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Saving-Investment Determinants of Japan's External Balance

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This article examines the role of domestic and foreign saving-investment behavior in the determination of Japan's current account. Declining fiscal spending in Japan and rising fiscal spending in the United States both are found to be major factors in the emergence of Japan's recent external surpluses. This implies that policy changes in both countries may be necessary to reduce Japan's large surpluses.

In recent years, Japan's large external surpluses have drawn much attention. Its current account balance in nominal dollars rose from a small surplus of $5 billion in 1981 to $86 billion in 1986. Relative to GNP, the surplus increased over this period from less than one-half of one percent to more than four percent.

The rising surplus has stirred conflicts with many of Japan's trading partners. A better understanding of the causes of this increase is needed to determine what policy responses may be appropriate.

The explanations for Japan's apparent propensity to export more than it imports have varied. Some have focused on "closed markets" and "unfair trade practices" that Japan allegedly has erected as barriers to foreign goods. Advocates of this view have urged Japan to reduce its trade barriers and to "buy foreign." However, there is little evidence that Japan's existing trade barriers have risen in the last several years at the time that its surpluses have grown. In fact, on balance, such barriers probably have fallen.[1]

Others have asserted that an "undervalued" yen prior to 1985 contributed heavily to Japan's external surpluses.[2] However, when the yen appreciated more than fifty percent against the dollar between February 1985 and the end of 1986, these surpluses did not show signs of leveling off and falling until recently.[3] As a result, most doubt that exchange rate changes alone will suffice to eliminate Japan's surpluses.[4]

The relation between the current account, the exchange rate, and other macroeconomic variables depends fundamentally on underlying saving and investment flows. National income account relationships imply that a country's current account depends on domestic private saving and investment behavior, as well as on domestic fiscal saving. An excess of domestic private saving over domestic private investment that is not "absorbed" by an excess of government expenditures over tax receipts can result in domestic net savings flowing abroad. The counterpart of this outflow of savings is a current account surplus. From this point of view, some have argued that the Japanese "save too much," and they suggest that the high saving rate by the private sector in Japan is the cause of Japan's trade surpluses. Accordingly, Japanese authorities have

been entreated, explicitly or implicitly, to adopt policy measures to discourage saving.

Still others have suggested that the recent rise in Japan's surpluses can be attributed in large part to the policies of the United States, Japan's largest trading partner. Since one country's current account deficit is another's surplus, macro developments in the rest of the world also are among the determinants of a country's current account. The rise in U.S. government deficits, according to this view, generated an excess demand for foreign goods by U.S. residents and accordingly, a rise in Japan's net exports.[5]

This paper provides an empirical analysis of Japan's current account as the product of its domestic and foreign saving-investment balances. The strategy of the paper is to estimate a current account equation relating the actual current account to variables generating short-run business cycle fluctuations in the current account and to non-business cycle, or "autonomous," movements in domestic and foreign net savings. The estimated equation is used to decompose current account movements into autonomous and cyclical components, and in particular, to determine the extent to which Japan's current surpluses can be attributed to domestic and foreign saving-investment behavior.

The major conclusion of this analysis is that most of Japan's present current account surplus can be related to autonomous factors affecting private and government net saving flows. Moreover, a decline in autonomous net saving in the United States associated with the emergence of fiscal spending deficits in the early 1980s has been a major contributor to this surplus. Autonomous net saving behavior in Japan and in the United States each accounts for 2½ percentage points of the 4 percentage point increase in the ratio of Japan's current surplus to GNP between 1981 and 1986. Cyclical factors actually worked to reduce the surplus by roughly 1 percentage point.

These findings suggest that adjustment by both the United States as well as Japan may be necessary to reduce Japan's external surplus. In fact, there are signs that these adjustments already are occurring. Following the recommendations of the 1986 Maekawa Report, Japan has moved to stimulate domestic demand and reduce net saving by increasing government expenditures, providing greater incentives for housing investment, and raising taxes on saving accounts.[6] At the same time, since 1986 the United States has moved in the direction of reducing its fiscal deficits.

The plan of this paper is as follows: Section I reviews recent trends in Japan's current account and in the private saving-investment and government saving balances of both Japan and the U.S. Section II presents a simple two-country model of the determinants of the current account balance. Section III describes the empirical analysis, and Section IV summarizes the results.

I. Recent Trends

From national account identities, the excess of the sum of domestic private (S) and government saving (TG) over domestic investment (I) equals a country's current account surplus (CA):

$$CA = S - I + TG$$

Chart 1 plots, over the period 1966 to 1986, four-quarter moving averages of Japan's current account, private saving-investment (SI = S − I), and government saving balances, each as a share of GNP.[7]

Over the past twenty years, Japan's current account balance has shifted widely, with deficits as well as surpluses. Surpluses averaging roughly 2 percent of GNP were recorded in 1971–1972 and in 1978. Deficits averaging 1 percent emerged at the time of the oil price crises of 1974 and 1979–1980.

The most recent surpluses, however, are significantly greater than those previously attained. From 1966–1980, Japan's current account averaged a surplus of only 0.6 percent of GNP, with a peak of 2.4 percent in 1971. In 1985, the surplus reached 3.7 percent of GNP and in 1986, 4.3 percent.

Chart 1 also shows that in recent years Japan's net private saving-investment balance (SI) has increased as a percent of GNP. From 1966 to 1974 this balance averaged 1.4 percent; from 1975 to 1980, 3.2 percent, and from 1980 to 1986, 3.7 percent. Between 1980 and 1986 it rose by almost three percentage points.

Contrary to the common view, this rise in Japan's net private saving balance is the result of a sharp decline in investment rather than a rise in saving. Private saving averaged 17.5 percent of GNP from 1966 to 1974, 16.6 percent from 1975 to 1980, and 14.1 percent over the 1981–1986 period.[8] The long-run trend, in fact, has been a small decline in Japan's private saving rate.

Since 1975, the rate of private investment in Japan has fallen sharply. Net investment averaged 18.9 percent of GNP during the 1966–74 period, 13.4 percent during 1975–80, and 10.3 percent from 1981 to 1986. A decelera-

tion in Japan's long-run growth rate and a resulting reduction in domestic prospects for net investment have been associated with this declining investment.[9]

Japan's private saving-investment surplus is only part of the reason that the current account recorded such large surpluses in recent years. As the identity above implies, the behavior of government saving (i.e., government receipts minus expenditures) also has played a role.

Over the period from 1975 to 1979, the growth in surplus net private saving was largely matched by a rise in government budget deficits that reached 4.1 percent of gross national output in 1978, well above the average of 2.2 percent over the period from 1966 to 1974. Budget deficits rose because of increased government spending associated with the oil price shocks of the 1970s and the growth of social welfare programs. Since 1979, the budget deficit has declined steadily, with a small surplus attained in 1985. This improvement in the budget deficit reduced the demand for domestic saving. Thus the dramatic rise in Japan's external surpluses in the 1980s can be attributed more to sharp drops in private investment and the government budget deficit, than to an increase in private saving.

Chart 1
Japanese Net Saving and Current Account Balances

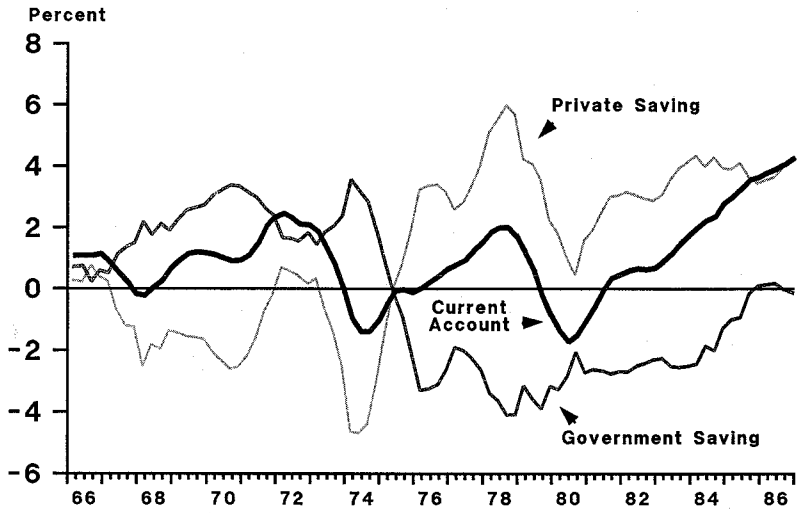
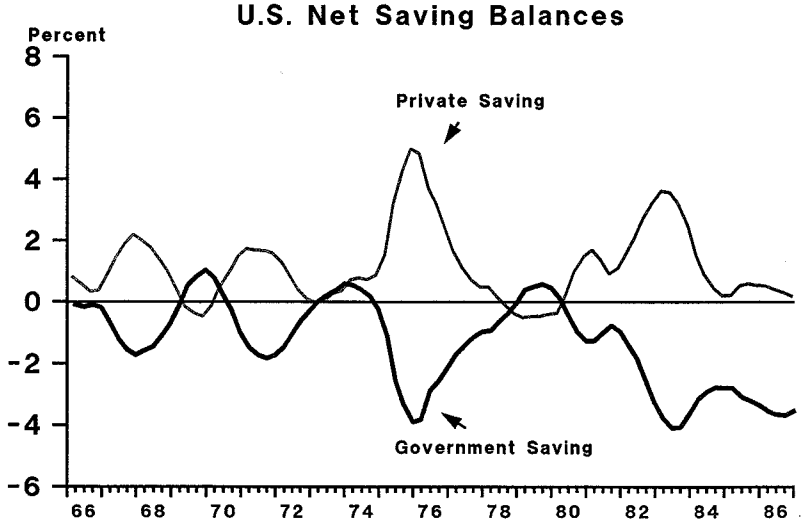


Chart 2
U.S. Net Saving Balances



In a global context, Japan's net exports (CA) are net imports by the rest of the world. Following the national account relation above, these net imports equal the excess of investment over private and government saving in the rest of the world.

Chart 2 plots four-quarter moving averages of the private saving-investment (SI^*) and government saving (TG^*) balances of the United States, Japan's largest trading partner, over the period 1966–1986. Observe that in contrast to recent trends in Japan, fiscal saving in the U.S. shifted from small surpluses (0.5 percent of GNP in 1979) to large deficits, averaging 3.4 percent during 1982–1986. Mirroring these increasing deficits has been a fall in the private saving-investment balance in recent years. This suggests that budget policies in the United States may be an important factor behind the development of Japan's current account surpluses.

In a general equilibrium context, saving and investment behavior both domestically and abroad are jointly determined by business cycle changes as well as by exogenous monetary and fiscal policy variables at home and abroad, and other fundamentally exogenous forces, such as autonomous shifts in private consumption or investment behavior. The following sections examine the extent to which the movements in private and government saving-investment balances and Japan's current account reflect autonomous or business cycle factors in Japan and abroad.

II. Theory

This section develops a simple two-country model of the determinants of the current account. The purpose of the analysis is not to capture all aspects of saving and investment behavior, but rather to focus on the essential channels of current account adjustment within a simplified framework.

The conditions for equilibrium in the goods market in the two countries can be written as (with time subscripts omitted):

$$CA = SI + TG \tag{1}$$

$$-CA = SI^* + TG^* \tag{2}$$

where SI, TG, and CA denote net private saving (private saving minus investment), net government saving (government receipts minus expenditures), and the current account balance, respectively. The variables with an asterisk denote the equilibrium for the foreign country—referred to as the United States. Those without an asterisk represent the domestic country—Japan, in this analysis.[10]

Net private saving for the domestic and foreign country takes the following form:

$$SI = SI_0[Z_1] + s_1(y - \bar{y}) + s_2 r \tag{3}$$

$$SI^* = SI_0^*[Z_1^*] + s_1^*(y^* - \bar{y}^*) + s_2^* r^* \tag{4}$$

where for Japan SI_0 denotes autonomous net private savings; y, real output; $\bar{y}$, full employment or potential output; r, the real interest rate; and Z_1, a set of exogenous variables that affect autonomous savings. The same variables for the United States again are denoted by an asterisk.

According to (3) and (4), net private saving depends on autonomous factors, the gap between actual and potential GNP, and the real interest rate.[11] The latter two terms reflect the effects of the business cycle and other short-run factors. The parameter s_2 is assumed positive: a rise in the interest rate raises saving and reduces investment. The sign of s_1 depends on the relative effect of an increase in the GNP gap on private saving versus investment.

Government net saving is specified as

$$TG = TG_0[Z_2] + t(y - \bar{y}) \tag{5}$$

$$TG^* = TG_0^*[Z_2^*] + t^*(y^* - \bar{y}^*) \tag{6}$$

where TG_0, TG_0^* represent autonomous government saving, and Z_2, Z_2^* denote exogenous variables that affect autonomous government saving for Japan and the United States, respectively. The parameters t and t^* are expected to be positive. TG_0 and TG_0^* may be interpreted as full-employment budget surpluses attained when actual output equals potential output.

To proceed, substitute (3) – (6) in (1) and (2), multiply (1) by s_2^* and (2) by s_2, take the difference, and solve for CA:

$$CA = \frac{s_2^*}{s_2 + s_2^*}(SI_0 + TG_0) - \frac{s_2}{s_2 + s_2^*}(SI_0^* + TG_0^*) + \frac{s_2^*(s_1 + t)}{s_2 + s_2^*}(y - \bar{y}) - \frac{s_2(s_1^* + t^*)}{s_2 + s_2^*}(y^* - \bar{y}^*) + \frac{s_2 s_2^*}{s_2 + s_2^*}(r - r^*) \tag{7}$$

Equation (7) provides an equation describing the determinants of the current account of the domestic country in both the long and short run.

In long run equilibrium, $y = \bar{y}$ and $y^* = \bar{y}^*$ and, assuming domestic and foreign assets are perfect substitutes, $r = r^* = \bar{r}$. Thus the first two terms of equation (7) may be interpreted as the autonomous components of the current account that are unrelated to the movements in the domestic and foreign saving balances associated with cyclical changes in GNP gaps and interest rates. The difference between these components may be interpreted as the domestic country's long run current account balance, CA_0.[12]

The long-run current account tends to improve when autonomous domestic saving increases relative to that of the foreign country. Thus an increase in domestic private saving or domestic government saving, or a fall in autonomous foreign private or government saving leads to a rise in the current account balance.

Intuitively, an autonomous decrease in, say, foreign saving tends to reduce the net flow of capital to the domestic country. The counterpart to the fall in foreign saving and capital inflows to the domestic country is a rise in goods bought in the domestic country relative to goods bought abroad, causing a rise in the domestic country's current account balance. The mechanism through which these changes occur involves a rise in interest rates to crowd out investment and dampen the fall in saving, as well as a depreciation (appreciation) of the domestic (foreign) country's currency to dampen the rise (fall) in its currrent account.[13]

Note that the impact of autonomous changes on the current account depend on the interest elasticities of net saving both domestically and abroad (s_2 and s_2^*). Moreover, a testable implication is that the absolute values of the coefficients of these two terms sum to one.

The last three terms of (7) represent the short-run, cyclical determinants of the current account. In the short run the current account may differ from its long-run equilibrium level because the determinants of private and public saving—income and the interest rate—deviate from their long-run values.

Whether a positive domestic GNP gap ($y > \bar{y}$) increases or decreases the current account below its long-run level depends on the propensity for net private saving out of income (s_1). If this propensity is sufficiently negative (i.e., $s_1 < 0$ and $s_1 + t < 0$), then a rise in output above potential reduces the current account. Intuitively, an increase in income above its full employment level causes domestic investment to rise by more than private saving does, thereby inducing a fall in net domestic saving and a fall in the current account. On the other hand, if $s_1 + t > 0$ (a sufficient condition is $s_1 > 0$), a rise in output induces an increase in the current account.

At first glance, this latter case may seem contrary to the typical Keynesian view that a rise in domestic income worsens the trade balance. However, the result here presumes that other determinants of the current account, particularly the autonomous components, are held constant. If, for example, the increase in domestic income is generated by an expansionary autonomous fiscal policy (fall in TG_0), equation (7) may indeed imply that a worsening of the current account would be observed at the same time. Foreign GNP gaps produce symmetrical results.

Unlike the effect of a GNP gap, the effect of an interest rate differential between the domestic and foreign countries is unambiguous. A positive domestic interest rate differential induces greater net saving domestically than abroad and a corresponding rise in the current account.

In summary, the long run current account is determined by the autonomous levels of net private saving and government saving domestically and abroad. In the short run, business cycle movements in output and in interest rates can affect the current account as well.

III. Estimation

Methodology

The strategy of the paper now is to estimate the autonomous and cyclical components of Japan's current account following the approach suggested by Ueda (1987). First, measures of the autonomous components of net private and government saving domestically and abroad are derived from estimates of equations following the specifications of (3)–(6). Next, an equation is estimated which relates the current account to the autonomous factors and to cyclical variables, as suggested by (7). The resulting equation is then employed to determine the relative magnitudes of autonomous and cyclical factors.

Although Japan trades with many countries, it is difficult and cumbersome to construct savings measures for most countries, particularly on a quarterly basis. Consequently, the United States, Japan's largest trading partner, will be treated as representing the rest of the world in this analysis. In (fiscal year) 1986 Japan's bilateral trade surplus with the United States accounted for more than half (57.9 percent) of its total trade surplus.[14] Treatment of the

United States as a proxy for the "rest of the world" should provide a rough approximation of the role of foreign factors in Japan's current account.[15]

The data sample covers the first quarter of 1965 through the fourth quarter of 1986. The source and construction of the data are described in the appendix. A proxy for potential GNP was derived from fitted values of regressions of the log of GNP on constant, trend, and trend-squared terms.[16] In the case of Japan, separate regressions were run for the periods from 1966:1 to 1973:4 and from 1974:1 to 1986:4 to account for a shift in the pattern of real economic growth. Proxies for *ex ante* real interest rates were obtained from *ex post* real long-term government bond rates, deflated by two-year ahead inflation rates in the case of the U.S. and two-quarter ahead inflation rates in the case of Japan.[17]

The equations were log-linear approximations of (3)–(7), with dependent variables scaled by potential GNP. Since the saving-investment balances, GNP gap, and real interest rate measures are themselves endogenous, instrumental variables were employed in the estimation. The instruments used in each equation included potential output and lagged values of the dependent and all explanatory variables, except for the real interest rate. In addition, the TG equations included current and lagged money supply growth; the SI equations included four lags of the quarterly inflation rate, the lagged nominal interest rate, current and three lags of money supply growth, and two lags of government savings; the current account included four lags of the quarterly inflation rate for both countries, and four lags of money supply growth for both countries and the lagged nominal interest differential.[18]

Table 1

Regression Results

(1) $SI/\bar{y} = -.68 + .06 \ln \bar{y} - 1.85 (\ln y - \ln \bar{y})_{-1} + .16r$
(3.60) (3.64) (3.32) (1.47)

$\bar{R}^2 = .68$ SEE = 0.0178 DW = 2.36 RHO = .53
Sample: 1966:1–1986:4

(2) $SI^*/\bar{y}^* = -.08 + .03 \ln \bar{y}^* + .72 (\ln y^* - \ln \bar{y}^*) + .03r$
(.61) (1.84) (6.43) (2.83)

$\bar{R}^2 = .75$ SEE = .0072 DW = 1.63 RHO = .67
Sample: 1965:3–1986:4

(3) $TG/\bar{y} = .56 - .04 \ln \bar{y} + .64 (\ln y - \ln \bar{y})$
(5.81) (5.84) (2.01)

$\bar{R}^2 = .25$ SEE = .0230 DW = 0.81 Sample: 1965:4–1986:4

(4) $TG^*/\bar{y}^* = .38 - .05 \ln \bar{y}^* + .42 (\ln y^* - \ln \bar{y}^*)$
(6.84) (7.10) (8.42)

$\bar{R}^2 = .62$ SEE = .0099 DW = 0.43 Sample: 1965:4–1986:4

(5) $CA/\bar{y} = .01 + .56 (SI_0 + TG_0)/\bar{y} - .34 (SI_0^* + TG_0^*)q/\bar{y}$
(4.40) (6.44) (3.47)

$-.85 (\ln y - \ln \bar{y}) - .48 (\ln y^* - \ln \bar{y}^*) + .06 (r - r^*)$
(4.04) (2.60) (.97)

$\bar{R} = .31$ SEE = .0129 DW = 2.02 Sample: 1967:1–1986:4

The government saving equations were not corrected for serial correlation since they are structural rather than behavioral equations, and the t-statistics associated with the coefficient estimates did not matter. The private saving equations, however, were corrected for serial correlation in the following way: an estimate of the serial correlation parameter was obtained from the residuals of the initial application of the instrumental variables regression. The final results were then obtained by performing an ordinary least squares regression on the quasi-differences of exogenous variables and the instrumented values of endogenous variables.[19] The current account equation did not require correction for serial correlation.

Results

The results of the equations used to estimate autonomous and cyclical private saving and government saving are reported in lines 1–4 in Table 1.

Net private saving in Japan (SI) is positively related to the real interest rate and negatively to the lagged GNP gap. For the United States, both the GNP gap and the real interest rate enter positively. In both countries, the interest rate signs are as expected. The effect of the GNP gap on net private saving is theoretically ambiguous, as discussed earlier. An increase in the GNP gap causes saving to rise by more than investment in the U.S. ($s_1^* > 0$) and by less than investment in Japan ($s_1 < 0$). In the government saving (TG, TG*) equations the GNP gap entered significantly with the expected positive sign for both countries.

With these results, measures of the autonomous net private saving balances (SI_0, SI_0^*) were obtained by subtracting the GNP gap and real interest rate terms from the actual balances. Likewise, measures of autonomous government saving balances (TG_0, TG_0^*) were obtained by subtracting the terms representing the effect of the GNP gap from actual balances. This construction implicitly attributes the error terms in the estimated equations to autonomous factors.

Charts 3 and 4 depict four-quarter moving averages of autonomous and actual net private saving balances relative to potential GNP for Japan and the United States, respectively. Charts 5 and 6 depict the autonomous and actual government saving balances for the two countries.

Chart 3 indicates that autonomous factors (SI_0) account for most of Japan's net private saving (SI), particularly during the shift from deficits to surpluses in 1975. This suggests that the decrease in investment that occurred in the mid-1970s was not just a short-run business cycle phenomenon, but rather was the result of structural changes in Japan's economy. Since 1981, Japan's autonomous private saving has increased moderately.

Chart 5 shows that since the early 1970s movements in Japan's government saving balance (TG) have been dominated by autonomous factors (TG_0) to an even greater extent than was the case for private savings. In recent years, Japan's rising level of government saving (falling budget deficits) also primarily is the result of changes in autonomous, rather than business cycle, factors.

Chart 3
Japanese Net Private Saving

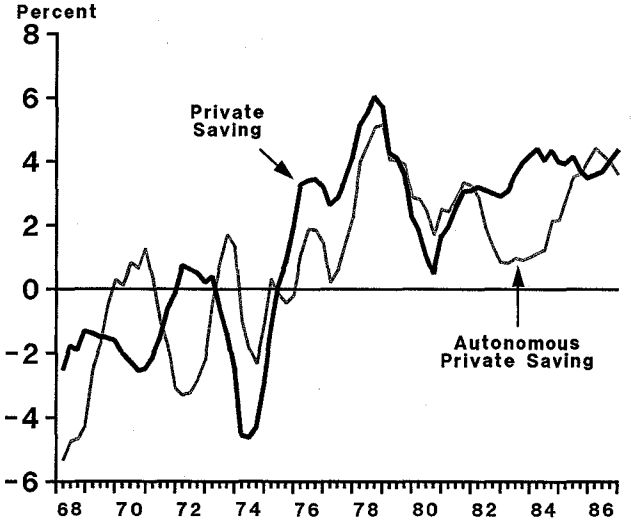


Chart 4
U.S. Net Private Saving

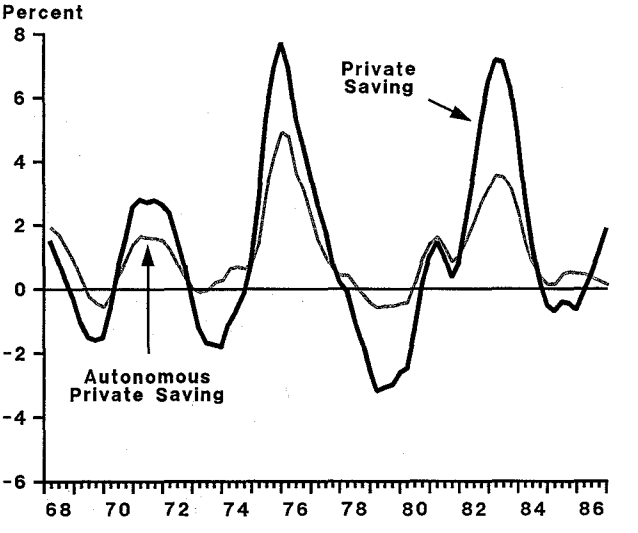


Chart 4 indicates that the portion of U.S. net private saving (SI^*) that is driven by autonomous factors (SI_0^*) declined sharply in 1983 but has since remained relatively flat.

Chart 6 shows that actual and autonomous government saving balances for the United States (TG^* and TG_0^*, respectively) do not track as closely as in Japan. Thus for the U.S., cyclical factors play a much greater role in government saving. Still, much of the fall in government saving (increase in the budget deficit) in the early 1980s has been autonomous in nature.

Summing autonomous government saving together with autonomous net private saving gives total autonomous domestic saving in each country ($SI_0 + TG_0$, $SI_0^* + TG_0^*$). In Japan, autonomous domestic saving averaged surpluses of 2 to 3 percent of potential GNP in the mid-1970s, but fell to deficits of nearly 3 percent in 1976, as a result of the sharp increase in the structural government budget deficits. Since then, the reversal of fiscal policy and the moderate rise in private saving in Japan, have induced a strong rise in the autonomous domestic saving balance. In the United States, aggregate private and government saving both have declined sharply since 1982; the U.S. autonomous domestic saving balance, converted into yen-equivalent terms by the real yen price of the dollar (denoted by q in Table 1) has risen (in absolute value) to about 6 percent of Japan's potential output.

The estimated effects of domestic and foreign net saving behavior on Japan's current account are reported in line 5 of Table 1. All coefficients have the expected signs, and, except for the interest rate differential, are statistically significant at the .05 level.

Note, in particular, that the current account depends positively on autonomous Japanese saving and negatively on U.S. autonomous saving. As implied by theory, the hypotheses that the absolute values of these two coefficients sum to 1 cannot be rejected.

Cyclical factors also are important. An increase in the Japanese income gap worsens Japan's current account; an increase in the U.S. gap also reduces the current account. As discussed earlier, the finding that an increase in the U.S. GNP gap worsens its own external balance and improves that of Japan's presumes that all other factors are being held constant. If, for example, the increase in U.S. income is generated by an expansionary autonomous fiscal policy (fall in TG_0^*), this analysis may imply that Japan's current account would improve.

To see more clearly the effects of autonomous factors ($TG_0 + SI_0$ and $TG_0^* + SI_0^*$) on Japan's current account, the actual (moving-average) current account balance (CA) and the estimated autonomous balance (CA_0) are plotted separately in Chart 7. For the years in which Japan experienced large surpluses in its current account (1972–1973, 1978, and 1982–1985) autonomous saving-investment behavior appears to have played a large role. The influence of cyclical factors associated with income and interest rate movements is apparent, particularly in 1981 and 1982 when the autonomous current account appears to have been

Chart 5
Japanese Government Saving

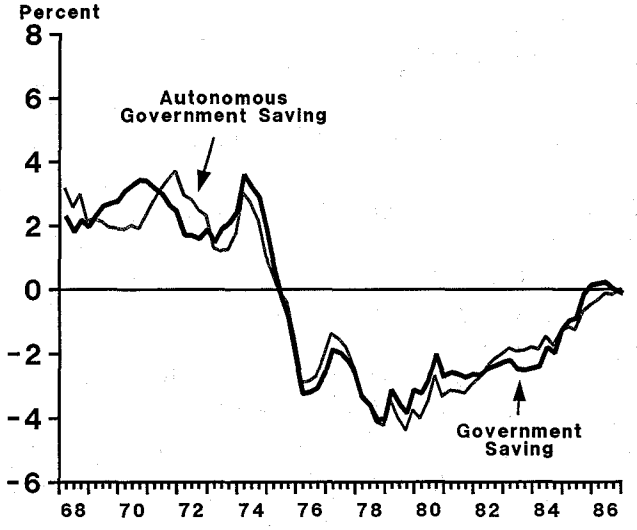


Chart 6
U.S. Government Saving

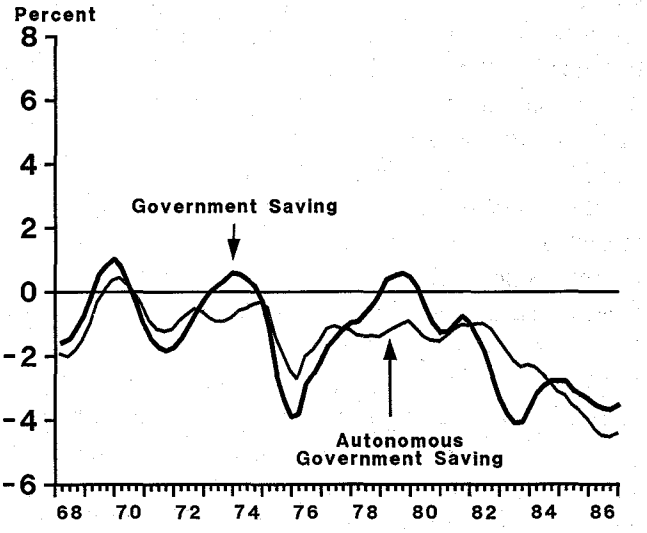
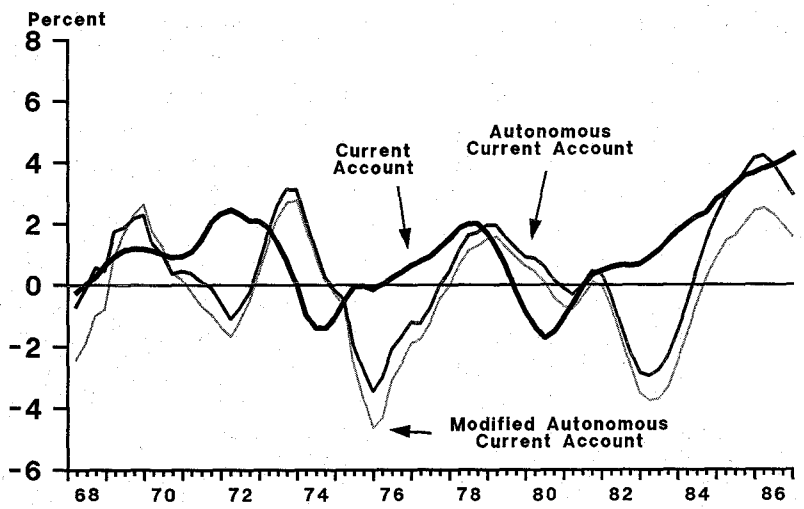


Chart 7
Japanese Current Account Balance



in deficit and actual surpluses were occurring. However, beginning in 1983, it is apparent that Japan's autonomous current account moved strongly into surplus, and now accounts for almost all of the recent actual balance.

Chart 7 also suggests that U.S. fiscal policies have played a major role in the recent emergence of Japan's external surpluses. By comparing Japan's autonomous current account (CA_0) with the estimated autonomous balance modified to remove the effects of autonomous U.S. budget policy, it is clear that, in the absence of any effects of U.S. fiscal policies, the autonomous current account in Japan decreases in almost all periods, particularly in the 1980s. In 1986, for example, this analysis implies that Japan's current account surplus would have been roughly one-half its actual level.

In other words, of the cumulative 4 percentage point increase in the ratio of its surplus to potential GNP between 1981 and 1986, autonomous net saving behavior in Japan explains 2.5 percentage points and net saving behavior in the U.S. accounts for 2.3 percentage points. Cyclical factors worked to reduce the surplus by roughly 1 percentage point. Thus U.S. policies as well as developments in Japan have played a role in Japan's emergence as a surplus country in international trade transactions.

IV. Conclusions

The framework used in this paper has focused on the role of domestic and foreign saving-investment balances in the determination of Japan's current account. This analysis indicates that autonomous changes, particularly those related to government budget policies, have been important determinants of Japan's current account. Most importantly, it suggests that Japanese saving-investment behavior alone does not explain recent increases in the external surpluses. The large U.S. budget deficits since 1982 also have played a major role.

These results imply that changes in autonomous government or private saving in both countries may be necessary to bring down Japan's large surpluses. Specifically, the United States needs to reduce its fiscal deficits, and Japan simultaneously ought to increase its deficit spending.

In fact, there are signs that such adjustments already are occurring. Following the recommendations of the 1986 Maekawa Report, Japan has moved to stimulate domestic demand and reduce net saving. Government expenditures have increased, stronger incentives for housing investment have been provided, and taxes on previously exempt savings accounts have been introduced. The desire to stimulate a lagging economy was the motive, but such measures also should contribute to a decline in Japan's current account surpluses.

In the U.S., the federal budget deficit has been reduced significantly, from $221 billion in 1986 to $156 billion in 1987. While it is unclear how quickly the deficit will be reduced in the future, the trend is in the proper direction.

ENDNOTES

1. Bergstrand (1986) cites evidence that Japanese tariffs are no higher on average than U.S. tariffs and that U.S. non-tariff barriers are as widespread as those in Japan.

2. Frankel (1984) discusses how prevalent this view was among U.S. Treasury officials when negotiating with Japan to reduce its barriers to international capital flows. Neither Frankel, nor Haynes, Hutchison, and Mikesell (1986), find any evidence that Japan's financial policies were directed towards depressing the value of the yen.

3. Haynes, Hutchison, and Mikesell (1986) surveyed recent evidence and found that in the 1980s Japanese trade flows have been relatively insensitive to exchange rate changes.

4. See Sakamoto (1988).

5. See Hutchison and Pigott (1984) and Bergsten and Cline (1985).

6. The Maekawa Report is formally known as "The Report of the Advisory Group on Economic Structural Adjustment for International Harmony," and was released by the Japanese government on April 17, 1986.

7. The GNP scaling variable used is "potential" output. The method used to construct this measure is described in Section III. The private saving measure used for Japan is defined to include statistical discrepancy.

8. Japan's traditionally high level of saving may reflect the need for retirement funds to supplement the low level of social security benefits, the high cost of housing, and heavy educational expenses. See Bergsten and Cline (1985) and Islam (1986).

9. Kasman (1987) estimates that Japan's potential real growth rate fell from 9 percent over the period 1967–1973 to 4.5 percent over 1976–1986. He attributes the deceleration of Japan's potential growth rate to declines in the rate of capital accumulation and in the rate of technical progress as the economy has matured. Other factors besides the slowdown in growth that also may have contributed to the sharp drop in the propensity to invest include (i) declining budget deficits beginning in 1979, which curbed public investment, and (ii) high real interest rates and the price of urban land, which caused residential construction to fall.

Some have argued that the timing of the shift in Japan's growth rate suggests that the oil price increases of the 1970s played a major role. While these shocks may explain cyclical movements in Japan's GNP, other countries more dependent on oil experienced less deceleration in trend growth in the 1970s.

10. Note that since goods market equilibrium in this model depends on the government budget balance, Ricardian equivalence does not hold.

11. Terms of trade and exchange rate effects on saving and investment are neglected. This specification also abstracts from the dynamics associated with the response of saving and investment to wealth accumulation. Turner (1986) specifies a model in which investment and saving depend directly on the exchange rate.

12. Since this specification abstracts from the dynamics associated with the response of saving and investment to wealth accumulation, in the long-run equilibrium of this model the current account may not equal zero. It also does not take into account complications arising from debt financing of the deficit in the short-run and the ultimate need to raise taxes to service the larger debt implied by the government budget constraint.

13. The implicit adjustment of the exchange rate and interest rate may be seen by specifying the determinants of the current account generally as follows:

$$CA = CA_a[Z_3] + c_1 q + c_2(y - \bar{y}) + c_3(y^* - \bar{y}^*) \quad (A.1)$$

where q is the real exchange rate, defined as the real yen price of the dollar, and Z_3 is a vector of exogenous variables that affect the current account. A Keynesian theory would imply $c_1 > 0, c_2 < 0, c_2^* > 0$. We abstract from the interest payments on net foreign assets.

In the short run, the two equilibrium conditions (1) and (2) determine the two output levels y and y^*, with the interest rates determined elsewhere in asset markets in an unspecified manner. In the long run, $y = \bar{y}$, $y^* = \bar{y}^*$, $r = r^* = \bar{r}$, and $q = \bar{q}$. Hence (1) – (6) imply

$$SI_0 + TG_0 + s_2\bar{r} = CA_a + c_1\bar{q}$$

$$SI_0 + TG_0 + s_2^*\bar{r} = -(CA_a + c_1\bar{q}).$$

Solving these two equations for the two unknowns $\bar{r}$ and $\bar{q}$ yields:

$$\bar{r} = -(1/(s_2 + s_2^*))(DS_0 + DS_0^*)$$

$$\bar{q} = (1/c_1)\{(s_2^*/(s_2 + s_2^*))DS_0 - (s_2/(s_2 + s_2^*))DS_0^* - CA_a\},$$

where $DS_0 = SI_0 + TG_0$, $DS_0^* = SI_0^* + TG_0^*$. Thus, in the long run, the real interest rate and the exchange rate depend only on autonomous private and government saving. Substituting in (A.1) gives the long-run current account, CA_0:

$$CA_0 = (s_2^*/(s_2 + s_2^*))DS_0 - (s_2/(s_2 + s_2^*))DS_0^*, \quad \text{or}$$

$$CA_0 = CA_a + c_1\bar{q},$$

The long-run current account depends on the exogenous current account CA_a and the long-run exchange rate $\bar{q}$. An increase in either domestic private or government saving depreciates the country's currency and improves its current account.

14. Sakamoto (1988).

15. Ueda (1987) considers the saving behavior of both the United States and OPEC. Knight and Masson (1988) construct a simulation model of the interaction of saving and investment behavior in Japan, the United States, and Germany.

16. The trend-squared term allows trend growth to be flexible. An alternative approach used by Ueda (1987) and Kasman (1987) is to estimate full-employment GNP for Japan from a production function.

17. These inflation horizons worked best in the empirical analysis. Federal Reserve Bank of San Francisco staff forecasts were used for U.S. inflation during 1988 where appropriate.

18. Money growth, inflation, and nominal interest rates were included in the list of instruments to properly instrument out the real interest rate.

19. The instruments are quasi-differenced by taking the difference between the current value of the instrument and the lagged actual value of the instrumental variable (the latter, of course, multiplied by the serial correlation estimate). See Fair (1972), who points out that in generating instruments, the exogenous variables should include lagged values of all endogenous variables (including the dependent variable), and current and lagged values of predetermined variables.

DATA APPENDIX

Sources

Bank of Japan Statistical Monthly (BOJSM);
Bank of Japan Statistical Annual, National Income Statistics (BOJSANI);
Citibase (CB);
Data Resources, Japan Database (DRI);
International Financial Statistics (IFS)

Japan

Real GNP: billions of 1980 yen, BOJSM

Potential GNP: Calculated from antilog of fitted values of an OLS regression of the log of real GNP on constant, trend, and trend-squared terms estimated over periods 1965:2–1973:4 and 1974:1–1986:4

Price level: implicit GNP deflator, 1980 = 100, BOJSM

Long-term interest rate: central government bond rate, percent per year, end of period, DRI

Exchange rate: yen per dollar, period average, IFS line 158rf

Money supply: M1 + Quasi-money + CDs, billions of yen, end of period, IFS lines 34 + 35 + 36aa

The following series are in billions of yen and were seasonally adjusted using the SAS X-11 procedure:

Current account balance = net lending to rest of world − capital transfers from rest of world

Net lending to rest of world: BOJSANI, Table 6, line 3.3
Capital transfers from rest of world: BOJSANI, Table 6, line 3.6

Government savings = government receipts − government expenditures

Government receipts: BOJSANI, general government section

Government expenditures = government receipts − government savings + general government gross fixed capital formation − general government capital consumption

Government savings: BOJSANI, general government section; also DRI series SAVEGNS

General government gross fixed capital formation: BOJSANI, gross national expenditure section—Table 1, line 3.1.b.c; also DRI series GIFIXONS

General government capital consumption = total gross fixed capital consumption − private capital consumption

Total gross fixed capital consumption: BOJSANI (also DRI series CCANS)

Private capital consumption available annually from DRI series CCAP. Quarterly series computed assuming percentage of total to private capital consumption is constant over the year.

Net private savings = private savings − private investment

Private savings = total savings − general government savings + statistical discrepancy

Total savings: BOJSANI, Table 6
General government savings: see above
Statistical discrepancy: BOJSANI, Table 6

Private investment = change in inventories + private gross fixed capital formation − private capital consumption

Change in inventories: BOJSANI, Table 6, line 3.2
Private gross fixed capital formation: BOJSANI, Table 1, line 3.1.a
Private capital consumption: see above

United States

Real GNP: billions of 1982 dollars, CB

Potential GNP: Calculated from antilog of fitted values of an OLS regression of the log of real GNP on constant, trend, and trend-squared terms over period 1965:2–1986:4.

Long-term interest rate: 20 year Treasury bond rates, monthly average, percent per annum, CB series FYGT20

Money supply: M2, monthly average, billions of dollars, CB

Price level: GNP implicit deflator, CB. (Figures for 1988 used in calculating ex post real interest rate from FRBSF staff forecasts.)

The following series are in billions of dollars, at seasonally adjusted annual rates:

Net private savings = gross private savings − gross private domestic investment

Gross private savings: CB series GPS
Gross private domestic investment: CB series GPI

Government savings = government receipts − government expenditures

Total government receipts: CB series GGFR + GGSR
Total government expenditures: CB series GGFEX + GGSEX

REFERENCES

Bergsten, C. Fred and William Cline. *The United States-Japan Economic Problem,* Washington, D.C., Institute for International Economics, No. 13, October 1985.

Bergstrand, Jeffrey. "United States-Japanese Trade: Predictions Using Selected Economic Models," *New England Economic Review,* Federal Reserve Bank of Boston, May/June 1986.

Fair, Ray. "The Estimation of Simultaneous Models with Lagged Endogenous Variables and First Order Serially Correlated Errors," *Econometrica,* Vol. 38, May 1970, pp. 507-516.

Frankel, Jeffrey. *The Yen-Dollar Agreement: Liberalizing Japanese Capital Markets,* Washington, D.C.: Institute for International Economics, 1984.

Haynes, Stephen, Michael Hutchison, and Raymond Mikesell. "Japanese Financial Policies and the U.S. Trade Deficit," *Essays in International Finance,* No. 162, Princeton University, International Finance Section, 1986.

Hutchison, Michael and Charles Pigott. "Budget Deficits, Exchange Rates, and the Current Account: Theory and U.S. Evidence," *Economic Review,* Federal Reserve Bank of San Francisco, Fall 1984.

Islam, Shafiqul. "Does Japan Save Too Much?" Washington, D.C.: Institute for International Economics, June 1986.

Kasman, Bruce. "Japan's Growth Performance over the Last Decade," *Quarterly Review,* Federal Reserve Bank of New York, Summer 1987.

Knight, Malcolm and Paul Masson. "Fiscal Policies, Net Saving and Real Exchange Rates: The United States, the Federal Republic of Germany, and Japan," in J. Frankel (ed.), *International Aspects of Fiscal Policies,* Chicago: University of Chicago Press, 1988.

Sakamoto, Tomohiko. "Japan-U.S. Bilateral Trade," *Economic Review,* Federal Reserve Bank of San Francisco, Spring 1988.

Turner, P. "Savings, Investment, and the Current Account: An Empirical Study of Seven Major Countries, 1965-84," *Bank of Japan Monetary and Economic Studies,* October 1986.

Ueda, Kazuo. "Investment Savings Balance and the Japanese Current Account Surplus," Japan Center for International Finance, Policy Study Series, No. 7, May 1987.