the Masks of Changing Exchange Rates - Changing exchange rate values can distort perceptions of real trade flows. Since the long-run appreciation and depreciation of the yen and the dollar, respectively, have been the mechanisms to increase Japan's imports and reduce its exports — with the opposite effects in the United States — trade flows must have responded. Yet the usual trade accounts do not show these expected effects. The reason is that the shifting values of currencies and changing price levels camouflage the real trade flows. Using the volume of trade eliminates the effects of price and exchange rate changes. Figure 10 presents one such index, prepared

²⁵ Reynolds, *op. cit.*, p. 6.

²⁶ This relationship can be clarified in algebraic terms: $CA = (X - M) + (R - P) = S - I$, where CA is the current account, X is exports, M is imports, R is receipts from foreign assets, P is payments to foreigners on their domestic investments, S is savings and I is investment. From these relationships $(S - I) - (R - P) = (X - M)$. If savings and investment are relatively independent of exchange rates and if the net flow of payments on foreign assets develops slowly over time, then exports and imports must respond to these capital flows. Exchange rates are the principal mechanisms that force the necessary response.

Figure 9: Net Investment Income From Abroad
(in billions of dollars)



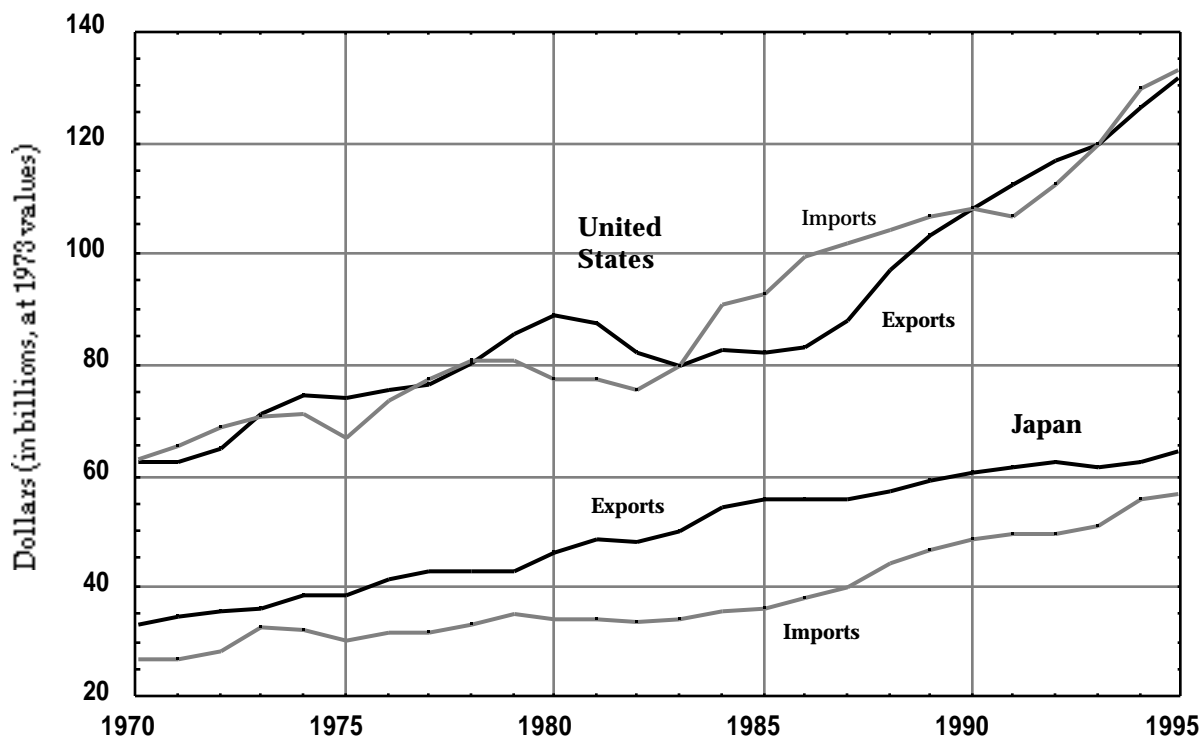
by the IMF. That organization used 1990 as the base year, but here the base year is shifted to 1973 for the external equilibrium reasons argued above; the index numbers are scaled to actual import and export values for 1973. The chart reveals that the volume of U.S. exports has climbed 4.9 percent a year since 1985, while Japanese exports in volume terms have stagnated, edging up just 1.1 percent annually. In contrast, imports into Japan have grown 4.7 percent annually, while U.S. purchases from abroad in adjusted terms have increased at a somewhat slower 3.7 percent rate. In fact, using 1973 prices as the base, the volume of U.S. exports equals the volume of imports.

This picture varies sharply from the usual dollar-denominated trade view. The implication is that, because of American overconsumption, the depreciating dollar makes foreign purchases more expensive while U.S. exporters get less for their products sold overseas. It is not as though U.S. companies are unable to compete successfully in world markets; they can as long as prices are lowered. Meanwhile, as much as Japan complains about hollowing out from the competitive pressures of the strong yen, its consumers are in a position to benefit from lower-priced imports. The volume figures should put to rest the notions that America cannot sell abroad and that Japan will not buy foreign products.

Extending The Analysis

Policies and events often have different short-run and long-run effects. Policymakers and commentators, though, frequently fail to recognize this possibility. Some examples will illustrate the point. In early August the Ministry of Finance announced a package of measures designed to increase capital outflows from Japan by easing restrictions on overseas portfolio investments (see *JEI Report No. 30B*, August 11, 1995). The immediate intention was to lower the yen's value against the dollar and

Figure 10: U.S. and Japanese Trade Volumes
(1973 dollars in billions)



other foreign currencies by driving up the demand for them and, in the process, to increase Japanese exports and reduce imports. If the policy has its desired effect, savings might increase slightly because of higher returns earned abroad and domestic investment could decline a bit because of the flow of savings out of the country and the resultant increase in interest rates at home. Thus, the current account could increase and imports and exports move in the desired direction — at least for a while. But, since Japan's net holdings of foreign assets will be higher than they otherwise would have been, the long-run effect will be in the opposite direction.

In another example the Clinton administration threatened this spring to impose sanctions on imports of Japanese luxury cars. Although this development narrowly was averted (see *JEI Report* No. 24B, June 30, 1995), suppose 100 percent penalty tariffs had gone into effect and imports from Japan consequently had declined. Unless American consumers put the money they would have spent on made-in-Japan luxury cars in the bank and left it there, the U.S. trade deficit would have been unaffected because savings and investment would have remained unchanged. Even if domestic cars were substituted for the foreign version, the result would be the same — something else would be imported from somewhere to make up the basic deficit in income and consumption.

A look at market-opening measures in Japan further illustrates the relation between trade and savings and investment. In the mid-1980s Tokyo removed its de facto ban on imports of satellites by the business sector, an action that was extended under pressure from Washington to public-sector purchases in 1990. As a result, American manufacturers have won contracts valued at several billion dollars to supply satellites to Japan. Other than making such firms as Hughes Aircraft Co. happy, what other effects did this move have? Savings and investment trends in both the United States and Japan over the last 10 years or so would not be expected to vary because of these additional trade flows, with the current account remaining basically the same. Something else obviously changed to balance increased U.S. exports of satellites. The balancing act was accomplished by a shift in the Japanese demand curve

for foreign goods, which would drive down the yen and make the dollar's value increase. As a result, other American exporters would have a slightly more difficult job selling overseas, but importers here could buy at lower prices. Moreover, with less competition from higher dollar-priced goods, Japanese exporters would face an easier situation abroad, but consumers in Japan would see less competition to drive down prices at home. The current account thus would have been balanced by a combination of exchange rate-driven trade adjustments little contemplated by U.S. negotiators who took pride in the results of their negotiating skills.

In general, Japanese commentators are correct to note that market-opening measures lower the yen's value and enable Japanese producers to become more price competitive abroad. Such initiatives also benefit users of products in the specific liberalized market. But the overall impact is to penalize importers as a class due to exchange rate changes and do nothing about Japan's trade surplus or the long-run trend toward an appreciating yen, which would resume after the one-time drop.

The surge in American demand for Japanese cars and light trucks in the 1980s could be taken as a real force in the goods market that exchange rates had to balance. The yen would have been driven upward by the flow of dollars in search of yen. This case is essentially the reverse of the satellite example. As the dollar fell in value, American consumers would have been hurt by more expensive imports of other products, while U.S. exporters would have benefited. Japanese automotive companies certainly profited from this demand, but other exporters in Japan had to pay the price.

Conclusions

All of the forces and effects that have been discussed can occur simultaneously; it is a multivariable world. While the yen is undervalued because Japan is exporting capital, the same currency is appreciating because of the returns from holding foreign assets. As Japanese exporters wait for the latest twist of the J-curve, they are responding to exchange rate changes of 18 or more months ago. Short-term events like the January Kobe-Osaka earthquake produce a real interest rate advance that comes on top of the existing rates prevailing in Japan.

The possibility of smaller Japanese savings in the future because of an older population with a lower propensity to save has long-term implications that policy analysts are attempting to understand. If investment declines at a slower pace than savings, for example, the country eventually will cease running a current account surplus with the rest of the world. Several studies estimate the disappearance of Japan's surplus between 2000 and 2005, although projections of when two declining curves will intersect each other are notably imprecise.²⁷

When talking about exchange rates, moreover, what is true today may be reversed tomorrow. What is cause may become effect. The shocks and news of today and the expectations about the future mingle with the events reported in yesterday's stacks of newspapers. People who are not careful about these distinctions are likely to make mistakes, although the subject of exchange rates is sufficiently confusing that many will slip by the most careful writer.

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The views expressed in this report are those of the author and do not necessarily represent those of the Japan Economic Institute.

²⁷ Cited in John Williamson, "Estimates of FEERs (Fundamental Equilibrium Exchange Rates)," in John Williamson (ed.), *Estimating Equilibrium Exchange Rates* (Washington, D.C.: Institute for International Economics, 1994), p. 195.