Explaining the Postwar Pattern of Personal Saving

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Personal saving as a percentage of disposable income, the only official saving rate published by the U.S. Bureau of Economic Analysis, declined sharply during the 1980s. This decline has been viewed as particularly troubling, because it occurred during a time when business and government saving also plummeted and in the wake of numerous supply-side efforts to increase personal saving.

Economists spent most of the decade trying to explain the decline in personal and national saving. They have supplied a host of possibilities, including the impact of capital gains, a decline in the need for retirement saving, and the impact of slower income growth, among others. None of these candidates, however, provides a convincing explanation for the apparent changing pattern of personal thrift. Two potential culprits have received considerably less attention and most probably have played major roles in the decline in the reported personal saving rate: the appreciation of owner-occupied housing in the late 1960s and 1970s, and the funding limitations faced by private pension plans in the 1980s.

The late 1960s and the 1970s witnessed a spectacular housing boom as the members of the baby-boom generation started to establish their own households. This housing boom affected the reported saving rate during the 1980s in two ways. The first was a behavioral response to the run-up in housing prices, as individuals reduced their saving out of current income in the wake of unexpected capital gains on their homes. The second was an accounting effect, as the national accounts seriously understated the return to housing following the boom. The understatement reduced measured income and saving during the late 1970s and the 1980s. The housing story highlights the fact that a significant increase in asset prices, even if not recorded directly in the reported saving statistic, has an enormous impact on saving.

The second culprit is the funding behavior of private pension plans. The pension component of personal saving, as measured by employer contributions to their company plans, dropped dramatically during the

1980s. This drop stemmed from the rapid run-up in stock prices that brought many plan sponsors squarely up against the Internal Revenue Code's full-funding limitation, which restricts tax-deductible contributions once plan sponsors have reached designated funding levels.

This article presents an empirical analysis of the extent to which the housing boom and pension funding provisions determined the pattern of saving in the postwar period. Part I lays out the trends in saving over the postwar period. Parts II and III explore the relationship between the housing boom and personal saving, looking first at the behavioral response and then at the accounting issue. Part IV discusses the role that pension funding has played in determining the pattern of personal saving. Part V summarizes the regression results. The implications and conclusions are discussed in Part VI.

I. Trends in Personal Saving

Personal saving as a percentage of disposable income dropped in the late 1980s (Table 1). The highly publicized saving rate fell from nearly 10 percent in the early 1970s to a low of 2.7 percent in 1987; in 1990 saving equalled 4.6 percent of disposable income. Roughly 1 percentage point of the decline can be attributed to the drop in employer contributions to private pension plans, but the remainder comes from nonpension saving.

The drop in personal saving is puzzling, given the long list of factors that should have encouraged higher saving by individuals. The 1980s witnessed the introduction of numerous saving incentives, such as individual retirement accounts (IRAs) and the expansion of 401(k) and 403(b) plans, that allowed individuals to make pre-tax contributions and defer interest on earnings until withdrawal. The 1980s was also a decade during which the sudden collapse of rapid inflation produced very high real rates of return; most observers would expect such high returns to stimulate saving. Finally, demographics would also have led a forecaster to predict higher private saving during the 1980s; the reduction in the number of young exceeded the increase in the elderly, both of whom are viewed as small savers. These small savers represented a declining share of the overall population, leading one to expect increased saving in the aggregate.

Moreover, the decline in personal saving occurred within the context of an even more dramatic drop in business and government saving. From the 1950s through the 1970s, business saving averaged 3.5 percent of national income, and government saving hovered around minus 0.5 percent. In the 1980s, changes in business and government contributed importantly to the collapse of the national saving rate. The federal government's deficit rose from 1 percent to 3 percent of national income in the wake of massive tax cuts and continued spending on defense. Business saving fell from 3 percent to 1 percent of income, as financial corporations suffered substantial losses leading to negative undistributed corporate profits after 1985, and nonfinancial corporations paid out increasing shares of their after-tax income.

Table 1
Personal Saving as a Percentage of Disposable Income, 1950 to 1990

Item	1950–59	1960–69	1970–74	1975–79	1980–84	1985–90
Personal Saving	6.8	6.8	8.6	7.4	6.5	4.2
Private Pensions	1.2	1.6	2.1	2.7	2.5	1.5
Non-Pension	5.6	5.2	6.5	4.6	4.1	2.7
Addendum: Saving as a Percentage of Net National Product						
Total	8.5	8.0	8.1	8.1	4.1	1.4
Personal	5.2	5.1	6.6	5.7	5.2	3.3
Business	3.6	3.2	2.0	3.6	1.8	.8
Government	−.2	−.3	−.5	−1.2	−2.9	−2.8

Note: Items may not sum to totals because of rounding.
Source: U.S. Bureau of Economic Analysis, 1986, *The National Income and Product Accounts of the United States, 1929–82*, Tables 1.8, 2.1, 5.1, and 6.13; U.S. Bureau of Economic Analysis, 1986–1990, "National Income and Product Accounts: Revised Estimates," *Survey of Current Business* (July), Tables 1.9, 2.1, 5.1, and 6.13.

Some have argued that individuals take account of the behavior of business and government when making their own saving decisions and compensate for changes in those sectors by adjusting their own saving rate. If valid, this argument provides further support for the expectation of an increase in the personal saving rate, rather than a decrease, during the 1980s. That is, individuals would have been expected to compensate for the low level of business saving by increasing their own direct saving. Similarly, to the extent that taxpayers perceived that the large federal deficits would impose greater tax burdens on their children, they might have increased their saving to produce offsetting bequests.

Despite the long list of reasons suggesting that personal saving should have increased in the 1980s, it dropped sharply. The question is: "Why?" The next three sections explore the role played by the housing boom and the mechanics of pension funding.

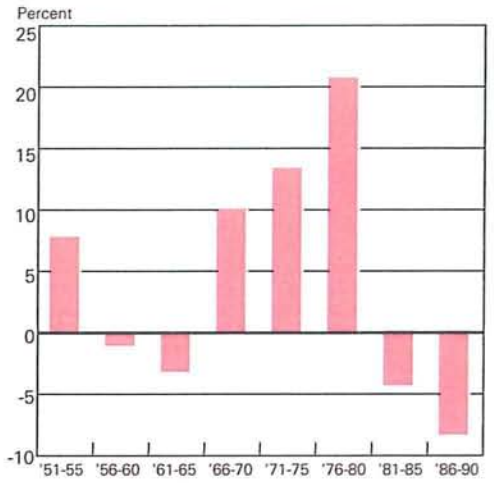
II. The Housing Boom and Personal Saving: The Behavioral Response

A housing boom can have a powerful effect on saving, and the United States enjoyed a dramatic increase in the value of the housing stock during the late 1960s and the 1970s. Real capital gains on housing for the nation as a whole amounted to 10 percent of the housing stock in the late 1960s, increased to 13 percent of the stock in the early 1970s, and rose to 21 percent in the late 1970s (Figure 1). ("Real" means that all increases in value due simply to changes in the price level have been removed.) The late 1960s and the 1970s were an unusual period; housing values had changed little before the boom, and since the boom, housing prices have failed to keep pace with inflation. Such a dramatic swing in the value of an asset that accounts for 28 percent of the nation's net worth and that is widely held by all income groups in the population is bound to have a direct and important effect on personal saving.

On the behavioral side, the life-cycle model provides a very clear prediction that unexpected capital gains in housing will lead individuals, all else equal, to reduce their saving out of current income. The notion is that people want to maintain a steady stream of consumption over their lifetimes, and they can achieve that goal with less saving out of current income if they experience an appreciation in the value of assets they have already accumulated. The following simple model illustrates this point and explores the size of the impact of capital gains on saving.

Figure 1

Real Capital Gains on Housing as a Percent of Initial Stock



Source: Board of Governors of the Federal Reserve System (1991, pp. 19-24 and 61-66).

Suppose the population consists of individuals who expect to live exactly T years. People begin work at birth, earn E dollars of compensation per year while at work, and retire at age R. This leaves workers T − R years in retirement, during which time they earn no wages. Ignoring interest, an individual's lifetime income is

$$Y = RE, \tag{1}$$

or the product of years at work and earnings per year.

Workers wishing to avoid starvation during their retirement will save during their working years. According to the life-cycle model, they will save and dissave exactly enough so their annual consumption, C, is identical in each year of their life, including periods of work and retirement:

$$C = (RE)/T. \tag{2}$$

This consumption pattern implies that annual savings while at work will be

$$S = E - [(RE)/T] = E(T - R)/T \tag{3}$$

Assume that people live exactly 50 years and

typically retire when they reach age 40 (that is, $T = 50$ and $R = 40$). Next assume that the individual receives a lump sum capital gain (G) after 20 years of work. Income for the individual's remaining life becomes:

$$(4) \qquad Y = (R - 20)E + G + 20[E(T - R)/T].$$

Consumption over the remainder of the lifetime is obtained by dividing equation (4) by the number of years of life left, $T - 20$, yielding:

$$(5) \quad C = \{(R - 20)E + G + 20[E(T - R)/T]\}/(T - 20).$$

Given that yearly saving is simply earnings minus yearly consumption and after separating the terms of equation (5), saving can be written as:

$$(6) \quad S = E - (R - 20)E/(T - 20) - G/(T - 20) - 20[E(T - R)/T]/(T - 20).$$

The impact of the capital gain on annual savings is determined by the partial derivative of saving with respect to G, thus:

$$(7) \qquad \delta S/\delta G = -[1/(T - 20)].$$

Assuming that people live exactly 50 years and given the assumption of a lump sum gain in year 20, this equation implies that $1 of capital gains will reduce annual saving by $.03. If the gain occurred earlier in life, the reduction would be smaller; if the gain came later, the saving offset would be somewhat larger. The important point, however, is that an unexpected run-up in housing prices would reduce saving out of current income and the personal saving rate.

III. The Housing Boom and Personal Saving: The Accounting Issue

On the accounting side, a run-up in house prices affects the reported saving statistic, because the National Income and Product Accounts (NIPA) severely understate the return to owner-occupied housing in the wake of a housing boom. To understand this point, it is necessary to take a brief look at the treatment of owner-occupied housing in the NIPA and the impact of this treatment for personal saving.

The NIPA consider the purchase of a house an investment that yields annual services to the occupants during their tenancy. To account for these services, homeowners are treated as if they rent their homes to themselves and net rental income for owner-occupied housing is a component of personal income. In other words, personal income is composed of wages and salaries, transfer payments, interest and dividend income, proprietors' income, and net rental income of homeowners. Taxes are subtracted to yield disposable income. Thus,

$$(8) \quad Y^d = Y^o + Y^{int} + (SR - INTM - OHE) - TAX,$$

where Y^d is disposable income,
Y^o is all other income excluding interest income and imputed income on housing,
Y^{int} is interest income,
SR is the imputed return earned by owner-occupants,
INTM is mortgage interest expense,
OHE is other expenses of owner-occupants, and
TAX is personal tax and nontax payments.

The NIPA also allocate disposable income among its uses: consumption, interest paid to business on loans other than mortgages, and saving. Consumption includes both outlays for goods and services and imputed consumption of owner-occupied housing.

$$(9) \qquad Y^d = C^o + SR^c + INTB + S,$$

where C^o is consumption excluding owner-occupied housing,
SR^c is the imputed consumption of owner-occupied housing,
INTB is interest payments to business, and
S is personal saving.

Combining the sources and uses of disposable income to estimate saving implies that

$$(10) \quad S = (Y^o - TAX - C^o - OHE) + (Y^{int} - INTM - INTB) + (SR - SR^c).$$

House prices come into play through their impact on SR and SR^c. Mechanically, imputed housing consumption is an estimated space rent, which is derived from data on the owner-occupied housing stock and rents for comparably valued tenant-occupied units as reported in the decennial census. For years between the censuses, rents are revised according to the rent component of the consumer price index and the number of households in the Census Bureau's current population survey. The NIPA also assume that imputed housing consumption, SR^c, is equal to the return received by homeowners, SR.

This treatment of housing consumption and the return to owner-occupied housing is correct only if two assumptions hold: 1) the benefits of owning and renting a particular property are identical, so that market rents are an accurate gauge for the return to

owner-occupied housing, and 2) any premium associated with owning rather than renting can be attributed to consumption rather than saving.

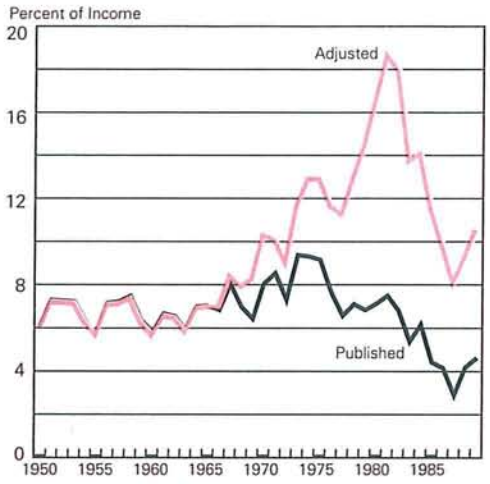
In fact, individuals are willing to pay a premium over market rents to own their home, and the reasons for that premium include both consumption and saving considerations. On the consumption side, owners can remodel the kitchen and paint the walls any color they want; they also gain a sense of pride and stability from owning their homes. On the saving or investment side, owners acquire the landlord's right to manage the property, his option to cancel the lease, and a hedge against rising rents. Because the features that accompany ownership are more valuable than those offered to renters, the market rent figure used by the NIPA understates housing consumption and the return to owner-occupied housing. (See Kopcke, Munnell, and Cook (1991) for a more complete discussion.)

A more accurate estimate of the return to owner-occupied housing would be derived from the value of the housing stock and the opportunity cost of funds, represented by the sum of the mortgage interest rate and the rate of depreciation on residences. The extent to which such a reestimation of space rents affects personal saving and the saving rate depends on how much of the premium is attributable to consumption and how much to investment. At one extreme, if the entire premium reflects the ability to paint the walls purple—and thus is attributable entirely to consumption—then the reestimation of space rents would have no impact on the dollar amount of personal saving, since both housing consumption, SR^c, and the return to housing, SR, would increase by the same amount (see equation (3) above). It would, however, lower the measured saving *rate*, since income, the denominator, would increase by the amount of the premium associated with ownership.

On the other hand, if the full premium is attributed to saving, the return on owner-occupied housing, SR, rises, consumption, SR^c, remains unchanged, and reported personal saving and the personal saving rate rise with the imputed space rent premium. The case for considering most of the premium as saving, as opposed to consumption, is compelling, particularly in the wake of the housing boom. Imputed net rental income became negative in the late 1970s, because individuals were willing to pay a substantial premium to own their homes in the wake of the housing boom. House prices (and rents) had increased nearly 45 percent in real terms between 1966 and 1979; the expectation was that prices (and rents) would continue to rise. To avoid paying higher rents, people were willing to spend substantially more to own their residences. The NIPA recorded the tripling of homeowners' mortgage debt, but they did not record the higher implicit rents accruing to homeowners.

Figure 2

Personal Saving Rates: Published and with Space Rent Adjustment, 1950 to 1989



Source: U.S. Bureau of Economic Analysis (1986, Table 5.1) and (1986 to 1990, July, Table 5.1).

A more accurate measure of personal saving requires adjusting personal income to reflect the full return accruing to owner occupants; it also requires determining how much of that return is attributable to consumption and how much to investment. For the adjusted saving rate shown in Figure 2, it was assumed that the homeowner's full return was equal to the product of the housing stock and the opportunity cost of funds. This approach produced a substantially larger return than that reported in the NIPA. In allocating the difference between the calculated and the NIPA figures to consumption and investment, it was assumed that all the premium before the first signs of the housing boom in 1966, roughly 7 percent per year, could be viewed as consumption; after 1966, any premium in excess of 7 percent was attributable to investment.

The pattern of personal saving that emerges from

these calculations is very different from that revealed in the reported statistics. Personal saving surged during the late 1970s as a result of the higher return to housing that followed the dramatic run-up in housing prices. When the escalation in housing prices ceased and individuals no longer expected further real gains or rising rents, the return to owner-occupied housing regained more normal levels and saving dropped. But the saving rate appears to have dropped back to levels experienced in the 1950s and 1960s rather than to unprecedented lows. Therefore, it does not appear as if any fundamental shift has occurred in the nation's attitude toward thrift.

IV. Private Pension Plans and Personal Saving

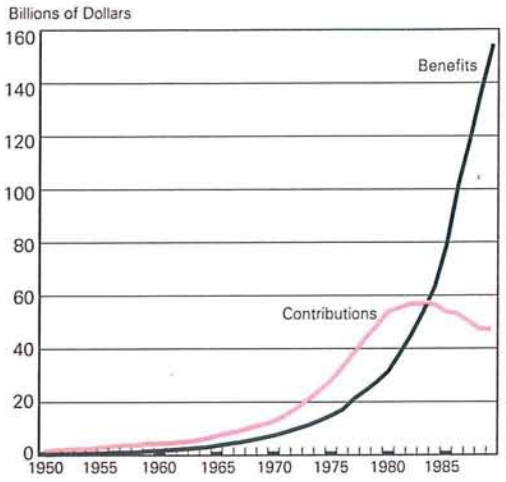
As discussed earlier, a second major factor affecting saving in the 1970s and the 1980s is the funding of the nation's defined-benefit pension plans. Employer contributions to pension plans are counted as part of personal income, so that, all else equal, an increase in pension contributions means greater personal income and higher personal saving. As shown in Figure 3, annual contributions to private pension plans grew from $13 billion in 1970 to $49 billion in 1979, and therefore were an important component of personal saving during the 1970s. In 1979, contributions suddenly leveled off and they have actually declined in nominal dollars over the 1980s.

The reasons for this dramatic shift in the pattern of pension contributions can be found in the laws governing defined benefit plans. The Employee Retirement Income Security Act of 1974 (ERISA) instituted provisions whereby sponsors of defined-benefit pension plans were required to put aside money to cover accruing benefit costs and to pay off existing unfunded liabilities over a 40-year period. Much of the higher level of personal saving in the late 1970s can be attributed to this push to fund private plans.

In the 1980s, enormous gains on corporate bonds and common stocks meant that many plan sponsors could satisfy ERISA's minimum funding requirements without making any further contributions. That is, sponsors of defined-benefit plans operate as target savers. They have promised specific benefits, for which they must accumulate specific assets; if they can satisfy their goals through capital gains, they can reduce their annual contributions to the pension fund.

Figure 3

Private Pension Contributions and Benefits, 1950 to 1989



Source: U.S. Bureau of Economic Analysis, (1986, Table 6.13) and (1986-90, July, Table 6.13).

The impact of the large capital gains on the minimum funding requirements alone cannot explain the dramatic falloff in pension contributions. ERISA has extensive averaging and amortizing provisions, so that a stock market boom would have produced a much slower change in contributions to meet minimum funding goals than actually occurred. The abruptness of the change appears to have been caused by the combination of higher returns and the Internal Revenue Code's full-funding limitation (incorporated as Title II of ERISA). This provision was designed to protect Treasury revenues by limiting the amount of tax-deductible contributions that can be made by sponsors of overfunded plans. Any plan assets in excess of the amount defined as full funding are considered surplus and must be applied as a full-funding credit against normal cost payments. The full-funding limitation makes it virtually impossible for firms to make any contributions to fully funded plans.

Prior to 1987, full funding was defined as assets in excess of accrued liability, calculated on the basis of an ongoing plan. In the 1987 Omnibus Budget Rec-

onciliation Act (OBRA), Congress tightened the limitation by (inappropriately) redefining full funding. The new law constrained pension assets to be no more than 150 percent of termination liability, which, in most cases, is a significantly smaller amount than ongoing accrued liability.

The full-funding provision, especially with the OBRA redefinition of full funding, makes pension contributions and thus personal saving very sensitive to the number of plans that are up against the funding ceiling. Moreover, the amounts of money that could be affected by the full-funding limitation are large, both absolutely and relative to total personal saving. For example, in 1989, with pension contributions of $48 billion, personal saving amounted to $172 billion or 4.6 percent of disposable income; if pension contributions had simply stayed at their 1979 levels in real terms, they would have amounted to $81 billion, raising saving to $205 billion or 5.5 percent of disposable income. If 1979 contributions had kept pace with private sector wages, they would have amounted to $101 billion in 1989, raising personal saving to $225 billion or 6.0 percent of disposable income.

The impact of the stock market boom on pension funding and the impact of the housing boom on personal saving are similar in that both reflect situations where changes in asset prices affect the allocation of current output. Thus, while the NIPA are designed to focus only on currently produced goods and services, both the measurement of this output and its allocation between consumption and saving depend crucially on the current and future value of assets.

V. Estimating the Impact of Housing and Pensions on Personal Saving

This section attempts to determine whether the evidence is consistent with the hypothesis that the housing boom and pensions have played a major role in the pattern of saving in the postwar period. Two approaches are adopted. The first introduces independent variables and accounting adjustments to explain the reported NIPA saving and saving rate. The second adjusts the saving variables themselves to move towards a more accurate measure of saving and uses the independent variables to explain the adjusted pattern of saving. The two approaches yield very similar results.

For the NIPA saving measure, the basic equation was a simple saving function with additional variables to capture pension funding and accounting adjustments. That is,

$$(11)\quad S_t = \beta_0 + \beta_1 Y_t + \beta_2 NWH_{(t-1)} + \beta_3 NWO_{(t-1)} + \beta_4 RINT_t + \beta_5 PF_t + \beta_6 YSR_t + \beta_7 YDUR_t$$

where S is personal saving,
Y is personal disposable income,
NWH is owner-occupied housing net worth in the previous period,
NWO is all other net worth in the previous period,
RINT is real after-tax interest rate,
PF is status of pension funding,
YSR is an income adjustment for space rents, and
YDUR is an income adjustment for consumer durables.

Income and wealth are the usual components of any saving equation based on the Ando-Modigliani life-cycle model. If households wish to distribute consumption evenly over their lifetimes, then previously accumulated assets will reduce the need to save out of current income to reach the intended target. The only modification here is separating net worth into housing and other components because of the contention that the housing boom had a significant impact on saving. The values for these variables and others included in the equations are summarized in Table 2.

The real after-tax interest rate earned on investments would be expected to have a positive impact on saving. Although the impact of such a return is theoretically ambiguous, creating both an income and a substitution effect, the consensus among economists is that the substitution effect dominates. Interestingly, the negative real after-tax rates during the 1970s and the positive rates in the late 1980s would have been expected, all else equal, to have produced a pattern of saving opposite to that actually observed.

Two measures of pension funding are used. The first is a statistic published by the Wyatt Company on the percentage of plans with 1,000 or more active participants that have assets greater than accrued liability. Here the relationship between pension funding status and saving should be negative; the more plans fully funded, the smaller will be employer contributions. The second measure attempts to turn the pension funding concept into a dollar figure by estimating the difference between the liabilities of defined benefit plans and pension assets held by

Table 2
Factors Affecting Personal Saving, 1982 Dollars per Capita, Selected Years, 1950 to 1989

Year	Personal Saving	Personal Disposable Income	Wealth		Real Interest Rate After Tax	Pension Funding		Income Adjustments	
			Housing	Other		Percent of Plans Fully Funded	Funding Gap	Space Rent	Consumer Durables
1950	$317	$5,215	$3,930	$17,965	−6.2	15.0	$2,349	$23	$66
1955	329	5,725	5,123	20,680	−.3	15.0	3,941	13	−196
1960	351	6,061	5,971	23,119	1.5	15.0	5,910	74	−225
1965	498	7,066	6,467	25,328	1.9	15.0	8,057	18	−328
1970	659	8,177	7,661	27,833	1.4	15.0	9,201	263	−11
1975	820	8,959	9,239	24,902	−1.9	17.0	9,348	452	67
1980	696	9,746	12,423	29,131	−1.0	31.0	5,615	1,183	339
1985	471	10,655	12,377	32,163	1.3	78.0	1,022	936	−169
1989	533	11,553	13,689	36,118	2.8	82.0	1,029	862	−142

Source: Personal saving and disposable income taken from U.S. Bureau of Economic Analysis, 1986, *The National Income and Product Accounts of the United States, 1929–82*, Tables 2.1 and 5.1, and U.S. Bureau of Economic Analysis, 1986–1990, "National Income and Product Accounts: Revised Estimates," *Survey of Current Business* (July), Tables 2.1 and 5.1. Wealth information from Board of Governors of the Federal Reserve System, 1991, "Balance Sheets for the U.S. Economy, 1945–1990," (April) pp. 19–24. Real after-tax interest rate calculated as [(one-year T-Bill rate * (1 − average marginal tax rate)) − average inflation rate over the previous three years]. The pension funding variables are based on Wyatt Co. data from their *Survey of Actuarial Assumptions and Funding* on the percent of defined benefit plans with assets greater than accrued liabilities. The gap variable uses this information (FF), along with data on pension fund assets (A) taken from the Federal Reserve's "Balance Sheets" and the percentage of assets in defined benefit plans (DB) from EBRI (1990) to calculate the difference between accrued liabilities and assets using the following formula: GAP = ((A * DB)/FF) − (A * DB) = (A * DB)(1/FF − 1). The income adjustments are calculated as described in Kopcke, Munnell and Cook (1991).

these plans. The relationship between this pension funding "gap" and saving should be positive.

The space rent adjustment is the premium, discussed earlier, that people are willing to pay to own rather than rent a residence. It is the difference between the return to owner-occupied housing reported in the NIPA and the return calculated by applying the opportunity cost of funds to the housing stock. As evident in Table 2, this premium became very large in the wake of the housing boom and has been declining steadily over the 1980s.

A second accounting adjustment is also included, this one pertaining to the treatment of consumer durables. Currently the NIPA treat expenditures on durables as consumption; in fact, durables are very similar to owner-occupied housing in that they provide a stream of services over several years. Thus, on the consumption side, the adjustment involves subtracting outlays for consumer durables from consumption and adding back in an estimate of the value of consumer services. On the income side, the adjustment involves estimating the return to consumer durables by subtracting from the value of consumption services the interest payments used to finance the purchase of the consumer durables and depreciation. This step eliminates the current double-counting involved in including as outlays both the expenditure for the consumer durables and the interest payment to finance that expenditure. The variable included in the equation is the income adjustment.

Two variants of this equation were estimated. In the first, all variables were converted to 1982 dollars, using the implicit price deflator for personal consumption expenditures, and expressed on a per capita basis; the real interest rate was multiplied by real net worth to convert it into a dollar measure, and the pension funding gap was included, that is, the difference between accrued liabilities and assets in defined benefit plans. In the second variant, all variables were expressed as rates; saving and other dollar variables were divided by disposable income, while the full-funding measure and the real interest rate remained as rates.

The results of both equations explaining NIPA saving confirm the importance of the housing boom and pension funding on the saving pattern (Table 3). Housing enters in two places. The first is the stock of owner-occupied housing, which has a statistically significant negative coefficient indicating that for each dollar of unexpected increase in the value of housing, individuals reduce their saving out of current income by 9 cents. The coefficient on housing is three times

larger than that on other forms of wealth, reflecting the fact that housing is the major asset holding for most families.

Interpreting the coefficient is a little tricky. If all the gains in the per capita stock of housing simply reflected earlier saving and more investment in housing, then one would not expect a major shift in saving patterns. On the other hand, if increases in the housing stock resulted from unanticipated gains, then households would be expected to revamp their saving plans. Table 4 breaks down the change in the housing stock into investment and capital gains, revealing a sudden increase in the real value of housing beginning in 1966. Although it is beyond the scope of this paper, the housing boom appears to coincide with the coming-of-age of the baby-boom generation. It seems reasonable to assume that the real increase of roughly 3 percent per year for the 14 years from 1966 to 1979 caught households by surprise and caused them to reassess their saving needs. If so, a 44 percent increase in the real value of housing with initial per capita holdings of $7,000 produces an unexpected gain over the entire period of $3,080. Applying the coefficient of 0.09 would imply that individuals saved $277 less annually per capita because of the 1966–79 housing boom.

The second place that housing enters the equation is the income adjustment for space rents. This variable is included because the NIPA understate the return to homeownership. The coefficient confirms that if the premium that homeowners were willing to pay were included in income, saving would have

Table 3
Regression Results: Explaining Personal Saving, 1950 to 1989

	NIPA Saving		Adjusted Saving		NIPA Saving As a Percent of
Variable	Per Capita (1982 Dollars)	As a Percent of Disposable Income	Per Capita (1982 Dollars)	As a Percent of Adjusted Income	Disposable Income 1950–81
Disposable Income	.17	22.33	.37	.42	23.93
	(5.0)	(6.5)	(10.3)	(11.3)	(5.7)
Income Adjustments					
Housing Space Rent	.41	.35	.94	1.02	.26
	(4.1)	(3.0)	(8.8)	(7.9)	(.86)
Consumer Durables	.07	−.05	.98	.88	−.02
	(.8)	(.6)	(10.2)	(8.6)	(.15)
Net Worth: Housing	−.09	−.08	−.15	−.15	−.08
	(3.6)	(3.0)	(5.4)	(5.1)	(2.1)
Net Worth: Other	−.03	−.02	−.03	−.04	−.03
	(3.1)	(2.5)	(3.9)	(6.1)	(2.6)
Pension Funding[a]	.03	−.06	.01	−.02	−.06
	(8.4)	(8.6)	(3.5)	(3.0)	(.7)
Real Interest Rate	.04	.23	.02	.19	.28
	(2.2)	(2.9)	(1.1)	(2.6)	(2.8)
Constant	275.0	−5.7	−49.4	—	−7.2
	(3.2)	(.1)	(.5)		(.1)
$\bar{R}^2$	.88	.77	.99	.96	.47
DW	1.7	1.5	1.8	1.6	1.5
SE	52.7	.7	55.3	.7	.7
Mean of Dependent Variable	531	6.7	1192	13.5	7.2

[a]Pension funding is measured first as the dollar gap between accrued liabilities and assets in defined benefit plans and second as the percent of large plans with assets in excess of accrued liabilities. This explains the different coefficients in equations 1 and 3, on the one hand, and 2, 4, and 5 on the other.

Source: Authors' calculations.

Table 4
Percent Change in Real Value of Housing Stock due to Net Investment and to Capital Gains, Selected Periods, 1951 to 1990

Years	Percent Change in Housing Stock	Source of Change: Net Housing Investment (Percentage Points)	Source of Change: Capital Gains (Percentage Points)
1951–55	41.3	33.5	7.7
1956–60	22.5	23.5	−.9
1961–65	13.6	16.6	−3.0
1966–70	22.7	13.0	9.8
1971–75	28.4	15.1	13.3
1976–80	40.0	19.3	20.6
1981–85	6.6	10.9	−4.2
1986–90	8.9	17.1	−8.3

Source: Authors' calculations based on Board of Governors of the Federal Reserve System, 1991, "Balance Sheets for the U.S. Economy 1945–1990," C.9 Release (April), pp. 19–24, 61–66.

been considerably higher. Specifically, in the early 1980s, per capita income appears to have been understated by roughly $1,200; applying the coefficient of 0.41 to this amount suggests that personal saving was understated by $490. In other words, the housing boom not only directly reduced saving out of disposable income through the life-cycle behavioral response, but also resulted in a very large understatement of true saving because of the accounting problems.

Pension funding also appears to have had a substantial effect on NIPA personal saving. The enormous unfunded pension liability in the early 1970s combined with the passage of ERISA produced rapid growth in employer contributions to private pension plans. Then, in the wake of the stock market boom in the early 1980s, the funding gap, which had amounted to $5,615 per capita in 1980, declined to $1,022 by 1985; a coefficient of 0.03 on this variable suggests that the drop could have reduced per capita saving by roughly $138.

The second approach to the empirical exercise was to redefine both saving and income and reestimate the equations. That is, saving was augmented to include a substantial portion of the premium associated with homeownership and expenditures for consumer durables. Once again, the income adjustments were included as explanatory variables, but this time the expanded income measure was used as the denominator in the equation for the saving rate. The equations for the adjusted saving measures prompt two major observations. First, the independent variables provide a better fit for the adjusted than for the NIPA saving measure; in the per capita equation, the $\overline{R}^2$ rises from 0.88 to 0.99, and in the saving rate equation it goes from 0.77 to 0.96. Second, the results in terms of the sign, size, and significance of the coefficients are consistent across the two sets of equations. In other words, the equations for the adjusted measure confirm the important role for the housing boom and for pensions in determining the pattern of personal saving.

The final exercise was to determine the stability of the relationship between saving and the explanatory variables over time. For this purpose, the equation for the NIPA saving rate was estimated for the period 1950 to 1981 and the results were used to predict the saving rate for the years 1982 through 1989. The equation is presented in the last column of Table 3, and actual and projected saving rates are presented in Figure 4. Clearly the forces were already

Figure 4

Actual and Predicted Personal Saving Rates, 1950 to 1989

Source: U.S. Bureau of Economic Analysis, (1986, Table 5.1); and authors' calculations.

in place to produce dramatically lower measured NIPA saving in the 1980s than had been experienced in the 1970s. No fundamental shift in the nation's attitude toward thrift is required to explain the stunning decline in the official saving rate.

VI. Conclusions and Implications

This paper has shown that the NIPA personal saving rate was affected substantially by the housing boom and by pension funding regulations. It also showed that, in the wake of the housing boom, the NIPA saving rate understated personal saving, since the national accounts failed to account for the premium associated with homeownership and thereby understated income and saving. The question is why these findings are important.

First, the saving rate per se is not a very interesting notion; rather, the crucial issue is investment—that is, the share of current output put aside today to enhance living standards tomorrow. Policymakers and economists sense that too little of current output is being invested for the future and have seized on two available statistics—the personal saving rate and the budget deficit—to support their position. The serious understatement of income and saving in the wake of the 1966–79 housing boom suggests that the personal saving rate cannot be used as a measure of society's desire or efforts to defer consumption.

Second, concern about the rate of national investment, combined with the assumed link between investment and the personal saving rate, has created renewed enthusiasm for incentives to increase individual saving. The reported decline in the personal saving rate during the 1980s is used to document the need to enhance the return received by individuals for deferring consumption. The evidence presented above raises two questions about this line of reasoning. First, the saving rate during the 1980s was mismeasured; income and saving were understated because the return to owner-occupied housing was understated. A more appropriate measure of saving shows the personal saving rate declining from the heights of the 1970s, but declining back to historical levels, not to all-time lows. Second, the NIPA rate as reported has been driven down by the housing boom and by the run-up in the stock market in combination with the Internal Revenue Code's full-funding limitation on employer contributions to private pension plans. The forces were already in place in 1981 to produce the decline in the reported saving rate experienced during the 1980s; the decline did not result from any fundamental shift in individuals' attitudes toward thrift. Thus, the case for new saving incentives is not compelling.

In short, the personal saving rate and movements in this rate reveal little about society's willingness to defer consumption and invest for the future. Since investment is the ultimate goal, policy initiatives would be much better served by directly encouraging productive investment rather than stimulating the elusive concept of personal saving.

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