Is Japan's Saving Rate High?

Fumio Hayashi*
Visiting Scholar
Institute for Empirical Macroeconomics
and Professor of Economics
University of Pennsylvania

Japan's high saving rate continues to attract much attention—and anxiety—particularly in the United States. It seems as if the Japanese, being obsessed with saving, continue to snap up wealth worldwide. If this trend were to continue, some say the Japanese would soon own most of the world.

Three years ago I had a chance to examine the issue of Japan's high saving rate (see Hayashi 1986). I found that a substantial part—but not all—of the apparent saving rate gap between Japan and the United States is a statistical illusion attributable to differences in the way the two countries compile their national income accounts. Although no single theory could fully explain the remaining real difference in the saving rates, I felt that, on balance, the most promising explanation lay in the neoclassical view. This view associates a low level of initial wealth (Japan just after World War II) with a subsequent rapid accumulation of wealth (Japan in the 1970s and 1980s). Based on this neoclassical view, I conjectured that once Japan's wealth approached the level of wealth in the United States, then the Japanese saving rate would gradually converge to the U.S. rate.

Three recent developments have prompted me to reexamine the issue of Japan's high saving rate. First, events in the last few years do not seem to support my conjecture: although the Japanese personal and private saving rates declined a bit, the national saving rate actually rose. Second, in 1986 the U.S. national income and product accounts underwent a benchmark revision (not incorporated in Hayashi 1986) that raised the U.S. saving rate by as much as 2 percentage points in recent years. Third, early in 1989 the Japanese government published the long-awaited estimate of national income accounts from 1955 to 1969 (Japan 1989b), thus enabling me to extend the initial year of my analysis from 1965 back to 1955.

With these newly available data, I set about constructing the updated saving and wealth time series that are comparable between the two countries. (See Hayashi 1986 for details of the procedure used to adjust the data for comparability.) Once constructed, the new series revealed four noteworthy facts:

- The new data confirm even more forcefully than the previous data that most of the apparent gap between the Japanese and U.S. saving rates is a statistical illusion.

- Japan's postwar national saving rate shows a pronounced hump shape, peaking around 1970 and then steadily declining to the stationary U.S. rate until about 1980.

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- In the early 1980s, the two national saving rates diverge, with the two rates mirroring each other—the Japanese rate rising and the U.S. rate declining.

- After an initial decline in the late 1950s and early 1960s, Japan's wealth-to-income ratio (with land excluded) catches up with the U.S. ratio in 1987.

Unfortunately, not all of these facts are consistent with the neoclassical view on which I based my conjecture. The hump-shaped Japanese saving rate doesn't match the path predicted by a standard neoclassical model (see the paper by Christiano in this issue). The divergence between the two countries' saving rates in the 1980s doesn't support my conjecture that the two rates would gradually converge. And the U-shaped decline and rise in Japan's wealth-to-income ratio is also inconsistent with the neoclassical view that wealth starts low and rises rapidly.

Are these discrepancies between the facts and the neoclassical perspective irreconcilable? Not necessarily. I conclude by discussing how they might be reconciled.

Adjusting for Differences in Accounts

It is somewhat surprising to realize that even for two highly developed countries like Japan and the United States, the national income statistics are not directly comparable. Even an economic measure as basic as gross national product (GNP) does not translate directly between the two countries. As a result, simply taking the official statistics at face value and ignoring the differences in accounting practices could lead to conclusions that are quite misleading.

Two of the most important differences in the way Japan and the United States compile their national income statistics involve how capital is depreciated and how government expenditures are categorized.

First, in the Japanese national income accounts, reported depreciation is valued at historical costs rather than at replacement costs. So, at times of high inflation, historical-cost depreciation understates the loss in the value of assets due to depreciation. The difference between depreciation at replacement costs and depreciation at historical costs is called a *capital consumption adjustment.* The U.S. national income accounts incorporate a capital consumption adjustment, but the Japanese national income accounts do not. As a result, Japanese saving is overstated by the amount of the capital consumption adjustment because

(Net) Saving
= Gross Saving
− Depreciation at Replacement Costs
= (Gross Saving
− Depreciation at Historical Costs)
− Capital Consumption Adjustment.

It is possible, however, to infer Japan's implicit capital consumption adjustment from its national accounts, which include a section on balance sheets by sector at market prices. (See Hayashi 1986 for the procedure for using this information to estimate the capital consumption adjustment and hence depreciation at replacement costs.) Briefly, I use the following procedure:

Change in Market Value of Wealth
= Gross Saving
− Depreciation at Replacement Costs
+ Capital Gains
− Residual Losses.

Gross saving and capital gains can be calculated from the Japanese national accounts. I measure replacement-cost depreciation as gross saving plus capital gains minus the change in wealth, so that my measure includes residual losses.[1]

The second important difference in the two countries' accounting practices is that the U.S. national income accounts fail to recognize government capital formation, whereas the Japanese accounts do. In other words, all U.S. government expenditures are classified as consumption, so government saving is simply the net increase in financial assets (that is, budget surpluses). This difference implies that even GNP is not directly comparable between the United States and Japan because Japanese GNP includes service flows from the government's tangible assets.

To make these statistics comparable, I had a choice: I could either add government capital formation to government saving for the United States or subtract government capital formation from government saving for Japan. I chose to subtract from Japan's government saving because it is necessarily arbitrary to divide U.S. government expenditures between the consumption

[1]There is no way to separate out the residual losses component from my estimate of depreciation using the Japanese national accounts. Residual losses include things like loss of wealth due to natural disasters. Such losses should be negligible for normal periods.

and investment components. This adjustment implies a big reduction in government saving for Japan, where capital formation by the government has been about 5.7 percent of GNP between 1970 and 1987.[2] The adjustment also affects Japan's GNP and net national product (NNP) because the service flow from government capital has to be removed. For instance, reported GNP in 1987 was 345 trillion yen, but my adjustment lowers that estimate to 332 trillion yen.

Observing Real Differences in Saving

The data used in this study cover the years 1955–1987 and are taken from the following sources: the *Economic Report of the President* (U.S. President 1989), the *Annual Report on National Accounts, 1989* (Japan 1989a), and the *Report on National Accounts from 1955 to 1969* (Japan 1989b). To make valid comparisons between Japanese and U.S. saving rates, I adjusted the Japanese data, taking into account the differences just discussed.

To emphasize the impact of the data adjustment, Chart 1 shows the unadjusted and adjusted versions of the Japanese national saving rate versus the U.S. national saving rate. The difference between the adjusted and unadjusted Japanese rates (shaded) is the result of accounting for the capital consumption adjustment and government capital formation. To people unaware of the differences in national income accounting, the discrepancy between Japan's unadjusted saving rate and the U.S. rate appears quite substantial—even ominous. But by now it should be clear that most of the apparent discrepancy is due to accounting differences between the two countries.

In Chart 1, the adjusted data show that Japan's national saving rate, after its big surge around 1970, converges to the stationary U.S. saving rate toward the end of the 1970s. In the 1980s, however, the two saving rates diverge, with Japan's rate rising and the U.S. rate declining.

To gain a better understanding of why Japan's national saving rate moved as it did, I divide it into its two components: private and government saving rates. The adjusted rates for private saving are plotted in Chart 2. The chart shows that the U.S. private saving rate has been remarkably stable until about 1985. In contrast, the Japanese private saving rate has been relatively volatile, exhibiting a pronounced peak around 1970 before tapering off in subsequent years.

Chart 2 shows a notable feature of Japan's private saving—its low rate in the mid-1950s, particularly in 1956 and 1957. This feature is puzzling because the

Charts 1 and 2

Japanese and U.S. Saving Rates, 1955–1987

Chart 1 National Saving

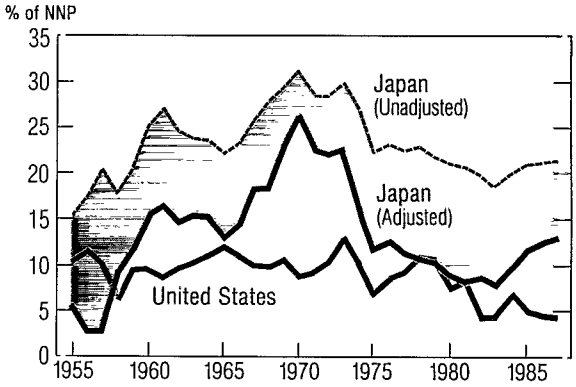
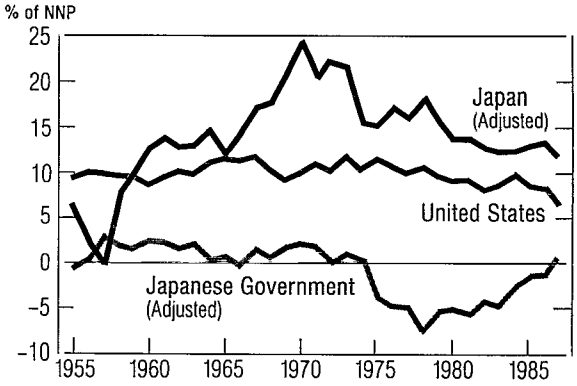


Chart 2 Private Saving



Note: For a description of the procedure used to adjust the saving rates for comparability, see Hayashi 1986.

Sources of basic data: Japan 1989a,b and U.S. President 1989

[2]This figure of 5.7 percent, which is taken from the Japanese national accounts, is overstated for two reasons. First, except for buildings, depreciation for government assets are zero (or, more precisely, depreciation is *one-hoss-shay* and the scrap value is placed in the reconciliation accounts). Second, for buildings, no capital consumption adjustment is made. If the overstatement is adjusted, then the ratio of government capital formation to GNP for 1970–87 falls to 3.6 percent.

gross private saving rate (the ratio of gross private saving to NNP) for those two years is higher than in other years in the late 1950s. But the (net) saving for those two years was low because depreciation was extraordinarily large (perhaps due to the residual losses component of my estimate of depreciation). For example, the ratio of depreciation to NNP in 1957 was 32 percent—large enough to bring net private saving down to zero. I suspect, however, that the data reported for the early years of the sample should not be considered totally reliable. (I return to this issue of reliability later on.)

Chart 2 also shows the Japanese government's adjusted saving rate (the ratio of budget surpluses to NNP). In the mid-1970s, the Japanese government started running budget deficits that, as a fraction of NNP, were larger than the U.S. budget deficits of the early 1980s. According to a principle known as the *Ricardian equivalence theorem,* deficits signal future tax increases, forcing households to increase their saving for future tax payments; therefore, deficits should be matched yen-for-yen by increased private saving. But the Japanese experience of the mid-1970s lends only partial support for Ricardian equivalence. Although private saving started to increase then, the increase was far from one-for-one with the deficits. That Japanese private saving failed to offset budget deficits in the mid-1970s can be seen by referring to Chart 1, which shows a continued decline in Japan's national saving rate.

Proponents of Ricardian equivalence could argue that the declining trend in Japan's national saving rate might have occurred even if the government had chosen *not* to run deficits at that time. However, the same argument would have trouble explaining the behavior of Japan's national saving rate in the 1980s, when the declining trend in national saving was reversed in 1983, precisely when budget deficits started to improve rapidly. Therefore, one explanation of the divergence of the two national saving rates in the 1980s is the difference in fiscal policies between the two countries.

Examining Differences in Wealth

The saving rates examined so far do not account for the other component of wealth changes: capital gains. If the reason for saving is to increase wealth, it doesn't matter whether a wealth increase is due to acquisition of assets or to capital gains. This suggests that I should replace saving by saving plus capital gains in the previous discussion. Unfortunately, capital gains are very volatile, so that including them would obscure basic trends in wealth accumulation. However, capital gains tend to average out, so the level of wealth should reflect these basic trends.

Chart 3 plots the ratio of national wealth (at the beginning of each year) to income (GNP) for the United States and Japan. National wealth consists of tangible assets (inventories, depreciable assets, and land) and net claims on foreigners. To be consistent with my definition of saving, I exclude government tangible assets from national wealth. The data on wealth for the United States are taken from the *Balance Sheets for the U.S. Economy, 1949–88,* compiled by the Board of Governors of the Federal Reserve System (FR Board 1989). The Japanese wealth data are taken from the balance sheets section in the annual reports on national accounts (Japan 1989a,b). To make the wealth series for the two countries comparable as well as consistent with the saving series, I also exclude consumer durables from wealth.

For a growing economy in a steady state, the wealth-to-income ratio should be constant. If the economy is on a path converging to a steady state from an initial low level of wealth, the ratio should be increasing. As seen in Chart 3, the U.S. wealth-to-income ratio is fairly constant—a fact consistent with the presumption that the U.S. economy has been in a steady state. The Japanese wealth-to-income ratio has been rising except in the early years of the sample period, but since then its level has far exceeded the U.S. level. This rise reflects the increasing share of land as a component of Japanese wealth. For 1987, about two-thirds of Japan's wealth was land, whereas the corresponding share for the United States was one-fourth.[3]

Land, however, is not a reproducible asset. Since its stock is fixed, land cannot be increased at the national level. Ando (1986) argues that for the purpose of international comparison, a better measure of wealth might be wealth exclusive of land. This measure of wealth can, in fact, be justified theoretically, since nonreproducible assets can be incorporated in a standard neoclassical growth model.

In a standard growth model, the nation's objective is to maximize the discounted sum of utility flows

$$(1) \qquad \sum_{t=0}^{\infty} \beta^t u(c_t)$$

subject to the capital accumulation constraint

[3]According to the Japanese national accounts, the value of Japanese land (excluding government land) in 1987 was 1,554 trillion yen for Japan and $3.4 trillion for the United States. Thus, at the current exchange rate, private land is worth three times more in Japan than it is in the United States.

Charts 3 and 4

The Wealth-to-Income Ratios for Japan and the United States, 1955–1987

Chart 3 With Land

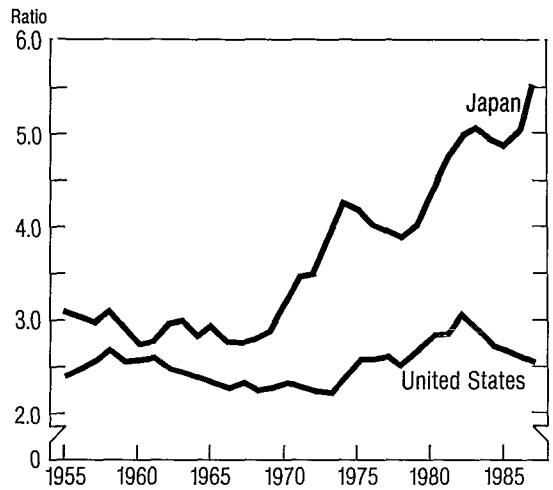
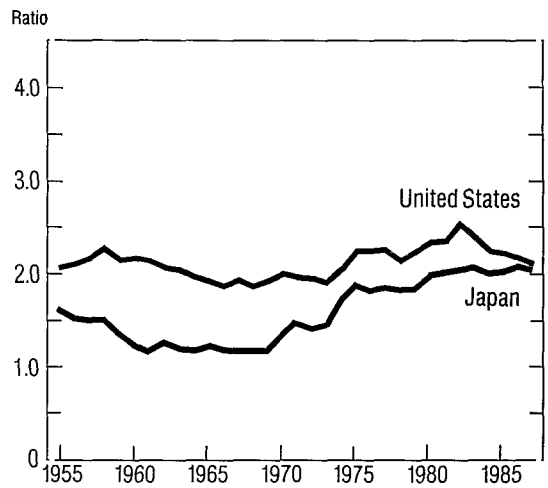


Chart 4 Without Land



Note: Consumer durables and government tangible assets are excluded from the definition of wealth.
Sources of basic data: FR Board 1989, Japan 1989a,b

$$k_{t+1} = f(k_t) - c_t - \delta k_t$$

where

β = a discount factor
c_t = consumption at time t
$u(c_t)$ = utility of consumption
k_t = the stock of reproducible assets at time t
$f(k_t)$ = output as a function of capital
δ = the physical depreciation rate.

As is well known, the wealth-to-income ratio $k_t/f(k_t)$ converges monotonically to a steady-state value in the neoclassical growth model. Land could enter the model in one of two ways: through the production function $f(\cdot)$ or through the objective function $u(\cdot)$. For the objective function case, assume that the utility from land is additive, so the nation's objective function is

$$(2) \qquad \sum_{t=0}^{\infty} \beta^t [u(c_t) + v(l)]$$

where

l = the stock of land
$v(l)$ = utility of land.

Since land is nonreproducible, for the nation as a whole there is no accumulation equation for land. Furthermore, since l is given, the optimal plan for consumption and accumulation of reproducible wealth, $\{c_t, k_t\}$ for $t = 0,1,2,\ldots$, for model (1) is also optimal for model (2). Thus, the standard neoclassical growth model is applicable to an economy with land, provided that the land component is excluded from wealth *and* output measures.

The empirical counterpart of k_t is the nation's wealth exclusive of nonreproducible assets (land). This measure is the sum of inventories, depreciable assets, and net claims on foreigners. To obtain a corresponding output measure, I must subtract from GNP the service flows from land. The U.S. national income accounts, however, do not contain a direct measure of these service

flows. So instead, as a first approximation, I use the housing component (including imputed rent from owner-occupied housing) of personal consumption expenditures.[4] I subtract this component from GNP to obtain an empirical counterpart of output $f(k_t)$.

The wealth-to-income ratios thus adjusted for the two countries are displayed in Chart 4. The U.S. ratio is virtually unaffected by the land adjustment. (Note that the recent U.S. wealth-to-income ratio is not low by historical standards.) But, as expected, adjusting the data to remove land changes the picture for Japan drastically from the one shown in Chart 3. Now it appears that the Japanese wealth-to-income ratio has been converging to the U.S. ratio *from below*. This is precisely the prediction of the neoclassical growth model for an economy starting from a low level of wealth. Despite the increase in the Japanese national saving rate in recent years, Japan's wealth-to-income ratio has remained stable. This is mainly due to the large nominal capital loss on net foreign claims because of the recent depreciation of the dollar against the yen. That loss is about 5 percent of NNP for 1986 and 3.5 percent of NNP for 1987.

The early years of the sample period show a *decline* in Japan's wealth-to-income ratio, but this decline is inconsistent with the neoclassical view. The decline, however, seems to be due to large depreciation on depreciable assets, which form the bulk of national wealth. As mentioned earlier, the change in depreciable wealth can be broken down into three components: gross saving plus capital gains less my measure of depreciation, which includes replacement-cost depreciation and residual losses. It is this third component that is unusually large for the early years of the sample.

The size of this component certainly casts serious doubt on my estimate of depreciation. To pursue this issue a bit further, I calculate the *implicit* depreciation rate—the ratio of depreciation to the value of national depreciable assets at the beginning of each year. If the physical depreciation rate is constant for each asset type and if the composition of depreciable assets doesn't change over time, then the implicit depreciation rate should be constant. From 1970 to 1987, the calculated implicit rate for Japan is a very smooth declining series with a mean of about 12 percent. As I argue in Hayashi 1986, the decline reflects the shift in the composition of assets from short- to long-lived assets, and the residual losses component of my estimate of depreciation is indeed negligible. However, from 1955 to 1969, the implicit depreciation rate is much more volatile, with a much higher mean of 20 percent. The residual losses component of depreciation cannot explain the high implicit depreciation rate because, by definition, it should average out to zero.

Although some part of the high depreciation rate must be real (due to the lower quality of physical assets acquired during the aftermath of World War II), I suspect that the remaining part is a statistical illusion. I think it likely that Japan's initial wealth in 1955 is grossly overestimated. The wealth series in the Japanese national accounts is based on the government's separate surveys on the stock of wealth for some benchmark years. It is possible that the 1955 wealth estimate is so large that assets must be depreciated rapidly to be consistent with subsequent benchmark wealth estimates.

Reconciling Differences Between Theory and Facts

This paper has examined saving and wealth accumulation over the last three decades for the United States and Japan. The United States can be characterized as an economy in a steady state whose saving rate is just enough to maintain a constant level of the wealth-to-income ratio. Only very recently has Japan reached the same stage of economic growth. The wealth-to-income ratio, adjusted to exclude land, is now roughly the same for the two countries—at slightly above 2, or at about the historical average of the U.S. ratio. If we subscribe to the standard neoclassical growth model, this ratio is the equilibrium level of the wealth-to-income ratio for both countries.

I have observed that Japan's national saving rate exhibits a pronounced hump shape, peaking around 1970 and then steadily declining toward the U.S. rate until about 1980. The paper by Christiano (in this issue) demonstrates that it may be plausible to reconcile this pattern with the neoclassical view.

Regarding the mirror-image divergence of the two countries' national saving rates in the 1980s, two interpretations are possible. The neoclassical view is that the current U.S. wealth-to-income ratio, which is considerably lower than it was in the late 1970s due to the decreased national saving rate, is the equilibrium rate. In contrast, Japan's national saving rate *had to increase* over the last few years to maintain the Japanese

[4]My adjustment using the housing component of personal consumption expenditures is slightly inconsistent because the housing component includes imputed and cash rent from housing structures. However, a proper adjustment would make very little difference for the wealth-to-income ratio because the impact of the adjustment mainly occurs in the numerator.

wealth-to-income ratio in the face of the large capital losses on net foreign claims. According to this neoclassical view, the saving rate gap between the two countries should disappear in the next few years.

The second interpretation is based on the contrasting behavior of government saving in the two countries. If the private sector fails to offset changes in government saving, a reduction in budget deficits translates into an increase in national saving. Thus, the saving rate gap is a reflection of the difference in fiscal policy between the two countries. If this second view is correct, a substantial reduction in the U.S. budget deficit is needed to shore up the slumping U.S. national saving rate.

Perhaps the biggest embarrassment to the neoclassical view is the U-shaped wealth-to-income ratio for Japan, rather than a ratio that rises steadily from an initial low level. However, as I stressed earlier, the declining part of the U-shape might well be due to measurement error, in which case the neoclassical view may still prevail.

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