Personal Saving Behavior and Real Economic Activity

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Many analysts view personal saving behavior, summarized by statistics such as the personal saving rate or household debt acquisition, as a key determinant of real economic activity. Some blame the recent sluggishness of output and employment growth on low personal saving in recent years.

> The low rate of personal saving leaves consumers unprepared for their customary role of pulling the economy out of recession, according to Lacy Hunt, chief economist for the Hong Kong Bank Group in the United States.[1]

> The biggest problem in America's economy:. is debt. It is not so much corporate debt,:. but consumer debt:.. [I]ndividuals are in no position to spend the economy out of recession:. no room to raise borrowing, no savings to run down.[2]

> The past three years have not been a normal postwar recession, but a depression:.. [T]he current episode of strength will soon peter out in a triple dip, followed by a deeper stage of depression:.. Debt has grown too large to be sustained out of cash flow. As soon as the balance sheet is depleted, a deeper crisis of asset liquidation will catch the world by surprise.[3]

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[1] *American Banker* 1992, p. 11.

[2] *The Economist* 1992, pp. 13–14.

[3] Davidson 1993, p. A15. While the author is also looking at saving by other sectors in the United States as well as saving in other leading economies, the saving behavior of U.S. households plays an important role in his analysis.

Others take a longer-term view and see low personal saving lowering capital formation, thereby leading to lower growth in real output, productivity, and future standards of living.

> Mr. Hunt said savings as a percentage of disposable income are lower than at the end of any of the five previous recessions. This will have adverse long-term ramifications for investment in plant and equipment and for U.S. competitiveness in world markets:.. With the U.S. saving rate consistently less than one-half those in Japan and Germany, "it would appear that the nation is ill-prepared:. to compete effectively."[4]

> The United States has long had one of the lowest saving rates in the world:.. The low rate of saving means that the United States has a lower level of income and possibly a substantially lower rate of income growth than would otherwise be possible.[5]

> [L]ow national saving is the most serious problem facing the U.S. economy. Low saving accounted for:. the slow growth in standards of living that continued throughout the 1980s:.. [T]he low saving rate is increasingly the result of insufficient personal saving by U.S. households.[6]

In contrast to these views, this paper argues that personal saving data alone reveal little about the current or future state of the economy. Consider first the assertion that low saving, as it is conventionally measured, is to blame for the recent sluggishness of real economic activity. Most economists would agree that a proposition is valid if (1) it accords with a generally accepted, internally consistent theoretical framework, (2) measurements implied by the theory are consistent with its predictions, and (3) alternative theories are not consistent with some of the measurements. The assertion that recent economic sluggishness is tied to low saving is questionable on several grounds. Proponents of that view have failed to present a well-articulated theory; the view is not consistent with data on household wealth; and the basic data on personal saving rates can be explained in a way that does not imply a linkage of low saving rates and recent economic sluggishness.

Next, the assertion that current low saving will result in lower long-term growth does follow from an influential theoretical framework, unlike the asserted linkage between personal saving and current economic activity. That long-run relation, however, is more complex than suggested by simple theory. Determining the adequacy of the nation's prospects for real growth will require much more data than simple saving rates.

A by-product of this inquiry is an exposition and explanation of several statistics that help describe the saving behavior of households. The most commonly cited statistic is not consistent with standard consumer theory, and may

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[4] *American Banker* 1992, p. 11.

[5] Feldstein 1989. While the author is referring to national saving, household saving is an important part of his analysis.

[6] Summers 1990, p. 153.

also be subject to substantial measurement error. All told, one should not view household saving or debt rates as conclusive indicators of real economic vitality; at best they may suggest that a look at more relevant data is in order.

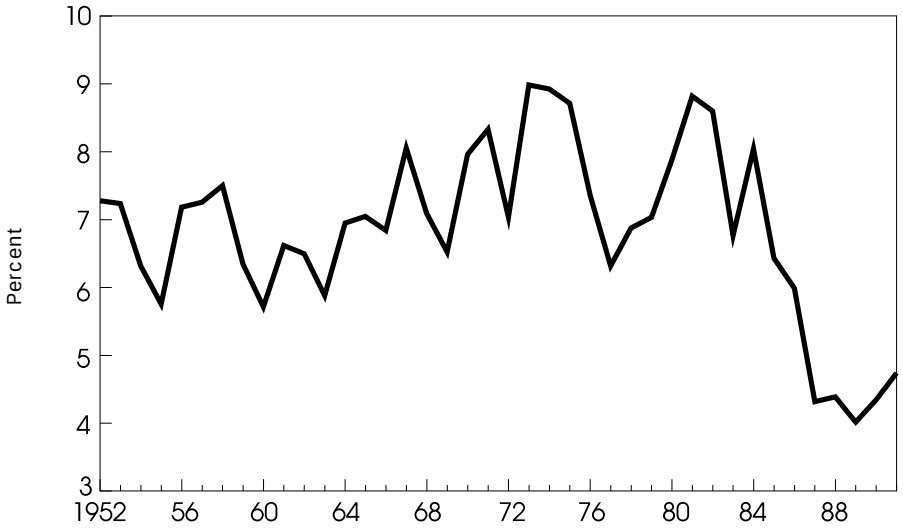
1. WEALTH AND SAVING

This section tackles the assertion that recent economic sluggishness is due to recent rates of household saving and debt acquisition. The first step is to question the relevance of the most widely cited statistic, which was not derived from the most widely used consumer theory. A measure that is more relevant to consumer spending is then discussed.

Measuring Saving

Analysts who view recent personal saving with alarm often focus on a particular statistic published in the National Income and Product Accounts (NIPAs). That statistic, which is often referred to as the *saving rate*, is simply the ratio of saving to disposable personal income. As shown in Figure 1, it declined from 9 percent to 4 percent in the 1980s and remains well below levels of the 1950s,1960s, and 1970s. To understand the significance of that decline, note first that personal saving is defined as unspent income. The definition suggests the indirect approach actually used to estimate saving, which is to subtract estimated

Figure 1 Personal Saving Rate



Note: Ratio of personal savings to disposable personal income.
Source: National Income and Product Accounts

outlays (mostly consumer spending for goods and services) from estimated income. Saving, however, is much smaller than either income or spending; therefore any error in estimating either item will cause a much larger error in estimating saving. For example, in 1991 personal income was $4.8 trillion and personal saving was $0.2 trillion; thus a 1 percent error in estimating personal income would result in a 24 percent error in estimating personal saving. Since neither income nor spending is measured precisely, personal saving is probably estimated with a large error. That fact alone should make any user of saving data especially cautious.[7]

Even if NIPA income and consumption were both measured precisely, one might question the relevance of the particular definitions employed. Two examples illustrate this point.

(1) NIPA income is defined as income from current production. By definition asset revaluations are not part of NIPA income. A country could therefore boost its NIPA income by depleting its exhaustible mineral reserves without having to account for the reduced land values that would result. Similarly, NIPA personal income is not affected when the market value of assets owned by individuals changes. Accordingly, the bull market in residential real estate in the 1970s and bull markets in stocks and bonds in the 1980s did not directly affect NIPA measures of income and saving. As will be discussed below, asset appreciation, whether or not officially measured, can substitute for saving in that both provide the means for future consumption.

(2) Another definitional problem is dividing private spending between consumption and investment. NIPA investment is defined as the purchase of physical assets. If a person acquires productive capabilities through additional schooling, any payments for tuition, textbooks, and related items are defined as consumption. Many economists, however, see a strong analogy between *physical capital*, the tangible assets that can be used for future production, and *human capital*, the skills and abilities that people can use for future production. Since future production can be boosted by either physical or human capital formation, and since the purchase of either human or physical capital involves a trade-off of consumption today for future productive capacity, it is somewhat arbitrary to label spending for one as investment while labeling spending for the other as consumption.[8]

[7] There is even more reason to be suspicious of early estimates of saving rates, which are based on incomplete data. Months or even years after the first estimates, revised values based on more complete information can substantially change the reported saving rates. At times the first reports have had significant bias. For example, from 1980 to 1987 initial releases underestimated saving rates by an average of 2 full percentage points (200 basis points). It is certainly conceivable that current reports of low saving will be revised upward at some future date.

[8] Estimates of the size of the stock of human capital suggest it is no minor matter. Jorgenson and Fraumeni (1989), for example, estimated the value of the stock of human capital to be $194 trillion in 1984, versus $16 trillion for tangible physical capital.

Two Nobel Laureates, Sir John Hicks and Milton Friedman, have separately noted that the NIPA definition of income (income from current production) was not derived from mainstream economic theory. "[A]ny one who seeks to make a statistical calculation of social income is confronted with a dilemma. The income he can calculate is not the true income he seeks; the income he seeks cannot be calculated."[9] "I do not believe that [terms such as Income and Saving] are suitable tools for any analysis which aims at logical precision."[10] "The designation of current receipts as 'income' in statistical studies is an expedient enforced by limitations of data."[11]

A concern of both Hicks and Friedman was that while national income accountants were developing a system that could display an abundance of consistent information *at any particular point in time,* the information would not be consistent over time.[12] Because the relative price of capital changes over time, the evolution of the market value of the capital stock cannot be measured by NIPA investment and depreciation. Accordingly, the time profile of personal wealth cannot be constructed from initial wealth holdings and NIPA saving data.

Wealth

One could approach the NIPAs with a fresh eye and reconstruct aggregates such as income and saving that are based more firmly on economic theory. Since that task is beyond the scope of a single paper, an interested reader is referred to a good book on the subject such as Eisner (1989). The more modest aim of this section is to suggest that aggregate wealth figures are relevant for analysis of consumer spending and real economic activity.[13]

In order to appreciate the linkage of consumption and wealth, consider the following problem. An individual wishes to consume at a constant rate over his lifetime. His salary, however, will rise over time but then cease during retirement. What constant level of consumption can be maintained?

The answer is illustrated in Figure 2, which illustrates a simple version of the *life-cycle* theory of consumption. Early in life when earnings are low he

[9] Hicks 1939, p. 179.

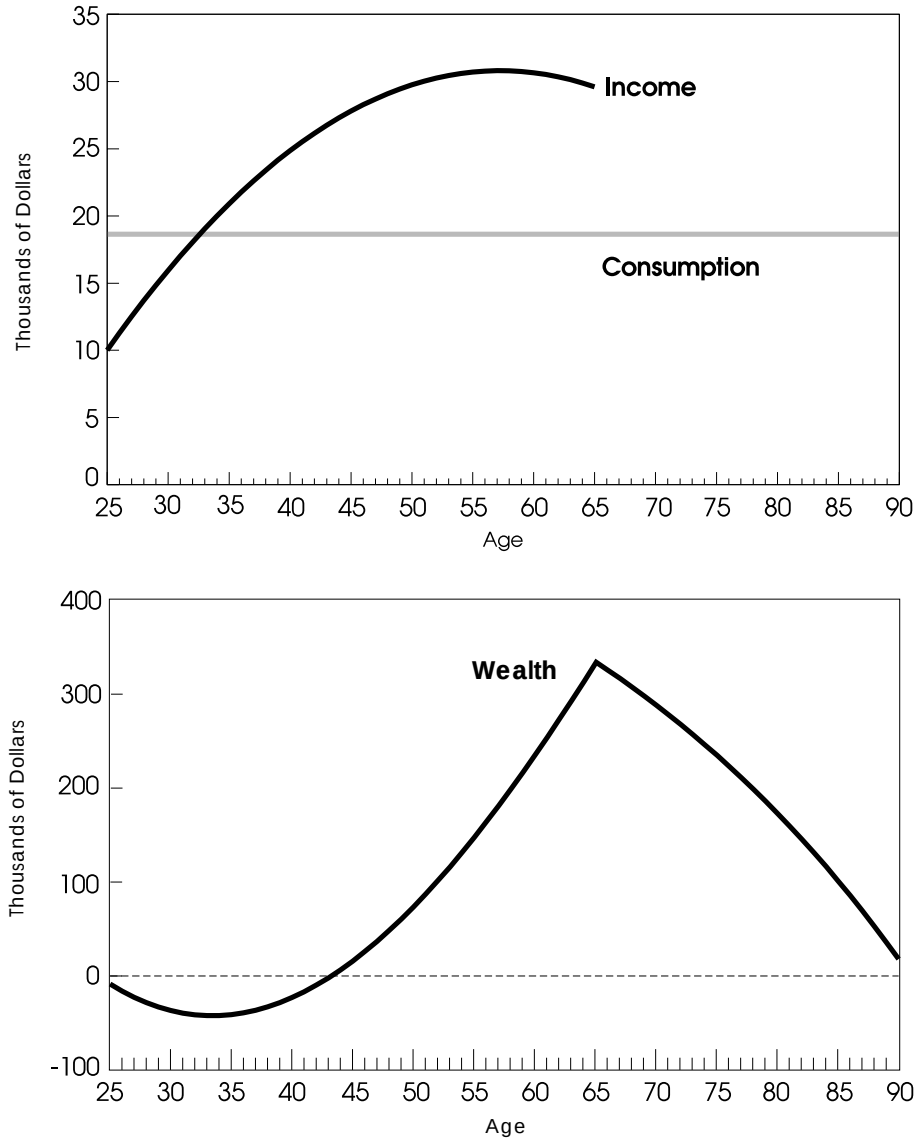
[10] Ibid., p. 171.

[11] Friedman 1957, p. 10.

[12] The choice of words is deliberate; consider "Since we have shown in the preceding chapters what determines the volume of employment *at any time,* it follows, if we are right, that our theory must be capable of explaining the phenomena of the Trade Cycle" (Keynes 1936). The textbook IS-LM presentation of Keynesian theory continues the point-in-time focus, thereby leading to shortcomings such as (1) investment not affecting the capital stock and (2) expectations taken as given rather than explained. In contrast, more recent dynamic equilibrium models such as those surveyed in Sargent (1987) or Barro (1989) explicitly model the evolution of the capital stock, expectations, and other variables over time. These newer models highlight the shortcomings of the NIPA definition of income, whereas models of the IS-LM type fit well with the NIPA definition.

[13] A more detailed look at saving, wealth, and economic activity is taken by Bradford (1990).

Figure 2 An Individual's Optimal Pattern of Wealth



Note: The horizontal axis represents time, divided between a working life of 40 years and retirement of 25 years. The vertical axis represents dollars of constant purchasing power. Given the path for income, consumption is the largest constant value consistent with a real interest rate of 3 percent and zero initial and final wealth, and the path for wealth is then calculated. The general shape of the income line, including the ratio of peak to initial income and the age of peak income, was taken from Graham and Webb (1979), and was calculated from cross-sectional estimates of lifetime earnings of men with college degrees.

would like to borrow to raise consumption; as earnings rise he would repay the accumulated debt and then build wealth that could be consumed during retirement.[14] While this simple example abstracts from uncertainty and other complexities of the real world, it serves to present the intuition of the basic economic theory of consumption.[15] A few key points should be noted. (1) Optimal saving varies substantially over an individual's life, swinging from negative to positive to negative. (2) A single observation of income and consumption describes just what the individual is doing at a single point in time. (3) An observation of wealth adds the additional information on the results of all past saving. (4) The ability to borrow and save allows the individual to enjoy a stable consumption stream despite a variable income stream. (5) The ability to borrow presupposes that someone else has already accumulated wealth and is willing to lend; in this example, an older individual with positive wealth might wish to lend to a younger one wishing to borrow.

To measure wealth one must track over time the prices and quantities of commodities that are not immediately consumed. For the whole economy, land, residential structures, and business plant and equipment are important items that can be productively employed for substantial lengths of time. Individuals, however, often do not own such assets directly but instead own financial assets—the paper claims to the physical assets or the income streams resulting from their use.

When people acquire physical and financial assets in order to smooth consumption over time, one can track their ability to pay for future consumption. A *balance sheet* for the household sector presents the assets and liabilities held by persons (rather than firms or government agencies).[16] One can look at the detailed information or use a simple summary statistic, such as households' net financial assets (or financial net worth), which is defined as financial assets such as cash, bank accounts, stocks, bonds, mutual fund shares and pension fund reserves, minus financial liabilities such as mortgages, revolving credit, and installment loans. This magnitude does measure the capacity of households to spend, whereas any period's saving rate does not.

Although the NIPAs do not contain comprehensive statements of wealth, estimates are contained in the Flow of Funds Accounts (FFAs) published by the

[14] An implication of this model is that saving should anticipate changes in labor income to the extent that such changes can be predicted. Campbell (1987) has found some evidence for this even with a NIPA saving measure.

[15] The extent to which a model of this type has been consistent with actual consumption behavior was examined by Fuhrer (1992), who found that while the model predicts long-run behavior well, it did not predict the downturn in auto sales in the 1990–91 recession.

[16] The NIPA definition of personal saving includes saving from families and single persons plus saving by unincorporated businesses, nonprofit institutions serving persons, and private welfare funds and private trust funds. Included under this definition are certain investment returns from private, but not public, pension funds. The reasoning underlying this definition of the household sector is discussed by Holloway (1989).

Table 1 Assets and Liabilities of Households, 1991
Billions of dollars

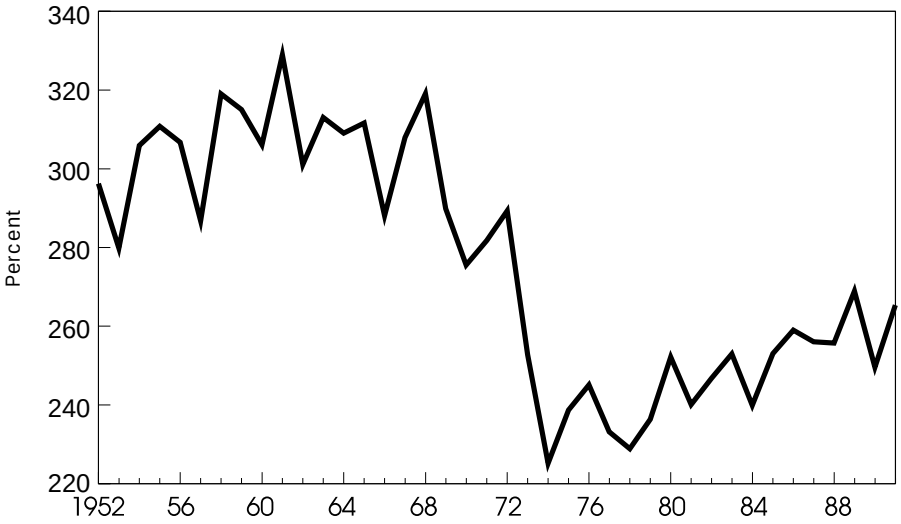
Assets	24,292		
Tangible		9,102	
Owner-occupied housing			3,712
Land			2,624
Consumer durables			2,099
Tangible assets of nonprofit institutions			677
Financial		15,190	
Deposits			3,376
Government securities			838
Bonds and other credit market instruments			1,156
Mutual fund shares			734
Corporate equity			2,334
Equity in noncorporate business			2,568
Pension fund reserves			3,473
Other			711
Liabilities	4,190		
Home mortgages			2,854
Installment consumer credit			744
Other			592
Net Worth	20,102		
Financial Net Worth		11,000	

Note: Data represent year-end values and are taken from the Federal Reserve Board's "Balance Sheets for the U.S. Economy 1960–91," (Release C.9) March 1992.

Board of Governors of the Federal Reserve System.[17] The FFAs contain detailed balance sheets for financial intermediaries, other businesses, households, and the federal government. A simplified balance sheet for the household sector is presented in Table 1 that includes major categories of assets and liabilities. A word of warning: many items on the household balance sheet are estimated as residuals, just as NIPA saving is a residual. Accordingly, measurement errors for many items can affect estimates of household net worth. Also, the FFAs take NIPA values as starting points for many estimates, and thus measurement errors in items such as income will be present in both sets of accounts. Moreover, some items in the FFAs are inherently difficult to estimate with precision. Also, while in principle each item should be measured at market value, in practice market values are not calculated for debt instruments such as mortgages and corporate, federal government, and municipal bonds. Corporate equity holdings, however, are presented at market value. For these reasons net worth is a statistic that is best used with caution.

[17] An introduction to the FFAs is given by Ritter (1974).

Figure 3 Financial Net Worth



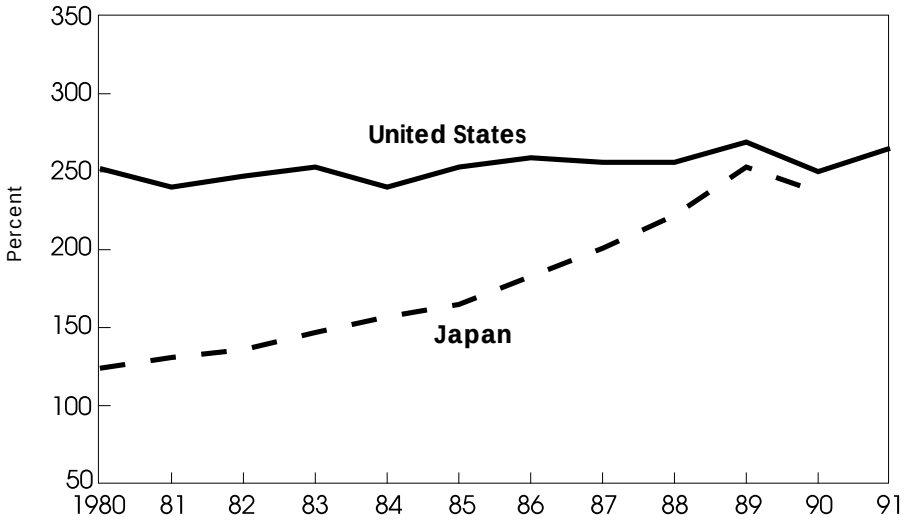
Note: Ratio of net financial assets, household sector (end-of-year) to disposable personal income (annual average).
Source: Flow of Funds Accounts and National Income and Product Accounts.

Since asset holdings grow over time due to real economic growth and inflation, it is useful to scale them by considering the ratio of net financial assets to disposable personal income.[18] As Figure 3 illustrates, the asset-income ratio has fluctuated between 2.2 and 3.3 times income over the past 40 years. The most dramatic change was the decline from 3.2 in 1968 to 2.25 in 1974. During the 1980s the ratio was reasonably stable, rising slightly over the decade. There is nothing in this figure to suggest that consumers have saved so little that

[18] Why not net assets, rather than the less comprehensive net financial assets? The two differ by the amount of real assets owned by households, that is, durable goods, land, and housing. Adequate treatment of the reliability of estimated market values of land and housing would require a good bit of additional discussion that would be tangential to this paper's topic. At a later date an article is planned for this *Quarterly* that will address land and housing values. One piece of evidence is that survey estimates of residential housing values often report much higher values than are given in the FFAs, with analysts such as Curtin, Juster, and Morgan (1989) judging the surveys to be more accurate.

For what they are worth, the FFA housing figures show a decline in household housing and land values of $160 billion in 1990, but with gains of $402 billion in 1989 and $397 billion in 1991. Other figures, such as constant quality price indexes for existing homes do not show a downward movement in 1990 or other years. Thus despite anecdotes of house prices falling these figures do not reveal an aggregate sustained fall in housing values that would affect the conclusion of this section that household wealth rose more rapidly than income over the 1980s and early 1990s.

Figure 4 Net Financial Wealth of Household Sector Ratio to Disposable Personal Income



they cannot now afford to purchase goods and services. If current saving looks low to some observers, that may simply reflect households having accumulated a level of wealth they consider satisfactory. That interpretation is consistent with the decline in the personal saving rate in the 1980s being accompanied by rising household wealth.

How does household wealth in the United States compare with similar statistics in foreign countries? Although the saving rate of U.S. households is below that rate in other countries, Figure 4 illustrates that U.S. households are wealthier. Households in countries holding less wealth often save more in order to accumulate wealth, as exemplified by Japan.

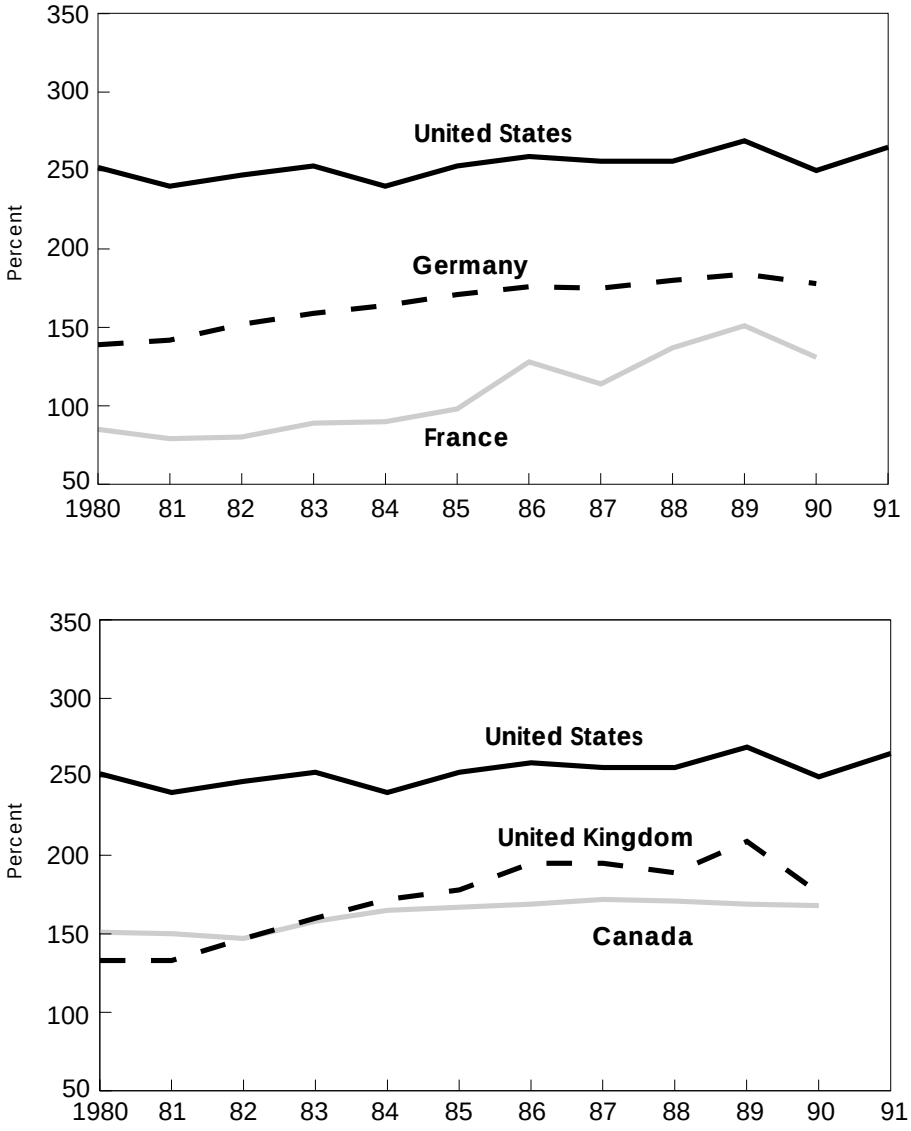
Possible Objections

One might acknowledge the potential usefulness of data on household wealth while raising objections to its current validity. This portion of the paper attempts to address some of the most important concerns.

Concentration of Wealth

Aggregate net wealth would not be a good measure for the majority of households if most wealth were held by relatively few households. While wealth

Figure 4 (continued)



Note: Ratio of net financial assets, household sector (end-of-year) to disposable personal income (annual average).

Source: United States, Flow of Funds Accounts and National Income and Product Accounts; other countries, *OECD Economic Outlook*, December 1991: Organisation for Economic Co-operation and Development, Paris, p. 21.

in the United States is more concentrated than income, it does not appear so concentrated as to render data on wealth irrelevant. The 1989 Survey of Consumer Finances[19] reported that families with incomes below $10,000 had a median net worth of $2,300. It is certainly likely that these families in the lowest quintile of the income distribution would be unable to draw on savings to finance additional consumption. Families in the next quintile, earning between $10,000 and $20,000, had a median net worth of over $27,000, and higher-income groups also had median net worth well over annual income. Another way of describing the survey data is that the median family of a subset of the population that accounts for 80 percent of household income and a greater percentage of aggregate consumption had accumulated a significant amount of wealth. The data therefore do not appear to support the view that wealth is too narrowly distributed to be a useful indicator of potential aggregate consumption.

Debt

Another objection addresses the role of debt. If people are highly indebted and many of their assets are illiquid, then the burden of debt repayment might restrict their consumption even if the value of their assets is relatively large. As Figure 5a indicates, household debt is indeed high, relative to the recent past; in 1991 it was almost equal to a full year's disposable personal income, whereas in the mid-1950s debt was less than half a year's income.[20] As the figure indicates, the debt-income ratio grew about 2 percentage points per year from 1952 to the mid-1960s, grew fairly slowly until the early 1980s, and has since grown by 3 percentage points per year. Interestingly, corporate debt shows somewhat similar behavior in Figure 5b, namely, an initial period of growth that was interrupted in the 1970s and resumed in the 1980s.[21] Is that simply a coincidence?

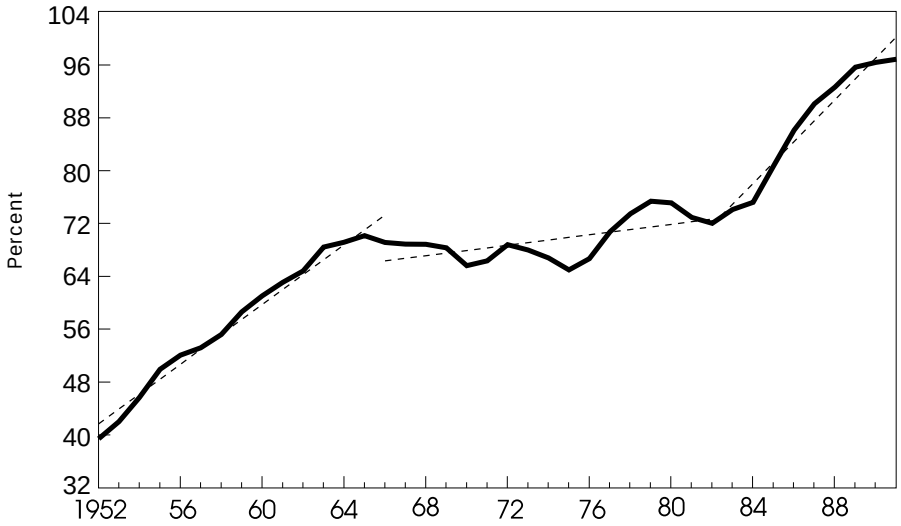
What follows is one possible explanation of the data. The behavior of debt, income, and wealth can be reconciled by noting that a revolution in financial intermediation has occurred over the past 40 years, as a few examples indicate. Credit cards serve two functions: allowing routine transactions to be made without currency and supplying widespread unsecured lines of credit. Mutual funds allow individuals, even those who have fairly small amounts to invest, to benefit from broadly diversified and professionally managed equity and bond portfolios. Home equity lines of credit allow easy, tax-advantaged access to equity in owner-occupied housing. Corporate lending has also been transformed, as many firms that would have borrowed from banks in the 1950s now have access to security markets. In short, the efficiency of financial intermediation

[19] Data are taken from Kennickell and Shack-Marquez (1992).

[20] This figure is similar to Figure 2 in Altig, Byrne, and Samolyk (1992).

[21] This figure is similar to Figure 1 in Paulus (1991).

Figure 5a Household Debt to Income Ratio

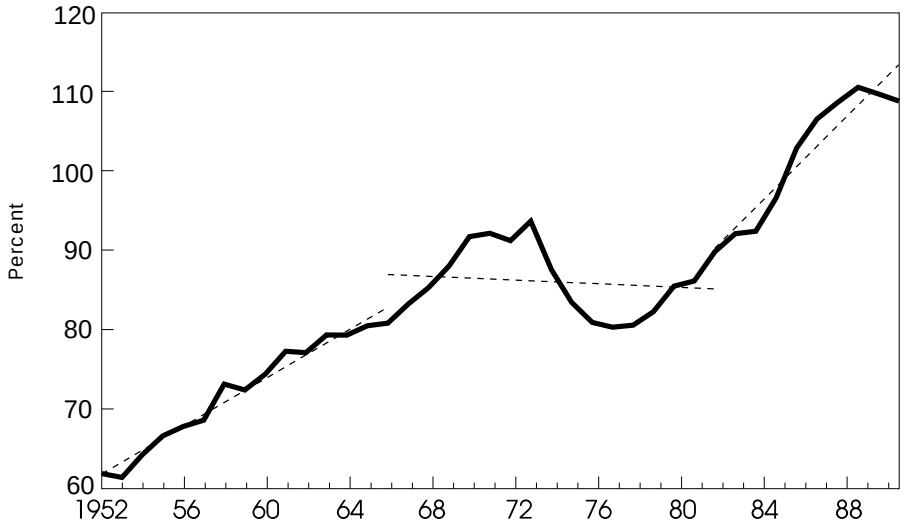


Notes: Ratio of household liabilities (end-of-year) to disposable personal income (annual average). The trend line from 1952 to 1966 represents annual growth of 2.5 percentage points per year, the trend line from 1966 to 1982 represents growth of 0.40 percentage points per year, and the trend line from 1982 to 1991 represents growth of 3.1 percentage points per year.
Source: Flow of Funds Accounts and National Income and Product Accounts.

has improved, in the sense that individuals can better smooth consumption over time and many producers can more readily finance investments yielding high returns.

The trend toward more efficient financial intermediation was interrupted from 1967 to 1981. In a different context Webb (1992) argued that this period had an inflation-tolerant monetary policy. Inflation averaged 1.5 percent from 1952 to 1966, 7.3 percent from 1966 to 1982, 3.9 percent from 1982 to 1991, and 3.0 percent in 1992. Rising inflation in the late 1960s and early 1970s and high, variable inflation in the remainder of the decade played havoc with investing in financial instruments that had traditionally been denominated in nominal terms. During this period Regulation Q restricted the nominal interest rates payable on many deposits, and taxes were levied on nominal rather than real returns. The always difficult process of channeling savings to their most productive uses became even more difficult as financial intermediation was thereby strained and distorted. Debt-income ratios stagnated during this period despite the benefit debtors received from unanticipated inflation and the bias in the tax laws at the time that favored financing by debt rather than by equity.

Figure 5b Corporate Debt to Income Ratio



Notes: Ratio of nonfinancial corporate liabilities (end-of-year) to national income originating in private nonfinancial business. The trend line from 1952 to 1966 represents annual growth of 1.5 percentage points, the trend line from 1966 to 1982 represents a 0.1 percentage point rate of decline, and the trend line from 1982 to 1991 represents growth of 2.6 percentage points per year. Source: Flow of Funds Accounts and National Income and Product Accounts.

The idea that the rise in private debt in the 1980s reflected increasing efficiency of financial intermediation is not consistent with the quotations at the beginning of this paper. The alternative view of the authors quoted seems to be that the rise in debt backed an unsustainable consumption binge. Proponents of that alternative have not, to the author's knowledge, recognized that wealth rose relative to income in the 1980s even though saving rates declined. Since higher levels of wealth allow higher levels of future consumption, consumption levels of the 1980s appear to be sustainable. Moreover, it appears that the rate of return on invested assets was relatively high in the 1980s.[22] A high rate of return is symptomatic of savings being put to highly productive uses, which in turn is symptomatic of efficient financial intermediation.

[22] The change in financial wealth can be stated as the saving from labor income and transfer payments plus the return on assets; in symbols, $dW = Y - C + rW \equiv S + R$. The change in the wealth-income ratio is by definition $d\left(\frac{W}{Y}\right) = \frac{Y\,dW - W\,dY}{Y^2}$; substituting from the previous expression and rearranging terms, an increasing wealth-income ratio means that $\frac{R}{Y} > \frac{W}{Y}g - \frac{S}{Y}$, where g is the growth rate of real income. Thus with a wealth-income ratio of 2.5, a real growth rate of 3.5 percent, and a saving rate of 4.5 percent, the real rate of return on net financial wealth must exceed 4.25 percent.

If one still wished to argue that (1) financial asset holdings are irrelevant due to imperfect markets and (2) household debt levels are nonoptimal in the sense of being higher than fully informed borrowers and lenders would choose, then there are further problems. Why would large numbers of borrowers and lenders make the same mistake in the 1980s? Did they believe there would never be a recession? Unless some such widespread error occurred, what is the basis of the assertion that debt levels are too high? The author is unaware of such questions being seriously addressed; as a result, assertions of debt being too high do not appear to be based on an economic theory involving rational people with stable preferences. When economic theory is used to study imperfect markets, the usual result is that some people are able to borrow *too little*, not too much.[23]

Measurement of Wealth

Another objection concerns the relevance of the FFAs. Questions of definition can arise over items included in household financial assets such as (1) nonprofit institutions as part of the household sector, (2) substantial assets and liabilities recorded at historical values rather than market values, (3) government bonds recorded without excluding a liability for the future taxes that will be levied to pay interest on the bonds, and (4) pension fund reserves that are far removed from household control. These are valid concerns which demonstrate that these statistics from the FFAs, like every other macroeconomic statistic, are not estimated in the exact form that many users would prefer.

Addressing the objections in order, (1) nonprofit institutions account for a small fraction of the household sector's economic activity; note in Table 1 that tangible assets of nonprofit institutions are less than 8 percent of the household sector total. (2) Marking debt instruments to market would strengthen the argument that household wealth is not unusually low, because the increase in bond prices as interest rates fell over the last ten years is excluded from the figures presented in this paper. (3) Excluding government bonds from these figures would not alter any conclusions, since they account for less that 6 percent of household financial assets. Also, economists are divided on the extent to which one should offset government bonds with anticipated future tax liabilities. (4) Wealth held in pension funds can affect household behavior. Households with a large amount of pension wealth can consume more today precisely because they do not have to save as much from current cash flows in order to provide for retirement.

The conceptual and measurement problems with the FFAs suggest that the accounts should be used with caution. Analysts who keep the accounts'

[23] For example, Bernanke and Gertler (1989) present a model in which potential borrowers with low net worth are unable to finance productive investment projects. Whited (1992) presents empirical evidence consistent with the view that financial constraints can reduce investment.

weaknesses in mind will find the data useful. The alternative is to ignore relevant balance sheet data.

Evaluation

Figure 1 illustrates that saving from current income is relatively low, and Figure 5a illustrates that the household debt to income ratio is relatively high. These phenomena can be explained without asserting that something has been so seriously wrong with consumer finances as to explain the past recession and the subpar expansion that followed. The explanation instead notes that the relatively large net worth of households contradicts the notion that consumers are currently unable to finance optimal spending plans.

Authors who have linked saving behavior with recent economic weakness have several obstacles to overcome to establish their point. First, they need to detail the theoretical model of consumer spending that they use to define recent saving rates as too low or recent debt levels as too high. The widely used life-cycle model discussed above is apparently not the basis for such assertions, due to rising wealth levels in recent years.[24] A possible alternative could be models with imperfect loan markets, although these usually imply that debt levels are too low. And when a theoretical model is used to show that savings are too low, or debt too high, the authors then need to explain why consumers saved too little or borrowed too much, and why lenders willingly lent too much. Finally, it would help if the authors explained why they believe the conventional saving rate is measured with sufficient accuracy to allow confident assertions to be made.

The case has not been made that personal saving behavior has much to do with the recent subpar economic performance. While an unproven case might still be valid, there are plausible alternative explanations of the basic data. For example, if weak consumer spending was an important factor in explaining the slow recovery in 1991, that weakness could reflect the uncertainty caused by the large number of permanent job losses in the last few years and the prospect of more losses ahead due to job reductions announced but not implemented by many large organizations.[25]

2. LONG-RUN GROWTH

The previous section found only a questionable theoretical link between saving measures from the recent past and current spending. In contrast, standard economic theory posits a firm link between saving and the long-run level of

[24] An exception is the analysis of Bernheim and Scholz (1992), who present evidence that they interpret as showing that people without college educations do not save enough to maintain their standard of living in retirement.

[25] See, for example, Carroll (1992).

real output; in addition, there are theoretical frameworks in which saving can also affect the rate of growth. The linkage is that saving allows investment to raise the stock of productive capital. Many analysts are concerned about growth because recent growth rates in the United States appear low, relative to either growth in the United States in the 1950s and 1960s, or to growth rates in many other countries.

This section first reviews some data on economic growth in the United States, and possible interpretations of that experience. Next, the potential role of saving in a widely used theoretical model is examined. Some recent advances in growth theory that affect the interpretation of saving are next discussed. Unlike the first section of this paper, this section finds that a *properly measured* saving rate would be a useful statistic to the extent that it is a valid indicator of capital formation and thereby also an indicator of future growth prospects. Some empirical evidence on the correlation of saving and investment rates concludes this section.

Recent Experience

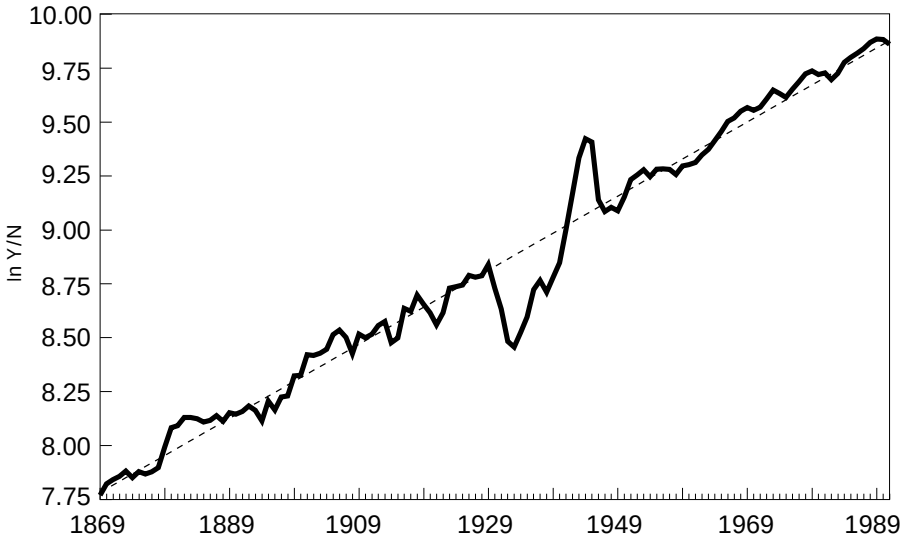
Figure 6 and Table 2 contain some basic data on Gross Domestic Product (GDP) per capita for over a century.[26] Figure 6 illustrates that the growth rate of per capita GDP has fluctuated around a trend of 1.7 percent, which means that it has doubled approximately every 40 years. The two largest departures from trend are the Great Depression and World War II. Table 2 allows one to calculate growth rates for shorter periods. Of particular interest is the most recent experience, in which growth declined from 2.1 percent between 1950 and 1973 to 1.6 percent between 1973 and 1989. Despite the fact that growth in the latter period is close to its long-run trend, some observers believe that the decline in growth indicates that the United States is failing to realize its economic potential.

Table 2 also indicates that while the level of output per capita is higher in the United States than in other major countries, several other countries have grown more rapidly in recent years. Most spectacular is Japan, where output per capita grew by 7.7 percent from 1950 to 1973, and by 3.1 percent from 1973 to 1989. Simply extrapolating the latest growth rates puts several countries ahead of the United States early in the next century. That too leads some to

[26] GDP is used to facilitate comparisons over time and across countries. It is not and was not designed to be a measure of economic welfare. There are also better measures of product one could devise; many investigators, however, believe that the correlation between GDP and a better measure is sufficiently high to warrant the use of GDP statistics.

It should also be noted that the accuracy of almost every economic statistic declines as one goes farther back in time. Analysts who produce the NIPAs today have much more raw data to use to construct aggregate statistics than did their counterparts 40 years ago, who in turn had much more raw data than did the individuals who have constructed estimates for GDP before 1929.

Figure 6 Output per Capita with Trend



Notes: Gross domestic product divided by population, annual data, logarithmic scale. Trend line represents annual growth at a 1.7 percent rate and is based on estimates from 1869 to 1929 and extrapolated for 1930 to 1991.
Source: GDP, National Income and Product Accounts, 1929–91, and Balke and Gordon (1989), 1869–1928; population, United States Census, 1950 to 1991, and *Historical Statistics of the United States: Colonial Times to 1970*, U.S. Government Printing Office, Washington, 1975: Series A7.

Table 2 Gross Domestic Product per Capita, 1985 Dollars, United States Prices

	1870	1913	1950	1973	1989
United States	2,247	4,854	8,611	14,103	18,317
Canada	1,347	3,560	6,113	11,866	17,576
France	1,571	2,734	4,149	10,323	13,837
Germany	1,300	2,606	3,339	10,110	13,989
Japan	618	1,114	1,563	9,237	15,101
United Kingdom	2,610	4,024	5,651	10,063	13,468

Note: These figures are taken from Maddison (1991), Table 1.1. They represent per capita GDP, expressed in constant dollars to remove the effects of inflation, and adjusted for differing purchasing power of currencies.

believe that the United States is growing too slowly, and to view low saving as a possible cause.

The Solow Growth Model

The name of Nobel Laureate Robert Solow is linked with a straightforward and influential theoretical model of economic growth.[27] Consider a specific production function, which states with symbols that national product depends on the amounts of capital and labor employed, as well as the state of knowledge:

$$Y_t = K_t^{\alpha}(A_t L_t)^{1-\alpha}, \tag{1}$$

where Y is the quantity of output, K is the stock of capital, L is the labor force, A can be interpreted as the state of knowledge about producing output, t indexes time, and α is a parameter between zero and one, the value of which can be statistically estimated. If one assumes (1) that the labor force and knowledge grow at given exponential rates of n and g, respectively, (2) that a constant fraction s of output is saved and invested,[28] and (3) that capital depreciates at an exponential rate d, it then follows that

$$\ln \frac{Y_t}{L_t} = gt + \left[\frac{\alpha}{1-\alpha} \ln(s) - \frac{\alpha}{1-\alpha} \ln(n+g+d) + \ln A_0 \right] \tag{2}$$

for a country experiencing steady-state growth, that is, a country for which the capital stock is consistent with the model's parameters and initial conditions. Note in equation 2 that the growth rate of output per capita is determined solely by the exogenous parameter g, the growth rate of knowledge. Other parameters in the bracketed term, *including the saving rate*, only affect the *level* of output per capita.

Differences in Growth Rates Across Countries

For a country like the United States in which output per capita does not depart too much from a constant trend over a long interval of time, the assumption of steady-state growth appears reasonable. An opposite case would be a country like Japan immediately after World War II where much of the capital stock had been destroyed. The Solow framework can be used to determine how fast a country off its steady-state growth path would converge to that path. Assuming that the speed of convergence is proportional to the difference (in logarithms) between the steady-state and the actual levels of output per capita, then

$$\theta = (n+g+d)(1-\alpha), \tag{3}$$

[27] A good exposition is Solow (1969).

[28] In the growth literature, the saving rate almost always refers to the national saving rate, which is the personal saving rate plus saving by firms and by the government.

where the parameter θ denotes the speed of convergence to the steady-state path. Note that the speed of convergence does *not* depend on the saving rate.[29] For example, if population growth n is 1 percent per year, the steady-state growth rate g is 2 percent, the depreciation rate d is 4 percent, and α is 0.3, then the speed of convergence would be about 5 percent. In other words, about 5 percent of the percentage gap between actual and steady-state output per capita would be eliminated each year, or half the gap would be closed in about eight years.

The idea of convergence has been used to interpret differential growth rates among different areas or countries. Mankiw, Romer, and Weil (1992), for example, augment the basic Solow model by adding a third factor of production, human capital, to physical capital and labor. Looking at a group of 98 countries and two smaller groups, they found that poorer countries in 1960 tended to grow faster from 1960 to 1985 than did richer countries; the estimated speed of convergence was about 2 percent. Barro and Sala-i-Martin (1992) also found evidence for convergence, both among states in the United States from 1880 to 1988 and in the set of 98 countries over a shorter interval; interestingly, they also estimate speeds of convergence of about 2 percent.

If convergence in the level of per capita output accounted for all the differences in growth, then one would not be concerned that countries with lower output were growing more rapidly than the United States. That faster growth would be a temporary phenomenon and would slow as a country's level of output per capita approached that of the United States. Evidently, however, more than just convergence is needed to account for all the variation in output growth. In Table 2, note that output per capita was higher in the United Kingdom than in the United States in 1870; by 1913 the countries' standings reversed. What accounts for the reversal? Between 1870 and 1913 the United States, Canada, and Germany grew faster than Japan, the poorest country. What accounts for this divergence? What accounts for the experience in the United States from 1950 to 1973 when growth was above the previous trend? And why have many countries remained poor over the last 40 years without showing any tendency toward rapid growth?

Endogenous Growth

These questions illustrate why some economists believe that while convergence is probably an important factor in many cases, other explanations of differential growth rates should also be examined. They have accordingly constructed models that depart in an important way from the basic Solow model. Instead of assuming that the economy's steady-state growth rate is a given value g based

[29] A change in the saving rate can change the steady-state capital stock, however, and thus influence the growth rate off the steady-state path.

on the automatic growth of knowledge, they emphasize the individual decisions that result in growth. This is now an especially rich area of macroeconomic research, and there will be no attempt to mention all the important models. Two examples of such endogenous growth models that are relevant for this paper are Lucas (1988) and Greenwood and Jovanovic (1990).

The Lucas model is of interest in that it provides a reason why growth might be too low, and points to the types of public policies that would raise the rate of growth. The model contains human capital, as do many in the endogenous growth literature, but notably makes an individual's productivity depend on both the individual's level of human capital and the community's average level of human capital. In other words, there is a positive externality to human capital accumulation: an individual's decision to acquire additional human capital would balance his own costs and benefits without taking into account that raising one's own stock of human capital also raises the community's stock and thereby raises the productivity of other members of the community. Human capital accumulation is the basic engine of growth in this model, analogous to the exogenous value g in the Solow model. Due to the positive externality, public policies such as subsidies to education can raise the growth rate and aggregate economic welfare.

An implication of the Lucas model is that saving is relevant, in that it coincides with the capital formation that affects the level and rate of growth of output. The measure of saving implied by his model includes both saving as conventionally measured plus investment in human capital. A generally acceptable measure of the latter would require an ambitious research undertaking. Individual researchers have proposed strategies for estimating investment in human capital, but different strategies have led to vastly different results. Measurement of some of the resources that are used for investment in human capital, such as teachers' salaries, buildings, and textbooks is straightforward. A more difficult question is valuing a student's time in school. How are differences in the quality of education to be estimated? When a person develops skills through experience, how is that measured? A professional consensus has not emerged on these and other difficult questions. But any saving statistic that fails to confront human capital measurement is omitting a very important part.

Financial institutions play a key role in the model of Greenwood and Jovanovic, in which the extent of financial intermediation and the degree of development are linked. Financial intermediation allows a given amount of saving to finance a greater amount of investment than could occur without intermediation. And mature economies can have relatively low saving rates with high growth due to well-developed financial intermediation. Therefore, simply comparing saving rates in different countries would not provide useful information on the adequacy of investment or on future growth prospects.

The theoretical linkage of financial intermediation and growth is supported by empirical evidence. King and Levine (1993) studied real growth and several

measures related to financial intermediation in 80 countries from 1960 to 1989. They found a robust correlation between the extent of financial development and contemporaneous growth, and also that financial development predicts future growth.

The Correlation of National Saving and Investment

The intuition linking saving and growth is highlighted by the formal models examined. In the basic Solow model the long-run growth rate is exogenous and is therefore unaffected by saving. Over shorter time spans, however, growth can be affected by saving. Once the growth rate is made endogenous, interpreting saving data can become even more difficult. If the Lucas assumption of externalities in human capital accumulation is important, then we should be focusing on a better understanding and measurement of human capital. And to the extent that more highly developed financial intermediation raises the return to saving, the meaning of a given rate of saving changes as an economy matures.

Despite these difficulties, researchers have presented empirical evidence that suggests a strong linkage between a country's saving and investment. One of the most influential studies, by Feldstein and Horioka (1980), found a strong correlation between rates of saving and investment for 21 countries. Figure 7 presents national saving and gross investment data, relative to GDP, for the postwar United States. The two series clearly move together over the 1960–74 interval studied by Feldstein and Horioka, although for much of the 1980s investment outpaced saving as foreign investment in the United States was relatively large. In 1991 both saving and investment hit postwar lows, reinforcing the concerns of many over inadequate investment due to inadequate saving.

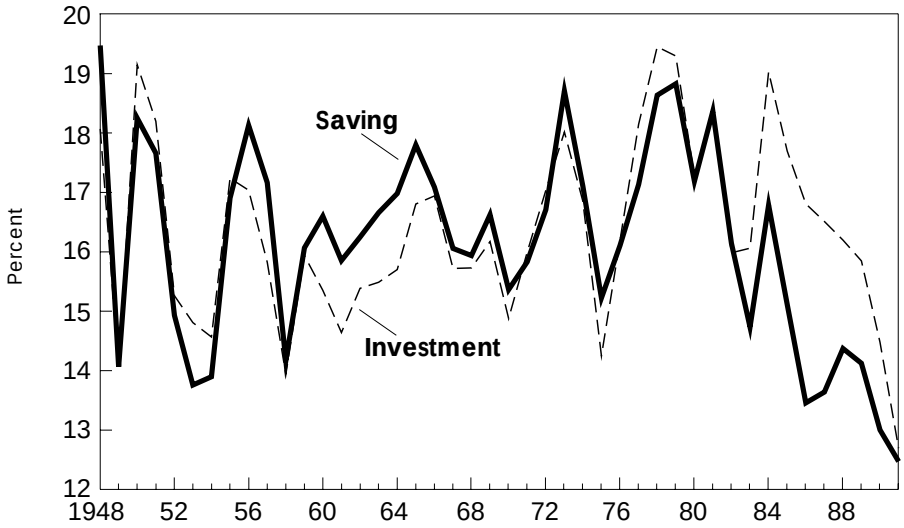
Simple correlations such as this are always difficult to interpret. Two variables can be correlated, even if movements in one do not cause movements in the other, if both are responding to movements of a third variable. There are many possible factors that might explain movements in both saving and investment. For example, both are low at business cycle troughs and rise during cyclical expansions. Interest rates are another factor affecting saving and investment.

A quick look confirms the possibility that the correlation might vanish after allowing for other factors. Table 3 contains empirical results based on:

$$V_t = c + \sum_{i=1}^{4} \alpha_{t-i} \frac{I_{t-i}}{Y_{t-i}} + \sum_{i=1}^{4} \beta_{t-i} \frac{S_{t-i}}{Y_{t-i}} + \sum_{i=1}^{4} \gamma_{t-i} R_{t-i} + \sum_{i=1}^{4} \delta_{t-1} U_{t-i} + e_t, \quad (4)$$

where V is the dependent variable, either the gross investment to GDP ratio or the national saving to GDP ratio, I is investment, Y is GDP, S is saving, R is the interest rate on 90-day Treasury bills, U is the capacity utilization rate in manufacturing, e is an error term, t indexes time, and the remaining symbols are coefficients that can be estimated by ordinary least squares. The

Figure 7 Gross Saving and Investment Relative to GDP



Note: Gross private domestic investment, divided by gross domestic product, and gross national saving, divided by gross domestic product.
Source: National Income and Product Accounts.

two equations can be used to examine the extent to which either investment or saving is correlated with previous values of those two series and also with previous values of an interest rate and the capacity utilization rate (which can be interpreted as an indication of the stage of the business cycle). Especially notable results from the investment equation are (1) the lagged variables are associated with a large portion of the movement of the investment-GDP ratio, and (2) the coefficients on lagged saving are not significantly different from zero, unlike coefficients on all the other variables.

If taken at face value, these results suggest that savings in the recent past do not directly affect investment; however, the results in Table 3 are suggestive rather than definitive. Most importantly, there was no experimentation with other measures of saving, investment, and output,[30] and there was no analysis of contemporaneous correlations of saving, investment, output, interest rates, and possibly other variables. The results do show, however, that the empirical correlation of investment and saving is not easy to interpret since it could well reflect the business cycle and possibly other influences.

[30] Cullison (1991) studied the relation of several measures of saving to quarterly GDP growth.

Table 3 Regression Results for Investment and Saving Rates

$$(1) \qquad \frac{I_t}{Y_t} = c + \sum_{i=1}^{4} \alpha_{t-i} \frac{I_{t-i}}{Y_{t-i}} + \sum_{i=1}^{4} \beta_{t-i} \frac{S_{t-i}}{Y_{t-i}} + \sum_{i=1}^{4} \gamma_{t-i} R_{t-i} + \sum_{i=1}^{4} \delta_{t-1} U_{t-i}$$

Time bounds: 1952 Q2 to 1992 Q2 $\overline{R}^2 = .84$

Variable	F-Statistic	Significance Level
I/Y	54.06	.00
S/Y	0.80	.53
R	5.09	.00
U	3.61	.01

$$(2) \qquad \frac{S_t}{Y_t} = c + \sum_{i=1}^{4} \alpha_{t-i} \frac{I_{t-1}}{Y_{t-i}} + \sum_{i=1}^{4} \beta_{t-i} \frac{S_{t-i}}{Y_{t-i}} + \sum_{i=1}^{4} \gamma_{t-i} R_{t-i} + \sum_{i=1}^{4} \delta_{t-1} U_{t-i}$$

Time bounds: 1952 Q2 to 1992 Q2 $\overline{R}^2 = .87$

Variable	F-Statistic	Significance Level
S/Y	101.45	.00
I/Y	1.64	.17
R	6.07	.00
U	2.26	.07

Note: I is gross private domestic investment, Y is GDP, S is gross national saving, R is the 90-day Treasury bill rate, and U is the capacity utilization rate in manufacturing.

3. CONCLUSION

Although many analysts cite the personal saving rate as a key indicator of the current and prospective strength of the economy, the saving rate alone actually reveals little about current and future conditions. Difficulties in defining, measuring, and interpreting saving should be kept in mind by prospective users.

Current saving data reveal little about prospective consumer spending. Basic economic theory instead indicates that household wealth measures resources accumulated for future spending. In addition, it would be a mistake to focus simply on one part of the household balance sheet, debt, without first determining its optimal level. Since debt has the positive roles of allowing individuals to smooth consumption over time as income varies and of financing productive investment, it should not be simply assumed that current debt levels are too high.

In contrast to the weak link between recent saving and current consumer

spending, there is a well-established theoretical link between saving and

investment, and therefore between saving and economic growth. Even here the message given by saving data can be difficult to interpret, since low national saving can occur while investment is buoyed by inflows of foreign funds; in addition, human capital formation is omitted from the usual saving measure. To determine whether national investment is adequate it could be more productive to look directly at detailed investment data. If profitable investments were not being made, one might wish to search for underlying causes such as taxes, regulation, externalities, or inadequate financing. A focus on conventionally measured saving may well divert attention from these important fundamentals.

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