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4 Aggregate U.S. Private Saving: Conceptual Measures and Empirical Tests

Patric H. Hendershott and Joe Peek

Many researchers define saving synonymously with the change in real wealth: net worth at the end of the period less net worth (revalued to current prices) at the beginning of the period.[1] Saving, then, would be the change in real resources available for future consumption.[2] While this change is certainly an important variable worthy of serious investigation, the ex post change in real wealth in most periods is largely the result of unexpected wealth changes (stock market gains or losses, housing and land booms, etc.). That is, the change in real wealth is generally dominated by real asset price changes, not planned decisions to increase or decrease the accumulation of wealth.[3]

Alternatively, and more customarily, saving is defined in flow terms as income less consumption and taxes. Given initial wealth and expectations regarding after-tax income and real capital gains, saving and consumption are simultaneously determined. Movements in saving rates, then, lead observers to conclusions regarding the effects of policies on behavior. For example, a decline in the personal saving rate immediately following both the introduction of individual retirement accounts (IRAs) and a sharp increase in real interest rates might lead one to conclude that IRAs have not encouraged saving and that saving is highly interest

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inelastic. However, if the saving decline were due to mismeasurement, then one or both of these conclusions could be incorrect.

The proper conceptual measurement of personal and private saving is the subject of this paper. The official national income and product account (NIPA) saving series are increased to reflect saving via net purchases of government pension assets (including social security) and consumer durables and decreased by that part of after-tax interest income attributable to inflation. The need for these adjustments is well understood (see, e.g., Blades and Sturm 1982); our intended contribution is the careful implementation of the adjustments and analysis of the resulting adjusted saving series.

The plan of the paper is as follows. We begin with a discussion of the problems in the official measurement of personal and corporate saving and then propose adjustments to correct the official series. Next, the adjusted personal and private saving rates are computed and analyzed. Finally, personal saving equations are estimated on annual data for the 1952–85 period to verify that the proposed conceptual adjustments are consistent with the data, that is, that the estimated coefficients on the adjustments are significantly different from zero and not significantly different from their expected values (plus or minus unity). While such macro relations suffer from aggregation problems, the estimates seem appropriate for the task at hand.[4]

A number of interesting findings are obtained. First, correctly measured personal and private saving rates in recent years (1983–85) are 5 percent (not percentage points) below their averages since 1950, not, as reported in the official statistics, at all-time lows and 20 percent below their post-1950 averages. Second, the personal saving rate has been more volatile over the past thirty-five years than the official data indicate. Third, consistent with Auerbach's (1982) findings, corporate saving has been less volatile. Fourth, the often-observed negative correlation between personal and corporate saving is due solely to measurement error (the negatively correlated inflation premia in the two saving components). Fifth, both personal and private saving have rebounded somewhat in recent years (1983–85), again in contrast to the official series.

4.1 Adjustments to Personal and Corporate Saving

Saving is generally calculated residually as the difference between income received and certain outlays made. For personal saving, income received includes wages and salaries, dividends, rents, interest, and transfers; for business saving, income is profits. Outlays for both include consumption expenditures ("dividends" and "depreciation" for

businesses), taxes, and interest paid. For our purposes, it is convenient to define saving as

$$\text{SNIA} = \text{INC} - \text{CEXP} - \text{TAX} - \text{NINTP}, \tag{1}$$

where SNIA is NIPA saving, INC is income other than interest received, CEXP is consumption expenditures, TAX is tax payments, and NINTP is net interest payments (interest paid less interest received). Thus, measurement errors in income or in any of the terms subtracted from it will be embedded in saving, dollar for dollar. Significant conceptual errors are generally made in the measurement of personal income, consumption, and net interest income of both persons and businesses. Before turning to the adjustments necessary to correct these errors, we explain why and how noncorporate business saving is included in personal saving rather than being aggregated with corporate saving into a broad total business category.

4.1.1 Integration of Households and Noncorporate Businesses

Private saving is the sum of household and business saving, but the components of saving reported in the NIPA are personal and corporate saving. That is, saving of noncorporate businesses is integrated with that of households into personal saving. Thus, corporate and noncorporate business saving are treated decidedly differently.

In the NIPA, two categories of noncorporate nonfinancial business are delineated: (1) sole proprietorships and partnerships and (2) other private business. The first category is further subdivided into farm and nonfarm, the second into real estate and other. The other-private distinction is apparently for household "portfolio" rental activities, such as owning a small duplex or shares in rental or oil and gas partnerships. Such portfolio activities, being analogous to purchases of real estate investment trusts (REITs) and other corporate shares, certainly should be integrated with household personal accounts. However, farm and nonfarm sole proprietorships and partnerships are businesses, and the retention of earnings within these enterprises seems no different from the retention within corporations.[5]

Unfortunately, the division of proprietorship and rental income between wages earned and capital income is unclear. Moreover, given the residual definition of saving as income less outlays, one would need to allocate household expenditures, taxes, and interest paid between personal and business activities. Given the impossibility of separating any of the right-hand-side variables in equation (1) into their personal and business components, "household" and noncorporate business income and expenses are fully integrated, and the resulting saving measure is labeled "personal saving."

Table 4.1 illustrates the effects of integration on the 1985 household balance sheet. The underlying data, which include market values of tangible assets and corporate equity, are from the Board of Governors of the Federal Reserve System (1986). In these data, nonfinancial business activity is divided among corporate, farm (including a small amount of corporate), and nonfarm noncorporate. Longer-term financial asset and liability series have been converted from par to market values (the data in parentheses are par values) using updated bond-price indices from Eisner and Pieper (1984). The first column in the table contains the basic household data (plus nonprofit organizations and personal trusts), the second column the noncorporate data (plus a small amount for corporate farms), and the third column the integrated household-noncorporate accounts. For comparison purposes, the data for nonfinancial corporations (excluding farms) are listed in the fourth column. As can be seen, the basic household sector has about $5 trillion in tangible assets (two-thirds is owner-occupied housing and the land it is on and over three-quarters of the rest is consumer durables), almost $6 trillion in financial assets, nearly $4.5 trillion in corporate and noncorporate equity, and $2.5 trillion in debt ($1.5 trillion of which is mortgages). Household net worth is thus about $13 trillion.

The nearly $2.5 trillion of household noncorporate equity represents claims on over $3 trillion of tangible assets as well as nearly $1 trillion of net debt. Almost half the tangible assets is land, largely for farming, and half the remainder is rental housing. Thus, the merged household-noncorporate balance sheet in column 3 looks far different from the basic household balance sheet.

The balance sheet of nonfinancial corporations differs greatly from that of nonfinancial noncorporate business, owing to the large role of corporations in manufacturing and their small roles in rental housing (less than 5 percent of the stock) and farming (which is in the noncorporate accounts anyway). In addition, corporations have far larger holdings of financial assets than do noncorporate businesses. Noteworthy is the large difference between the net worth of corporations computed residually from the balance sheet ($3,238 billion) and the market value of household corporate equity holdings ($1,906 billion). About half the difference reflects indirect household equity holdings via their life insurance and pension reserves. The other half is the often-noted difference between the replacement cost and the market value of corporate assets (Tobin's q being less than unity).

4.1.2 Conceptual Saving Adjustments

Household retirement transactions with the private sector are accounted for correctly in the computation of saving. A dollar "contributed" to a retirement plan is a dollar of income not consumed and thus

Table 4.1 **Balance Sheets of Households and Nonprofits, Noncorporate Businesses, and Nonfinancial Corporations, 1985 (billions of dollars)**

	(1) Households and Nonprofits		(2) Noncorporate Businesses and Corporate Farms	(3) (1) + (2)		(4) Nonfinancial Corporations	
Tangible assets:							
Owner-occupied housing	2,381		65	2,446			
Consumer durables	1,393			1,393			
Plant and equipment	251[a]		667	918		2,701	
Rental housing	60[a]		883	943		47	
Inventories			116	116		789	
Land:							
Owner occupied	952			952			
Other	65[a]		1,504	1,569		526	
Plus Financial assets:							
Demand deposits and currency[b]	303		21	324		78	
Other deposit and credit market assets[b]	3,525	(3,506)	53	3,578	(3,559)	933	(933)
Life insurance and pension reserves	1,992			1,992			
Net other assets	107		61	168		173	

(*continued*)

Table 4.1 (continued)

	(1) Households and Nonprofits		(2) Noncorporate Businesses and Corporate Farms		(3) (1) + (2)		(4) Nonfinancial Corporations	
Plus Equity:								
Corporate	1,949		−43[c]		1,906		−3,238	(−3,234)
Noncorporate	2,388	(2,434)	−2,388	(−2,434)				
Minus Debt:								
Home mortgages	−1,570	(−1,495)[d]			−1,570	(−1,495)		
Other	−982	(−946)	−939	(−893)	−1,921	(−1,839)	−2,009	(−2,013)
	12,814	(12,952)	0	0	12,814	(12,952)	0	0

Source: Board of Governors of the Federal Reserve System (1986); and authors' adjustments of book-to-market values for debt instruments (book values are in parentheses).

[a]Assets of nonprofit organizations (largely private schools, churches, and hospitals).

[b]Negotiable order of withdrawal accounts included in other deposits; credit market instruments defined broadly to include security and trade credit.

[c]Equity of noncorporate farms.

[d]Includes $44 billion of other mortgages.

a dollar of saving. Similarly, a dollar of interest earned on retirement accounts and not consumed is a dollar of saving. Finally, a dollar of benefits received and not consumed does not affect measured saving; cumulated wealth is simply being transferred from one asset form to another. Unfortunately, the treatment of government retirement accounts in the official NIPA saving statistics is far different.[6] A dollar contributed to a government retirement plan or social security, or accrued as interest on either, is not included in personal income and thus is not counted as a dollar of saving. Also, all benefits received are classified as income (transfer payments) and thus raise saving, even though a part of benefits are certainly a return of principal or interest. Because contributions and interest earned exceed benefits paid in a growing retirement system, the net result of this asymmetrical treatment is an understatement of income and thus of saving.

Theoretical models of consumption and saving behavior (e.g., the Life Cycle Hypothesis, the Permanent Income Hypothesis, and their derivatives) are stated in terms of the consumption of service flows. These flows, rather than consumption expenditures, are a determinant of household utility. Thus, saving is the deferral of consumption of service flows. To be consistent with theory, only the consumption of service flows should be subtracted from income; the component of consumer expenditures representing net investment in consumer durable goods should properly be considered saving. Official NIPA measures of personal saving, however, are based on the subtraction of all consumption expenditures, rather than of service flows only, and thus understate personal saving.

A major problem with both household and business saving statistics is the measurement of interest income received and paid during inflationary periods. The expectation of net capital losses on fixed-dollar financial assets that are due to inflation leads to the incorporation of an inflation premium in nominal interest rates to compensate investors for the expected losses. Part of household and business stocks of fixed-dollar assets are being converted into flows (the inflation premium component) that are recorded inappropriately as interest income received. Conversely, part of household and business stocks of financial liabilities are being eroded, and the associated inflation premium is wrongly recorded as interest paid. These inflation premia obviously rise with the inflation rate. Because households are net creditors, the overstatement of interest paid is less than the overstatement of interest received. Thus, personal saving is overstated. Because corporations are net debtors, corporate saving is understated.

The above discussion is summarized in table 4.2: row 1 contains the official measure of the various variables used to compute saving, row 2 lists the conceptual error, row 3 indicates the effect of the error on

Table 4.2 **Conceptual Errors in the Calculation of Personal and Corporate Saving**

	Income	Consumption	Net Interest Paid
1. Official series:			
Personal	Personal income less interest received	All consumption outlays	Interest paid less interest received
Corporate	Profits (with IVA and CCA) less interest received	Dividends plus capital consumption	Interest paid less interest received
2. Error:			
Personal	Net government pension purchases excluded	Some outlays are net investment	Some net interest received is return of principal
Corporate			Some net interest paid is erosion of principal
3. Effect of error:			
Personal	Saving understated	Saving understated	Saving overstated
Corporate			Saving understated
4. Correction:			
Personal	Add net government pension purchases	Add net consumer durable outlays	Subtract return of principal
Corporate			Add erosion of principal

Note: IVA = inventory valuation adjustment; CCA = capital consumption allowance.

the saving measures, and row 4 states the required corrections to the official series. Note that business income is defined to include the NIPA capital consumption and inventory valuation adjustments.[7]

One final point. Corporate income taxes are measured on an accrual basis, while personal income taxes are on a cash basis. Because individuals plan consumption and saving over a period of years, not weeks, the appropriate measurement convention is the accrual method (see Peek 1982). Thus, household tax payments need to be converted to an accrual basis.

4.1.3 Actual Consumption, Income, and Tax Adjustments

Some of the adjustments to the official saving series are straightforward. For the personal consumption mismeasurement, net (of depreciation) purchases of consumer durables (SCDUR) are added;[8] for the government employee life insurance and pension adjustment to personal income, net purchases of government life insurance and pension reserves (SGPEN) are added. Each of these series is available from the Federal Reserve flow-of-funds accounts.

As for social security, Blades and Sturm (1982) argue that contributions plus accrued interest less benefits should be added to personal saving.[9] This procedure seems appropriate if social security promises a fair market return. However, if social security is a bad investment, then some of the contribution should be viewed as a tax paid, and, if social security is an extraordinary investment, then households are receiving a transfer payment above and beyond their contribution. More generally, the addition to personal saving should be

$$(1 + \beta)\,\mathrm{CON} + i^m \mathrm{ACCON} - \mathrm{BENE},$$

where CON is current contributions, ACCON is the implicit cumulated stock of contributions and past interest earned, BENE is benefits paid, i^m is the fair market interest rate, and the sign (and magnitude) of β depends on how much the promised return on social security, i^s, exceeds or falls short of the market rate of return:

$$\beta \gtreqless 0 \quad \text{as} \quad i^s \gtreqless i^m.$$

Unfortunately, β and ACCON are not known. Thus, our adjustment for social security is more conjectural than our other adjustments.

Munnell, speculating that households might view social security old-age and survivors insurance (OASI) contributions as saving, added them to official saving (Munnell 1977, fig. 6-1, p. 115). Adding contributions to saving is the correct adjustment if one assumes that the transfer component of contributions, βCON, plus accrued interest at the market interest rate equals benefits received. This equality may have held approximately during the 1950s, 1960s, and 1970s. For example, the equality would hold if contributions equaled benefits (approximately correct since the mid-1950s), accumulated contributions equaled twenty-five times benefits paid, the market interest rate were 0.03, and the return on social security were perceived to be sufficiently above market that twenty-five cents of transfers accompanied every dollar of contributions ($\beta = 0.25$). We adopt this assumption as a working hypothesis and thus add OASI contributions (both employee and employer) to personal saving, denoting the adjustment as SSSEC. The contributions data are from U.S. Department of Health and Human Services (1986, table 15, p. 81).

In the late 1970s and early 1980s, the need to revise benefits downward and contributions upward (lower i^s relative to i^m and thus lower β) became clear. Declining birth rates, increased life expectancy, and likely slower real growth were all contributing factors (McSteen 1985). Legislation in 1983, which advanced scheduled tax-rate increases, taxed half of benefits above a fixed nominal total income level, and raised the

retirement age for future retirees, confirmed expectations of a reduced β. To account for a decline in β, we freeze the OASI adjustment at its 1980 real level of $119.5 billion (SSSEC80) for the entire 1981–85 period. The difference between SSSEC and SSSEC80 is roughly $10 billion in 1981–83 and $35 billion in 1984–85.

Figure 4.1 contains SGPEN, SGPEN plus SSSEC (or SSSEC80), and the sum of SGPEN, SSSEC (or SSSEC80), and SCDUR in constant 1982 dollars. Net purchases of government life insurance and pension reserves and social security OASI contributions have risen monotonically from $6 and $10 billion, respectively, in the early 1950s to $60 and $155 billion ($120 billion with the 1980s adjustment) in the mid-1980s. The net durables series has a strong cyclical component as well as an upward trend. On a trend basis, the series has risen, erratically, from $30 billion in the early 1950s (1950 and 1951 data were greatly affected by the outbreak of the Korean War) to $90 billion in the mid-1980s.

The personal income tax timing adjustment (STAX) is the difference between NIPA federal personal income tax payments and federal personal income tax accruals as calculated by the Bureau of Economic Analysis. The latter series is based on individual income tax return data adjusted for liability changes that are due to audits, amended returns, and additional assessments.[10] Most of the difference between payments and accruals (which has fluctuated between −7 and 16 billion 1982 dollars) arises because the net refund for tax year t is included in the liabilities of year t and in the cash payments of year $t + 1$. The

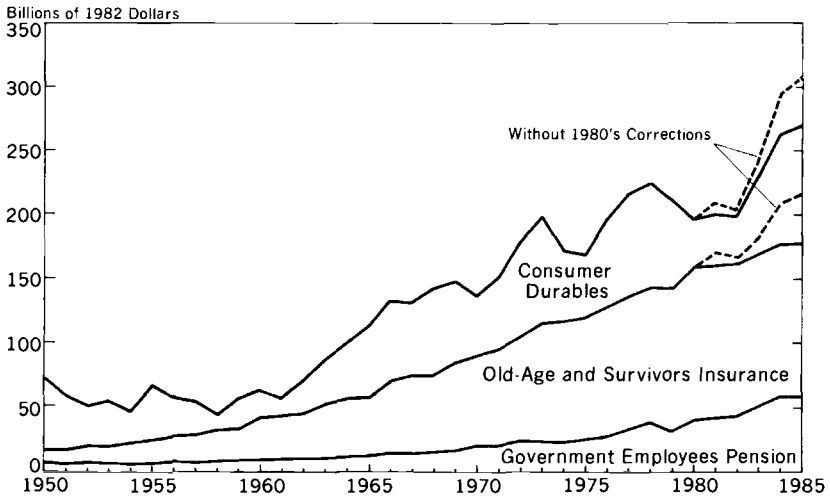

Fig. 4.1 Adjustments to personal saving

major fluctuations in the net refund series are due to differences in the timing and magnitude of the changes in income tax rates and the corresponding withholding schedules.

4.1.4 Inflation Premium Adjustments

A simple specification of the inflation premium is the product of the anticipated inflation rate and the stock of net fixed-income assets (see, e.g., Jump 1980).[11] This specification implies immediate, complete adjustment of interest income to the current anticipated inflation rate. In fact, net interest income included in personal saving did not adjust anywhere near this rapidly during the 1965–79 period of rising inflation. First, binding interest rate ceilings on at least some demand and savings accounts have existed in the United States since the early 1960s. Once these nominal interest rate ceilings became binding, the monetary interest payments on such assets incorporated an additional inflation premium only as rapidly as ceiling interest rates were raised. Second, while additional interest from financial institutions was imputed to individuals when interest rates (inflation) rose, imputed interest responded sluggishly to interest rate increases. Third, a significant part of fixed-coupon household assets and liabilities are long term. For these instruments, coupon receipts/payments adjust to an increase in interest rates only over time as new bonds are issued to replace maturing bonds (yields adjust immediately via a decline in the market price of the instruments). Thus, the inflation component of NIPA interest income and expenses substantially lagged the increase in the anticipated inflation rate. (The adjustment to a decrease in inflation will occur more rapidly to the extent that refinancing results in high coupons being replaced by lower coupons and deposit rate floors do not exist.)

The final problem with the simple specification of the inflation premium as the product of anticipated inflation and the stock of net fixed-income assets is the treatment of tax liabilities incurred on monetary interest income. Taxes are ignored in the specification, but only the net-of-tax inflation premium component is available to individuals to maintain the real value of their net financial assets during an inflationary period. If the real value falls by more than the net-of-tax premium, then an uncompensated real capital loss is incurred.

Similar arguments can be made against such a specification for the inflation premium in business net interest paid. Interest payments increase sluggishly when interest rates rise because some debt is long term. Moreover, interest is fully tax deductible, so the cost of the erosion of outstanding debt is only the net-of-tax inflation premium.

We have constructed inflation premium adjustments for personal and corporate saving that are based on the relevant measures of NIPA interest income and expense. Table 4.3 presents the components of the

Table 4.3 **Interest Income Received and Paid, 1985 (billions of dollars)**

	Households:		Nonfinancial Corporations
	As Persons	As Business	
Interest received:			
Monetary	310.1	8.4	105.3
Imputed[a]	91.0	0	0
Total	401.1	8.4	105.3
Interest paid	82.6	251.5	219.4

Source: NIPA table 8.8.

[a]Imputed interest from life insurance carriers and private pension plans (an unpublished Bureau of Economic Analysis series: the interest component of NIPA table 8.8, line 50). Because the imputed interest from banks, credit agencies, and investment companies does not enter into the calculation of the saving series, it has been omitted from the table.

interest measures relevant to our adjustments for 1985. Household interest received equals monetary interest received by persons and noncorporate businesses plus imputed interest received by persons from life insurance carriers and private noninsured pension plans. Imputed interest received by persons from banks, credit agencies, and investment companies is omitted because this interest is included in both personal income and consumer expenditures (in the latter as services furnished without payment by financial intermediaries) and thus nets out in the calculation of personal saving. Imputed interest received by noncorporate business and nonfinancial corporations is not included in their net income (and hence in personal income) for the same reason. Interest paid by households includes interest paid by proprietorships and partnerships and that on consumer credit and home mortgages.[12]

In general, the before-tax inflation premium component added to personal saving is calculated as

$$\text{(2)}\quad \text{SINFPERBT} = (\text{RRECPER} - \text{RRECPER50})\text{APER} - (\text{RPAIDPER} - \text{RPAIDPER50})\text{LPER},$$

where APER and LPER, respectively, represent the stocks of household fixed-income assets and liabilities at the beginning of the period, RRECPER and RPAIDPER, respectively, represent the ratios of the household interest series just discussed to APER and LPER, and RRECPER50 and RPAIDPER50 are the 1950 values of RRECPER and RPAIDPER.[13] This procedure allocates any increase in interest income/expense (adjusted for the growth in financial assets/liabilities) to our inflation component measure. It is likely that the inflation premium component in 1950, if any, was extremely small. To the extent that this

component was nonzero, our measures differ from the true components by a small constant.

To obtain the after-tax inflation premium, SINFPER, we divide the inflation premium terms into their taxable and nontaxable components and multiply the taxable component by 1 − TXPER, where TXPER is the assumed tax rate on personal interest income/expense.[14] The nontaxable portion is the imputed interest income from life insurance and private pension fund reserves and the interest received on state and local government bonds. The after-tax inflation premium is the sum of the nontaxable and the after-tax taxable terms.

The above equation implicitly assumes that the real interest rate built into interest income was constant during the 1950–85 period.[15] Because an increase in the real interest rate in the early 1980s is well documented (Clarida and Friedman 1983; and Hendershott 1986), we have constructed an inflation premium with a special adjustment for the early 1980s, SINFPER80. This premium allows for the gradual adjustment of interest income to a 3 percentage point increase in real interest rates in 1981. On the basis of an examination of changes in the differences between both RRECPER and RPAIDPER and the Livingston expected inflation data for the 1978–85 period, the SINFPER80 calculation assumes that the real interest rate incorporated in interest receipts and expenses was 1 percentage point higher in 1981, 2 points higher in 1982, and 3 points higher during 1983–85. This is equivalent to adding 1, 2, and 3 percentage points to the values of RRECPER50 and RPAIDPER50 for 1981, 1982, and 1983–85, respectively.

The after-tax inflation premium component netted from corporate saving is calculated directly as

$$\text{(3)}\quad \text{SINFCOR} = (1 - \text{TXCOR})[(\text{RPAIDCOR} - \text{RPAIDCOR50})\,\text{LCOR} - (\text{RRECCOR} - \text{RRECCOR50})\text{ACOR}],$$

where TXCOR is the maximum corporate tax rate and the other variables are defined analogously to those used in the personal inflation premium adjustment except that they refer to interest paid/received by nonfinancial corporations on their stocks of liabilities/assets.[16] SINFCOR80 is SINFCOR calculated with the same adjustment to RPAIDCOR50 and RRECCOR50 that was made to RRECPER50 and RPAIDPER50 in the calculation of SINFPER80. The annual series underlying the inflation premium adjustments are listed for 1950–85 in tables 4.4 and 4.5.

Figure 4.2 contains graphs of SINFPER, SINFCOR, SINFPER80, and SINFCOR80, again in 1982 dollars. The upward surge in the series, owing to both rising inflation (interest rates) and growing real (net) stocks of financial assets (households) and liabilities (corporations), is

Table 4.4 Series Used in Calculation of Inflation Premium for Personal Saving

	RRECPER (%)	RPAIDPER (%)	APER (billions of 1982 dollars)	LPER (billions of 1982 dollars)	TXPER (%)	SINFPER80 (billions of 1982 dollars)
1950	3.47213	6.67765	885.569	346.890	30.0000	0
1951	3.62734	6.31558	864.240	393.454	30.3000	1.17095
1952	3.78848	6.53545	860.559	418.250	32.4000	1.60004
1953	3.89554	6.72429	902.713	459.938	31.4000	1.96519
1954	4.02821	6.69979	962.390	501.293	28.4000	3.24317
1955	4.08097	6.93031	1,019.70	554.528	28.5000	2.94494
1956	4.22877	6.81111	1,071.92	628.785	29.2000	4.76539
1957	4.54734	6.97978	1,101.46	667.828	28.9000	6.99265
1958	4.64783	7.08339	1,161.29	699.622	28.6000	7.77630
1959	4.81918	7.31863	1,197.68	740.423	28.7000	8.54296
1960	5.03400	7.39512	1,249.80	800.947	27.9000	10.6701
1961	4.97613	7.25813	1,343.23	865.178	28.1000	11.6896
1962	5.23429	7.34574	1,409.46	922.403	27.3000	14.5868
1963	5.33418	7.41829	1,502.21	989.720	26.9000	16.2594
1964	5.59896	7.56336	1,575.97	1,072.81	24.7000	19.5194
1965	5.72340	7.54045	1,678.31	1,164.62	24.0000	22.6639
1966	5.89077	7.43275	1,745.77	1,248.80	24.3000	26.6974
1967	6.03193	7.44494	1,817.28	1,291.72	25.2000	29.5664
1968	6.13088	7.62368	1,876.79	1,333.80	27.6000	29.6173
1969	6.52220	7.98455	1,925.77	1,375.37	28.8000	32.2455
1970	7.05883	8.21503	1,923.00	1,404.16	27.5000	38.1481
1971	6.99428	8.32244	2,016.38	1,464.93	27.4000	37.6406
1972	6.95614	8.34080	2,102.10	1,585.28	28.3000	37.4130
1973	7.20567	8.35859	2,211.84	1,733.44	29.2000	42.3995
1974	7.73404	8.51718	2,223.77	1,768.64	30.3000	48.9060
1975	7.68269	8.66644	2,215.23	1,737.21	30.0000	47.2946
1976	7.59892	8.83102	2,314.65	1,782.80	30.8000	45.9414
1977	7.69806	8.95511	2,488.39	1,898.76	31.1000	49.6751
1978	8.05590	9.28648	2,570.19	2,037.51	32.5000	52.4066
1979	8.90958	9.88541	2,623.69	2,127.10	33.5000	60.2478
1980	9.96542	10.2795	2,672.13	2,168.89	35.5000	75.7653
1981	11.7073	11.3744	2,680.44	2,113.07	36.6000	87.6004
1982	11.5109	11.9017	2,831.30	2,100.11	33.3000	79.2545
1983	10.2373	11.4400	3,136.94	2,276.92	29.5000	61.9581
1984	10.7530	11.2722	3,321.55	2,512.49	31.6000	79.2944
1985	9.93531	10.9157	3,682.87	2,735.17	31.6000	74.1202

clear. The series rise from under $1 billion to peaks of $104 billion ($88 billion with the real rate adjustment) for households and $41 billion ($36 billion) for corporations. The business premium is generally 25–35 percent of the household premium until 1969. During the 1970–82 period, the business premium ranged between 40 and 48 percent of the household premium, before declining to just under 40 percent in recent years. The relatively high business premium in the 1970–82 period

Table 4.5 Series Used in Calculation of Inflation Premium for Corporate Saving

	RPAIDCOR (%)	RRECCOR (%)	LCOR (billions of 1982 dollars)	ACOR (billions of 1982 dollars)	TXCOR (%)	SINFCOR80 (billions of 1982 dollars)
1950	2.85923	1.54279	347.075	197.917	60.4000	.625985
1951	2.82839	1.35521	381.538	238.886	67.4500	.728603
1952	3.03263	1.42381	394.767	247.303	64.6000	1.04571
1953	2.95627	1.37445	419.914	250.884	64.2000	1.01444
1954	3.03899	1.35119	428.224	253.454	52.0000	1.57428
1955	3.10570	1.56251	458.425	260.338	52.0000	1.51578
1956	3.15123	1.53044	506.052	303.910	52.0000	1.89241
1957	3.30919	1.72385	536.142	299.404	52.0000	2.04559
1958	3.51458	1.70430	540.245	297.089	52.0000	2.60809
1959	3.70191	1.95630	568.696	316.513	52.0000	2.88552
1960	3.91519	2.01275	590.017	347.330	52.0000	3.53865
1961	3.85295	1.99045	631.317	347.002	52.0000	3.59599
1962	4.04220	2.05675	666.050	359.618	52.0000	4.27352
1963	4.15746	2.34922	704.165	370.151	52.0000	4.37428
1964	4.21240	2.38181	748.235	396.991	50.0000	4.98240
1965	4.26573	2.33330	796.786	421.355	48.0000	5.84551
1966	4.56703	2.52404	859.137	453.406	48.0000	7.19924
1967	4.90450	2.65485	900.172	470.837	48.0000	8.80650
1968	5.28326	3.14811	939.161	476.881	52.8000	8.92976
1969	6.19463	3.78531	1,000.08	509.028	52.8000	12.2754
1970	7.08312	4.10079	1,026.77	528.638	49.2000	17.3072
1971	6.49681	3.97785	1,103.85	526.300	48.0000	16.4014
1972	6.35713	4.01425	1,172.20	560.103	48.0000	16.4492
1973	7.17331	5.06742	1,241.98	609.957	48.0000	19.2155
1974	8.04000	5.57038	1,277.89	659.666	48.0000	23.3504
1975	8.49088	6.01390	1,128.00	564.570	48.0000	22.2516
1976	8.21072	6.34924	1,122.59	561.059	48.0000	19.5464
1977	8.10676	6.60031	1,203.95	583.771	48.0000	19.9242
1978	9.05009	7.69456	1,233.23	601.642	48.0000	22.9534
1979	10.4931	9.18456	1,269.86	655.776	46.0000	28.1149
1980	12.0062	10.4335	1,291.68	698.363	46.0000	33.2841
1981	14.6499	13.1575	1,253.36	702.177	46.0000	35.8125
1982	14.7015	13.0457	1,280.14	702.145	46.0000	35.0345
1983	12.4382	12.5213	1,380.89	685.095	46.0000	22.4964
1984	13.6668	12.8099	1,426.85	767.649	46.0000	29.1985
1985	12.3820	11.7272	1,583.50	802.422	46.0000	28.1052

reflected much higher interest rates relative to the 1960s and the depressing effect of deposit rate ceilings on household interest earned.

4.2 Official and Adjusted Saving Rates

Our adjusted personal saving series incorporates the five adjustments to SNIA described above. The first four adjustments are added to

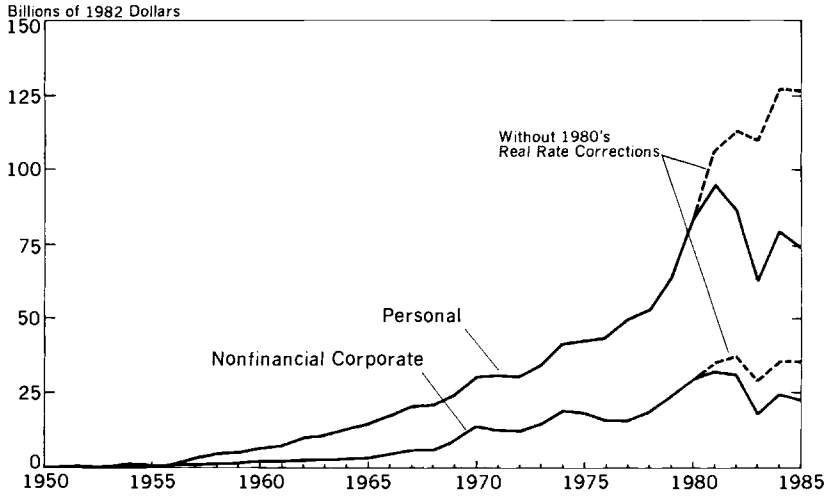

Fig. 4.2 Personal and corporate after-tax inflation premium adjustments

SNIA, while the inflation component is subtracted. Adjusted personal saving is thus

$$\text{(4)} \quad \text{SADJPER} = \text{SNIAPER} + \text{SCDUR} + \text{SGPEN} + \text{SSSEC80} + \text{STAX} - \text{SINFPER80}.$$

To obtain an adjusted personal saving rate, we divide the adjusted series by adjusted disposable income (and multiply by 100). The adjustments to disposable income are those indicated in the income and net-interest-paid columns of table 4.2 and the tax-timing adjustment. The adjusted income series is calculated as

$$\text{(5)} \quad \text{YDADJ} = \text{YDNIA} + \text{STAX} + \text{SGPEN} + \text{SSSEC80} - \text{YINF80},$$

where YDNIA is NIPA personal disposable income and YINF80 is the inflation premium adjustment for disposable income. The latter is computed from a relation similar to the after-tax version of equation (2) but with the interest income received/paid (adjusted for the rise in real rates in the 1980s) and asset/liability stock series redefined appropriately. The interest income received/paid series are increased, respectively, by including imputed interest received from banks, credit agencies and investment companies ($63.9 billion in 1985), and interest paid by consumers to business ($82.6 billion in 1985); the asset stock is increased by demand deposit holdings and the liability stock by other debt of households.

Our adjusted corporate saving series includes only the inflation premium adjustment:

$$\text{SADJCOR} = \text{SNIACOR} + \text{SINFCOR80}, \tag{6}$$

where SNIACOR already incorporates the NIPA capital consumption and inventory valuation adjustments. Owing to the inflation premium adjustment, the ratio of adjusted corporate saving to adjusted official disposable income is 15 percent greater, on the average, than the ratio of official corporate saving to official disposable income. However, the standard deviation of the adjusted ratio is 18 percent less. Our adjusted private saving series is the sum of the adjusted personal and corporate saving series:

$$\text{SADJPRI} = \text{SADJPER} + \text{SADJCOR}. \tag{7}$$

The components needed to compute these series are listed for 1950–85 in tables 4.6 and 4.7.

Figures 4.3 and 4.4 present the adjusted and official personal and private saving rates, respectively. The most obvious difference in the adjusted and official series is their average values. Given our additions to official saving, the adjusted personal series is over 6 percentage points greater than the official, on the average, while the adjusted private rate is nearly 7 percentage points greater. Moreover, the differences between the adjusted and the official series are far larger since 1970 than in the 1950s and early 1960s. The trend increase in the differences is the result of trends in our adjustments. The retirement contributions (government employees pension and social security) correction has a strong upward trend, adding 2 percentage points to saving rates in the early 1950s but 7 percentage points in the 1980s. The inflation premium correction also has an upward trend, rising from zero to nearly 4 percentage points of adjusted disposable income (for personal saving) in the early 1980s, before tailing off. No trends exist in the durables and tax-timing adjustments.

The retirement correction and the difference between it and the inflation premium corrections for personal and private saving, respectively, are plotted in figure 4.5. As can be seen, the difference (the net adjustment to saving) raises the official personal and private saving rates from 2 percentage points in the early 1950s to 4 points (5 for private saving) in the mid- and late 1970s, after which the effect is roughly constant.

The adjusted personal saving rate is more volatile than the official rate; its standard deviation is 60 percent greater. Moreover, the adjusted rate contains some broad movements that are not evident in the official rate. In particular, the adjusted saving rate declines from above 14 percent in 1950–51 to below 11 percent in 1958–61 and then rises back to over

Table 4.6 **Personal Saving and Its Adjustments (billions of 1982 dollars)**

	SADJPER	SNIAPER	SCDUR	SGPEN	SSSEC80	STAX
1950	114.817	48.0916	56.8702	6.87023	10.1794	−7.19466
1951	117.955	59.7122	41.0072	5.75539	12.0971	.553957
1952	115.865	61.2676	30.6338	7.04225	13.4472	5.07394
1953	120.855	63.4483	35.5172	6.55172	13.6034	3.70000
1954	102.202	56.1644	23.9726	5.47945	17.6815	2.14726
1955	119.875	54.2373	43.0509	6.10170	19.3661	.064407
1956	124.866	70.7641	29.2359	7.97342	20.5050	1.15282
1957	123.204	73.2258	25.4839	7.09677	22.0161	2.37419
1958	114.299	76.8987	11.7089	8.86076	23.9430	.664557
1959	113.494	67.4922	23.8390	8.97833	24.9288	−3.20124
1960	121.883	63.2219	22.1884	9.72645	33.0274	4.38906
1961	118.923	74.7748	13.5135	10.2102	33.8889	−1.77478
1962	135.088	76.6272	25.4438	10.3550	35.6775	1.57101
1963	142.367	71.3044	34.4928	11.3044	42.1478	−.623189
1964	164.406	90.2579	43.2665	12.6074	44.9542	−7.16046
1965	189.125	96.3483	56.7416	13.2022	44.9916	.505618
1966	208.948	98.0926	63.2153	15.2589	56.0763	3.00272
1967	223.330	119.947	56.6489	14.6277	61.5372	.135638
1968	218.500	108.142	68.4478	15.5216	60.3537	−4.34860
1969	228.330	102.927	63.9024	17.3171	68.1634	8.26585
1970	242.497	134.499	46.3869	20.7459	70.5268	8.48718
1971	260.744	147.661	57.2383	21.1581	75.1069	−2.77951
1972	290.411	131.477	74.5182	24.8394	80.9015	16.0878
1973	336.499	179.798	83.2323	23.8384	92.8788	−.848485
1974	302.352	176.782	54.6618	23.0347	95.2121	1.56673
1975	304.322	176.689	47.9730	25.5067	95.9729	5.47466
1976	302.464	153.035	68.5303	28.2748	101.217	−2.65176
1977	305.575	135.982	79.9100	33.7331	104.306	1.31934
1978	326.979	154.126	82.2377	39.0210	105.554	−1.55245
1979	314.377	151.023	69.0537	31.2020	112.428	10.9182
1980	276.859	158.083	36.8360	40.7621	119.464	−2.52079
1981	285.723	168.499	39.5349	41.9662	119.464	3.85941
1982	281.839	153.900	37.2000	43.9000	119.464	6.63000
1983	302.453	125.456	60.2306	51.3929	119.464	7.86744
1984	335.047	156.059	85.7539	59.1120	119.464	−6.04718
1985	324.790	128.061	91.9571	59.4281	119.464	0.0

14 percent in 1966. During the same time span, the official rate moves erratically within a 1.75 percentage point band. The two series also move differently since 1978. The adjusted series declines from nearly 15 percent to below 12.5 percent in 1980–82 and then rises slightly in 1984–85. In contrast, the official rate is nearly constant at about 7 percent throughout the 1978–82 period and then drops to 5.5 percent in 1983–85. That is, the adjusted series is 1 percentage point higher in 1983–85 than in 1980–82 rather than 1.5 percentage points lower.

Figure 4.6 presents the national and government (federal, state, and local) saving rates, both adjusted and unadjusted, as percentages of net

Table 4.7 Other Saving and Income Series (billions of 1982 dollars)

	SADJPRI	SNIACOR	YDADJ	YDNIA	YINF80
1950	146.740	31.2977	801.840	791.985	0.0
1951	150.338	31.6547	836.501	818.705	.610829
1952	150.713	33.8028	867.980	844.366	1.94956
1953	151.525	29.6552	899.911	879.655	3.59890
1954	137.338	33.5616	912.512	892.123	4.91936
1955	171.561	50.1695	964.880	945.085	5.73726
1956	168.951	42.1927	1,009.77	988.372	8.23759
1957	164.927	39.6774	1,033.30	1,012.58	10.7714
1958	148.870	31.9620	1,050.30	1,028.16	11.3275
1959	164.677	48.2972	1,083.96	1,066.87	13.6111
1960	167.671	42.2492	1,121.10	1,090.88	16.9193
1961	165.161	42.6427	1,147.95	1,122.52	16.8920
1962	198.237	58.8758	1,199.76	1,172.19	20.0331
1963	210.219	63.4783	1,234.56	1,205.22	23.4820
1964	241.881	72.4928	1,316.40	1,293.41	27.4121
1965	282.892	87.9214	1,394.58	1,367.42	31.5330
1966	307.428	91.2806	1,470.80	1,432.97	36.5017
1967	315.115	82.9787	1,530.99	1,494.95	40.2550
1968	302.239	74.8092	1,581.21	1,551.14	41.4639
1969	302.069	61.4634	1,648.49	1,601.71	46.9568
1970	301.529	41.7249	1,711.18	1,668.06	56.6385
1971	335.943	58.7973	1,768.93	1,730.07	54.6237
1972	380.522	73.6616	1,864.53	1,797.86	55.1533
1973	430.462	74.7475	1,972.85	1,918.79	61.8059
1974	362.631	36.9287	1,949.07	1,898.35	69.0914
1975	389.242	62.6689	1,987.24	1,930.40	70.1152
1976	396.132	74.1214	2,057.54	2,000.96	70.2597
1977	418.902	93.4032	2,132.37	2,067.92	74.9047
1978	446.436	96.5035	2,227.59	2,169.51	84.9369
1979	421.776	79.2839	2,269.52	2,211.38	96.4107
1980	353.677	43.5335	2,262.69	2,214.78	109.790
1981	367.201	45.6660	2,299.27	2,249.05	115.070
1982	336.874	20.0000	2,327.31	2,261.40	104.079
1983	387.389	62.4400	2,423.99	2,332.47	87.1984
1984	448.427	84.1813	2,537.72	2,470.49	105.299
1985	448.784	95.8892	2,601.90	2,527.26	104.250

national product. The area between the two pairs of national and government saving rate lines represents private saving. Less than half our adjustment to private saving represents a net addition to national saving. For the 1950–85 period, the private saving rate (as a percentage of net national product) is increased by 5.5 percentage points; the national saving rate is increased by only 2.5 percentage points (owing to the consumer durables adjustment). The remaining increase to private saving comes from a 3 percentage point reduction in the government saving rate (2.5 federal and 0.5 state and local). The federal government saving adjustment is composed of the tax-timing adjustment, the social security

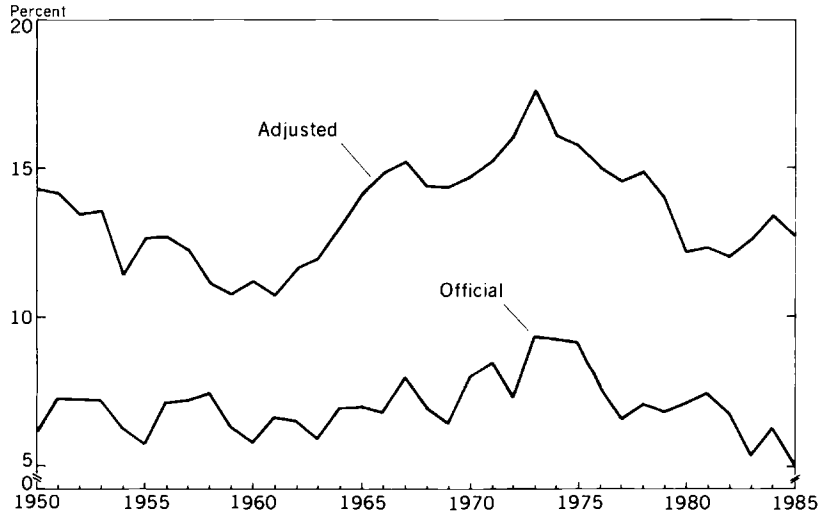

Fig. 4.3 Official and adjusted personal saving rates

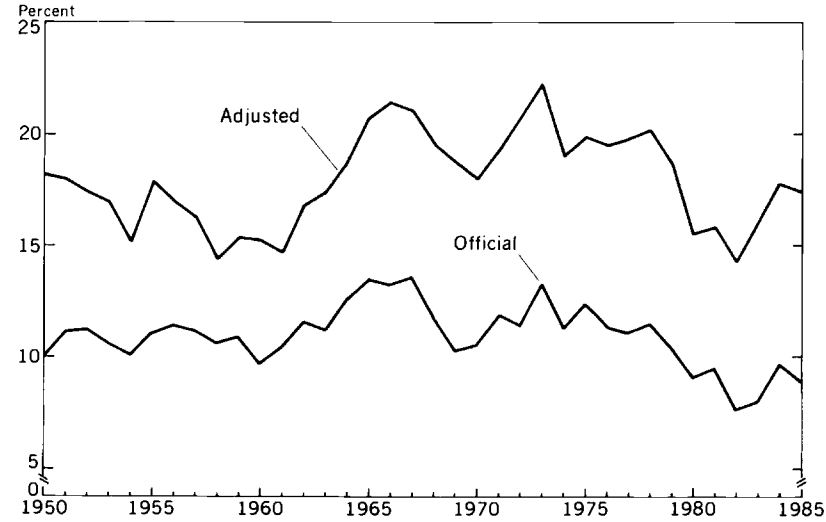

Fig. 4.4 Official and adjusted private saving rates

adjustment, about one-quarter of the government employees pension adjustment (SGPEN), and a portion of the net inflation premium adjustment (SINFPER80 – SINFCOR80). The federal government share of the net inflation premium adjustment oscillates from 80 percent in the 1950s down to almost 50 percent by the early 1970s and then back

to 80 percent by 1985. The state and local saving adjustment is composed of the remainder of the SGPEN and net inflation premium adjustments.

Table 4.8 contains average national, private, and federal government saving rates, both official and adjusted, for the 1982–85 period and the three preceding decades, 1952–61, 1962–71, and 1972–81, each of

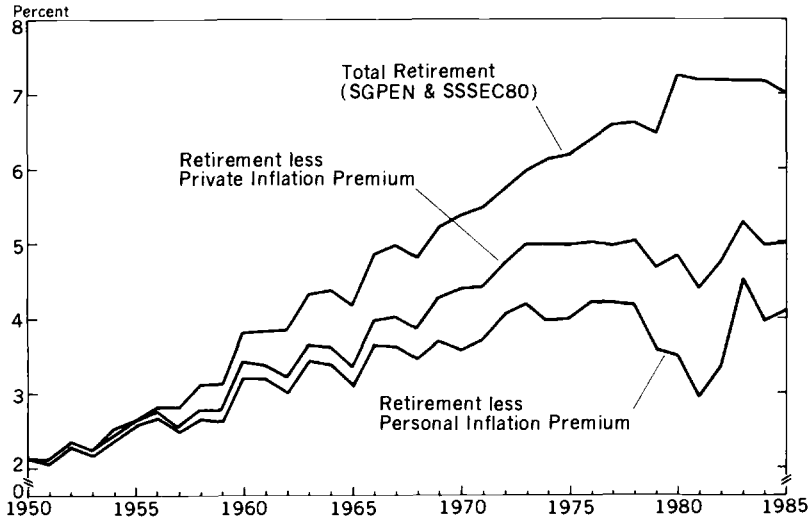

Fig. 4.5 Trend adjustments

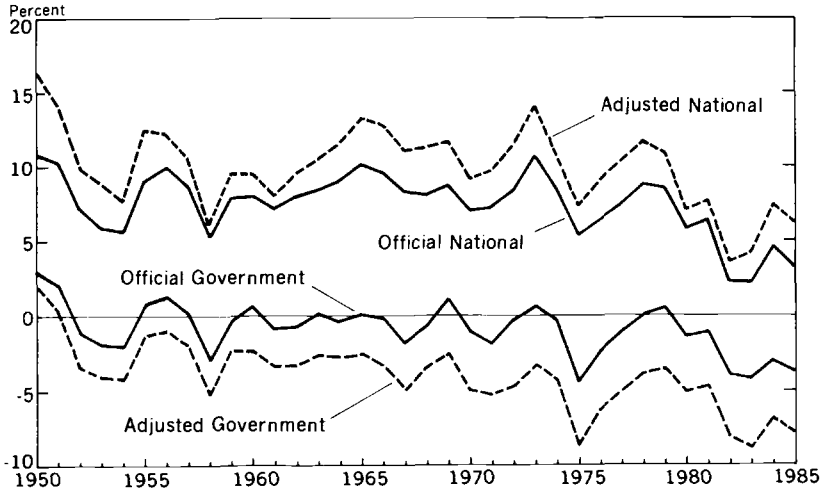

Fig. 4.6 Adjusted and official national and government saving rates

Table 4.8 **Official and Adjusted National, Private, and Federal Government Saving Rates (percent of net national product)**

	National		Private		Federal Government	
	Official	Adjusted	Official	Adjusted	Official	Adjusted
1952–61	7.50	9.55	8.16	12.33	−.46	−2.25
1962–71	8.48	11.14	9.05	14.48	−.65	−3.18
1972–81	7.64	10.08	8.64	15.12	−2.06	−5.67
1982–85	3.11	5.38	6.88	13.52	−5.43	−8.86

which concluded with a recession.[17] All three official saving rates are reasonably constant for the three decades, although the federal and national saving rates were both down by about 1 percentage point in the 1970s. In contrast, 2 and over 3 percentage point declines occurred in the private and federal saving rates, respectively, in the 1982–85 period, giving a whopping 4.5 percentage point decline in the national saving rate. The component adjusted saving rate series decline in a similar fashion from 1972–81 to 1982–85, but the context of their declines is far different. For one thing, the decline in federal saving is not a one-time aberration but the continuation of a trend; the decrease from 1972–81 to 1982–85 is only slightly greater than the decrease from 1962–71 to 1972–81. On the other hand, the decline in the private saving rate reverses an upward trend. Thus, the 1982–85 rate is 1 percentage point above the 1952–61 rate rather than at an all-time low.

4.3 Personal Saving Equation Estimates

Estimates of equations explaining real per capita personal saving are reported in this section. The primary purpose of the equations is to provide a test, albeit crude, of our proposed personal saving adjustments. If, for example, an adjustment should have a coefficient of minus unity in an equation explaining NIPA saving and the estimated coefficient is positive, this would constitute strong grounds for rejecting our adjustment. The equations are based on a model of planned wealth accumulation that includes measures of wealth, income, capital gains, the gross national product (GNP) gap (all in per capita constant 1982 dollars), the real after-tax interest rate, and the age composition of the population as explanatory variables (for a detailed description of the model, see Hendershott and Peek 1985a). This section begins with a discussion of the variables and estimation procedure, reports the results, and then analyzes their implications for the relation between personal and corporate saving.

4.3.1 The Variables and Estimation Procedure

Our adjusted disposable labor income measure is equal to the NIPA measures of wages and salaries, other labor income, and a proportion of proprietor's income, less labor's share of actual personal income tax liabilities and employee contributions for social insurance, plus the sum of government employees retirement benefits and SGPEN (equal to contributions plus accrued interest on cumulated contributions) and both SSSEC80 and OASI benefit payments (assumed to equal accrued interest on the stock of cumulated OASI contributions). The latter additions are needed to make the income measure consistent with our adjusted saving measure. Transfer payments are set equal to NIPA transfer payments less both government employees retirement benefits and OASI benefits (which we have reallocated to disposable labor income).

Both adjusted real disposable labor income and adjusted real transfer payments are divided into their expected and unexpected components through regression analysis (for specific details, see Hendershott and Peek 1985a). The predicted value from an equation with the variable in question being regressed on a set of predetermined variables is taken as the expected component; the residual series from the regression is taken as the proxy for the unexpected component. We use annual observations for the 1951–85 period. The explanatory variables for real per capita labor income/transfer payments are four lagged values of the dependent variable and one lagged value of each of the following: real government expenditures, the difference (gap) between potential and actual real GNP, the real value of the narrowly defined money supply (M1), the one-year after-tax nominal Treasury bill yield (RAT), an index of marginal personal income tax rates, and the one-year-ahead Livingston expected inflation rate from the December survey (π). The potential GNP measure is the middle expansion trend GNP series calculated by the Bureau of Economic Analysis. All variables except for interest, tax, and inflation rates are per capita.

The real net capital gains data were calculated from the Board of Governors of the Federal Reserve System (1986) as in Hendershott and Peek (1985b). We combined household assets and liabilities (including noncorporate business holdings) into three categories: (1) tangible capital (residential structures, consumer durable goods, land, and the plant and equipment and inventories of nonprofit institutions and noncorporate business); (2) corporate equities, held both directly and indirectly through household life insurance and pension fund reserves; and (3) all other financial assets less liabilities. The real capital gains measures were divided into their expected and unexpected components using a regression procedure similar to that used for the labor income

and transfer variables. The capital gains regressions have the ratio of net capital gains to the beginning-of-period stock of assets as the dependent variable. The explanatory variables include four lagged values of the dependent variable, the expected inflation rate, and lagged values of the first-differences of all the explanatory variables in the labor income/transfer equations. For the equities equation, we also include both our adjusted corporate saving variable lagged one period divided by the beginning-of-period stock of corporate equities and the top corporate income tax rate.

Below, we present estimates of personal saving equations with and without our tax-timing, government pension, social security, and inflation premium adjustments. The consumer durables adjustment cannot be employed as a regressor because it is an endogenous decision variable.[18] According to the Life Cycle/Permanent Income Hypothesis, individuals choose their level of consumption (durable plus nondurable) subject to their budget constraint. Not only do they choose the level of their consumption, but they also choose its composition; they can substitute more or less durable services for nondurables and services within their total consumption. In contrast, consumer choice over government employees pension or social security contributions and the inflation premium in interest income is severely limited, and thus these adjustments can be employed as regressors. The hypothesized minus one coefficient on the consumer durables adjustment is *imposed* in our estimation by adding this adjustment to NIPA saving and using this sum as the dependent variable.

Regressors considered, in addition to our saving adjustments and the income and capital gains variables previously described, include the beginning-of-period stock of real household wealth (with financial assets and liabilities converted from par to market values) from Board of Governors of the Federal Reserve System (1986); the share of the population over age sixty-four from the Council of Economic Advisers (1987); the real GNP gap; and the one-year after-tax expected real interest rate from the previous December, calculated as RAT $- \pi$. Both the population share and the real interest rate variables (less their mean values) have been multiplied by expected adjusted real disposable labor income. All the dollar variables are per capita constant 1982 dollar magnitudes.

The rather high correlations between pairs of explanatory variables make it very difficult to pinpoint the individual effects of the variables on personal saving. For example, the pairwise correlations between wealth, expected labor income, expected transfers, share of population over age sixty-four, SINFPER80, SGPEN, and SSSEC80 are each above 0.9. Furthermore, the pairwise correlations of each of these

variables with expected capital gains on net financial assets range between −0.88 and −0.92. First-differencing the data substantially reduces the collinearity between pairs of explanatory variables. Consequently, the equations have been estimated using first-differenced data. To simplify the exposition and to preserve degrees of freedom, we have combined the expected and unexpected components of adjusted disposable labor income, which tended to have very similar estimated coefficients. Similarly, because the estimated coefficients on expected transfer payments, expected and unexpected capital gains on net financial assets, and unexpected capital gains on tangible assets tended to be statistically insignificant (and, in many cases, quite erratic) across the various saving equation specifications, they have been omitted from the equations presented in the table. Finally, the one-year after-tax real Treasury bill rate was omitted because it never had a coefficient of either quantitative or statistical significance.[19]

Table 4.9 lists the annual values of the underlying income and capital gains variables employed; table 4.10 contains annual values of the wealth, GNP gap, and share of population over age sixty-four variables as well as the population and price (personal consumption deflator) series used to convert the variables to real per capita values.

4.3.2 The Estimates

Columns 1 and 2 in table 4.11 are estimated with data from the full 1952–85 sample period. The first column explains personal saving (including net durables, SNIAPER + SCDUR) without our proposed adjustments. Only the coefficients on wealth, disposable labor income, population share, and expected gains on tangible assets are statistically significant at the 95 percent confidence level with the predicted sign, although the unexpected transfer payments and GNP gap variables contribute to the explanatory power of the equation. In column 2, our saving adjustments (without the 1980s modifications) are included as additional explanatory variables. Each of the estimated coefficients on the four adjustment variables, except that on SSSEC, is more than two standard errors from zero with the expected sign, and that on SSSEC is nearly two standard errors from zero. Moreover, none of the four estimated coefficients are more than two standard errors away from their predicted values. However, the point estimates of the coefficients on both SGPEN and SINFPER are more than one standard error greater than their predicted values.

Because the equation underlying column 2 makes no special modification for either the 1980s decline in the expected rate of return on social security relative to market interest rates or the 1980s rise in real interest rates, the estimates are suspect. The problem with the 1980s

Table 4.9 **Income and Capital Gains Regressors (billions of 1982 dollars)**

	Disposable Labor Income	Expected Disposable Labor Income	Unexpected Transfers	Expected Capital Gains on Tangibles	Expected Capital Gains on Equities	Unexpected Capital Gains on Equities
1952	712.033	714.994	−.996596	−23.6644	50.6966	−20.4824
1953	740.798	722.594	−2.74272	18.9905	12.7700	−48.5985
1954	744.181	766.129	2.56290	−23.0304	181.424	61.3535
1955	792.188	801.673	−1.48341	38.7237	132.045	34.5562
1956	835.777	837.259	1.09040	52.2574	−33.4491	58.2429
1957	852.610	858.213	−1.40838	5.60093	70.3883	−223.059
1958	854.143	863.228	8.08566	11.6434	321.562	2.60369
1959	891.756	904.531	−2.98386	48.5902	57.7643	6.90525
1960	921.073	919.437	−1.61325	−40.1458	−47.9675	9.27656
1961	938.973	947.694	5.85560	48.7047	125.827	183.317
1962	985.174	981.883	−2.35641	10.0481	41.4844	−257.679
1963	1,014.77	1,037.76	−.826178	21.7782	107.671	108.101
1964	1,089.24	1,051.74	−2.02050	−5.30211	22.2578	111.837
1965	1,157.50	1,150.41	−2.07097	−36.5888	384.905	−211.248
1966	1,227.97	1,210.73	−.620632	23.1387	74.0213	−301.956
1967	1,271.51	1,273.73	7.11006	−80.8843	275.857	86.2283
1968	1,319.20	1,336.83	−2.70948	35.1256	−59.4526	349.605
1969	1,374.09	1,365.45	−6.76241	−21.3546	−575.661	200.040
1970	1,419.76	1,396.52	−5.19148	−85.5128	−249.114	131.943

1971	1,461.32	1,458.06	−1.85800	34.1214	177.194	14.7430
1972	1,545.53	1,530.34	4.07099	149.965	11.0519	130.596
1973	1,627.99	1,610.79	−.753529	56.3680	−583.386	−44.4732
1974	1,596.42	1,633.24	2.46929	30.1998	−160.863	−409.710
1975	1,603.04	1,597.59	20.4542	7.65396	204.291	35.3645
1976	1,673.66	1,679.58	4.38220	147.518	332.863	−190.838
1977	1,744.50	1,763.60	3.61491	166.509	−95.9255	−72.4244
1978	1,820.08	1,802.54	−2.79025	211.814	−12.5711	−46.3101
1979	1,851.20	1,833.68	1.42846	189.879	125.979	−3.92644
1980	1,829.55	1,850.95	4.04897	140.270	110.858	159.938
1981	1,834.07	1,838.87	−13.3642	−5.92587	−142.723	−16.2415
1982	1,840.05	1,832.49	−1.92113	−311.419	75.5721	46.9768
1983	1,903.60	1,892.92	−3.86014	117.652	224.651	−59.5040
1984	2,021.72	2,012.75	−8.74482	−8.52137	46.3441	−51.2612
1985	2,077.01	2,103.42	5.49889	−73.2014	84.0190	378.951

Table 4.10 Other Variables Used in the Estimations

	Wealth (billions of 1982 dollars)	GNPGAP (billions of 1982 dollars)	Population Over 64 (%)	Personal Consumption Deflator	Total Population (millions)
1952	3,731.63	−66.9006	8.38004	.284000	157.553
1953	3,828.43	−59.0993	8.50085	.290000	160.184
1954	3,891.66	16.8994	8.63421	.292000	163.026
1955	4,251.45	−18.5000	8.75364	.295000	165.931
1956	4,558.41	−3.59912	8.84413	.301000	168.903
1957	4,716.73	6.90063	8.94735	.310000	171.984
1958	4,627.57	54.3991	9.03810	.316000	174.882
1959	5,076.27	1.69995	9.13682	.323000	177.830
1960	5,219.43	17.9006	9.22948	.329000	180.671
1961	5,270.39	32.0993	9.30312	.333000	183.691
1962	5,664.32	1.10010	9.35842	.338000	186.538
1963	5,536.23	−6.29931	9.39432	.345000	189.242
1964	5,831.70	−35.5000	9.44661	.349000	191.889
1965	6,142.55	−76.2997	9.49599	.356000	194.303
1966	6,450.65	−120.599	9.54162	.367000	196.560
1967	6,462.38	−104.500	9.59731	.376000	198.712
1968	6,983.71	−116.500	9.64844	.393000	200.706
1969	7,489.31	−88.9001	9.71003	.410000	202.677
1970	7,247.24	6.80004	9.80581	.429000	205.052
1971	7,213.76	30.0998	9.90123	.449000	207.661
1972	7,595.64	−2.00000	10.0145	.467000	209.896
1973	8,080.00	−66.6000	10.1577	.495000	211.909
1974	7,750.13	17.1999	10.3159	.547000	213.854
1975	7,368.16	122.200	10.5087	.592000	215.973
1976	7,771.13	63.0993	10.6763	.626000	218.035
1977	8,355.22	5.30004	10.8482	.667000	220.239
1978	8,634.07	−77.4999	11.0079	.715000	222.585
1979	9,148.14	−79.5997	11.1679	.782000	225.055
1980	9,564.73	2.69995	11.2867	.866000	227.738
1981	10,009.9	18.0998	11.4001	.946000	230.138
1982	10,167.9	172.499	11.5375	1.00000	232.520
1983	10,049.3	132.000	11.6815	1.04100	234.799
1984	10,615.9	−4.59985	11.7995	1.08100	237.019
1985	10,831.1	−23.4006	11.9231	1.11900	239.283

observations can be solved either by eliminating the troublesome 1981–85 observations from the estimation period (col. 3) or by retaining the entire sample period but using the modified measures of the social security (SSSEC80) and inflation premium (SINFPER80) adjustments (col. 4). For the 1952–80 subperiod, each of the estimated coefficients on the saving adjustments is within one standard error of its predicted value, with the exception of that on STAX, which is just slightly more than a single standard error away. All but the inflation premium coefficient differ significantly from zero. Alternatively, when SSSEC80 and

Table 4.11 **Personal Saving (including net investment in consumer durables) Regressions, Annual Observations for 1952–85 (first-differences of real per capita data, standard errors in parentheses)**

Explanatory Variables	(1)	(2)[a]	(3)[b]	(4)	(5)	(6)	(7)
Tax-timing adjustment (STAX)	. . .	−1.034 (.232)	−1.276 (.266)	−1.016 (.226)	−1.020 (.225)	−1.00	−1.00
Government pension adjustment (SGPEN)	. . .	−1.704 (.692)	−1.593 (.721)	−1.613 (.640)	−1.868 (.592)	−1.00	−1.00
Social security adjustment (SSSEC80)	. . .	−1.023 (.575)	−1.429 (.618)	1.401 (.479)	−1.516 (.464)	−1.00	−1.00
Inflation premium adjustment (SINFPER80)	. . .	1.926 (.651)	.739 (.884)	1.225 (.398)	1.224 (.396)	1.00	1.00
Wealth	−.0309 (.0152)	−.0411 (.0119)	−.0287 (.0127)	−.0345 (.0105)	−.0382 (.0099)	−.0375 (.0090)	−.0357 (.0087)
Adjusted labor income	.497 (.087)	.599 (.075)	.584 (.075)	.566 (.062)	.552 (.060)	.503 (.050)	.489 (.049)
Unexpected transfers	−.783 (.505)	.134 (.385)	.656 (.422)	.322 (.382)	.298 (.379)	.096 (.312)	.124 (.301)
Percent population over age 64	−3.60 (1.68)	−3.68 (1.39)	−3.05 (1.57)	−2.83 (1.22)	−1.50	−1.50	−1.50
GNP gap	.0693 (.0488)	.0814 (.0351)	.0476 (.0445)	.0958 (.0348)	.0949 (.0346)	.0786 (.0303)	.0997 (.0314)

(*continued*)

Table 4.11 (continued)

Explanatory Variables	(1)	(2)[a]	(3)[b]	(4)	(5)	(6)	(7)
Expected gains on tangible assets	−.0657 (.0257)	−.0211 (.0213)	−.0318 (.0311)	−.0363 (.0183)	−.0356 (.0182)	−.0387 (.0160)	−.0491 (.0164)
Expected gains on corporate equities	−.0058 (.0137)	−.0239 (.0110)	−.0215 (.0108)	−.0246 (.0099)	−.0288 (.0091)	−.0251 (.0081)	−.0289 (.0081)
Unexpected gains on corporate equities	.0013 (.0131)	−.0092 (.0094)	−.0167 (.0099)	−.0138 (.0091)	−.0146 (.0090)	−.0142 (.0081)	−.0124 (.0079)
Nuclear fear	. . .	. . .	. . .	. . .	. . .	. . .	.00134 (.00073)
R^2	.632	.854	.862	.866	.861	.817	.836
SEE	63.87	43.81	41.93	41.92	41.67	39.88	38.46
DW	2.31	2.06	2.00	1.84	1.87	2.05	2.25

[a]The social security and inflation premium adjustments for this column, SSSEC and SINFPER, do not include the 1980s corrections.

[b]These estimates are for the 1952–80 period.

SINFPER80 are used as regressors and the equation is estimated over the entire 1952–85 sample period, each of the four coefficients differs significantly from zero, and each of the four is within a single standard error of its predicted value. All the estimated coefficients except for those on unexpected transfer payments and unexpected gains on corporate equities are now statistically significant with the expected sign. The introduction of the saving adjustments reduces the standard error of the equation by 35 percent compared to column 1. Whether we omit the 1981–85 observations or modify the social security and inflation premium adjustments, we obtain very similar results. As we move from column 3 to column 4, the sharpest differences are the doubling of the GNP gap coefficient and the sharp declines in both the unexpected transfer payments coefficient and the standard errors of the inflation premium adjustment coefficient and the coefficient on expected gains on tangible assets.

The only problem with the estimates in column 4, in our view, is the magnitude of the population share coefficient. This coefficient implies too large a negative effect of the aging of the population. In fact, a coefficient of -1.5 is as large, in absolute value, as seems plausible (Hendershott and Peek 1985a, 89). Constraining the coefficient to this value (col. 5) makes little difference. The equation standard error is reduced somewhat, and none of the individual coefficients changes by as much as half a standard deviation. The pension adjustment coefficients are now slightly more than one standard error from their expected values.[20]

Column 6 contains estimates with the coefficients on all the saving adjustments constrained to their theoretical values. These estimates imply significant positive labor income (coefficient of 0.50) and GNP gap (0.79) responses, significant negative wealth (-0.038) and expected gains on tangible assets (-0.039) and corporate equities (-0.025) relations, and an almost significant negative response to unexpected gains on equities (-0.014). The unexpected transfer payments coefficient, in contrast, is less than half a standard error from zero.

The final equation in table 4.11 includes Slemrod's (1986) nuclear fear variable. Increased fear of nuclear holocaust would likely reduce the propensity to save. When this variable (scaled by expected real adjusted disposable labor income per capita) is added to our basic equation, the estimated coefficient is significantly greater than zero (t-statistic $= 1.84$).[21] Of the other estimated coefficients, only those on the GNP gap and expected gains on tangible assets change (barely) by as much as half a standard error.[22]

How do the various explanatory variables interact to explain the broad swings in the adjusted personal saving rate discussed earlier, namely, the rise from an average 11.5 percent rate in the 1954–64 period

to nearly 15 percent in the 1966–78 period and then the decline to 12.5 percent in the 1980s? The two upper series plotted in figure 4.7 are the adjusted personal saving rate and the wealth/income ratio. The negative correlation between the series is obvious. The lower series is an average of the rate of growth in our real adjusted disposable income series for the current year and the preceding two. This average correlates positively with the saving rate and negatively with the wealth ratio, although the correlations break down somewhat in the 1969–78 decade. The correlations with the saving and wealth ratios indicate the two channels through which real income growth affects saving: more rapid growth raises the saving rate both directly because the marginal propensity to save exceeds the average and indirectly because the saving rate is negatively related to the wealth/income ratio, which falls when income grows more rapidly than wealth. The last relevant part of the explanation concerns movements in the stock market. Stock market gains averaged (as a share of income) 9.2, −2.9, and 6.0 percent in the 1954–66, 1968–78, and 1980–85 periods. These gains alter the wealth/income ratio (the negative gains in the middle period explain the breakdown in the negative relation between income growth and the wealth ratio) and also have a small direct effect on the saving rate.

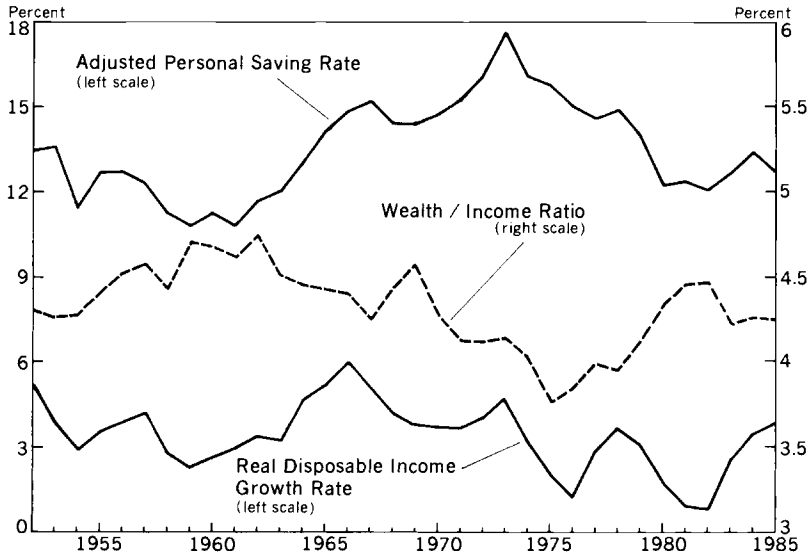

Fig. 4.7 Adjusted personal saving rate, wealth/income ratio, and real income growth

4.3.3 The Corporate Veil and Denison's Law

A question often asked is, Do households directly alter their saving in response to changes in corporate saving (Feldstein 1973)? The answer usually given is yes, to a significant extent (Howrey and Hymans 1978; and von Furstenberg 1981). That is, the coefficient on corporate saving when it is added to a personal saving equation generally lies between -0.45 and -0.7 and is statistically different from zero. If we regress official NIPA saving on the variables in column 1 plus official NIPA corporate saving, we get a similar result (coefficient of -0.43 with standard error of 0.23). However, this estimate comes from an equation in which both personal and corporate saving are mismeasured. More important, the measurement errors are negatively correlated; personal saving is too high during inflationary periods, and corporate saving is too low. When the series are corrected, that is, personal saving is lowered by the household inflation premium adjustment (and augmented by the other adjustments) and corporate saving is raised by the corporate inflation premium adjustment, the coefficient on corporate saving is positive (0.18 with a standard error of 0.13).

Even earlier, Denison (1958) focused attention on the relative stability of the *gross* private saving rate. He argued that, for many purposes, analysis of the total private saving rate is more appropriate than considering the personal and corporate saving components separately: "Indeed, it was the clear tendency, readily observable even in the dollar figures, for personal saving and corporate saving to move in offsetting fashion that first led me to deal directly with total saving" (p. 264). Later work by David and Scadding (1974) and others confirmed this relation. When official gross saving rates are plotted for the 1952–85 period, the negative correlation between them is, indeed, "readily observable"; moreover, the simple correlation coefficient is -0.31. However, such a relation is not observable between the adjusted saving rates, and their simple correlation coefficient is 0.33. Thus, the often-noted negative correlation between the personal and the corporate saving rates, either gross or net, appears to be due to the negatively correlated inflation premia inappropriately contained in the official saving measures.

The absence of a negative relation between household and business saving, correctly measured, does not mean that households do not respond rationally to corporate real wealth accumulation. If corporations were to generate an additional dollar of retained earnings through wise investments, the market value of corporate equity would rise. If the higher retained earnings were not expected to continue, then the equity value would increase by \$1 and households, by our estimates,

would consume 1.2 cents (the coefficient on unexpected corporate equity gains) in the current year and 3.6 cents (the wealth coefficient) in subsequent years. If retained earnings were expected to be higher in perpetuity, then the market value of corporate equity would rise by a multiple, say $25, and households would consume thirty cents of the initial $1 (0.012 times $25) and ninety cents (0.036 times $25) in each of the subsequent years.

4.4 Summary and Conclusion

Personal and private saving rates have hit post-1950 lows in the 1980s, according to official saving statistics. The average personal saving rate for 1983–85 was 5.6 percent, less than any year in the 1950–82 period and 20 percent below the average rate for that period. The average private saving rate for 1982–85 was 8.6 percent, less than any year in the 1950–81 period and 23 percent below the average rate for that period.

But the official statistics contain a number of conceptual measurement errors. The major ones are (1) treating net investment in consumer durables as consumption; (2) effectively treating net investment in government retirement plans, especially social security, as taxes; and (3) counting as interest income that part of interest received that is both due to inflation and available to compensate for inflation's erosion of fixed-valued asset stocks. The first two errors cause the official personal and private saving rates to understate the true rates; the last causes an overstatement of both rates, although less for private saving because the private sector is a smaller net creditor than is the personal sector.

The consumer durables correction is highly cyclical and generally raises saving rates by between 1.5 and 4.5 percentage points over the 1952–85 period. The retirement contributions correction, in contrast, has a strong upward trend, adding 2 percentage points to saving rates in the early 1950s but 7 percentage points in the 1980s. The inflation premium correction also has an upward trend, rising from zero to 3.5 percentage points (for personal saving) in the early 1980s, before tailing off. The difference between these trend adjustments raises the official personal and private saving rates by increasing amounts between 1951 and the mid-1970s.

Because of this trend in our adjustments, our adjusted saving rates in the mid 1980s are generally higher than the rates during the 1950–65 period and only slightly below the averages for the entire 1950–85 period. For adjusted personal saving, the rate for each year so far in the 1980s exceeds every year in the 1957–63 period, and the adjusted rate for 1984–85 exceeds the rate in every year in the 1954–64 span. Moreover, the 1984–85 rate is less than half a percentage point below the 1950–83 average, in contrast to the 1.5 percentage points the official

rate is below its 1950–83 average. The adjusted personal saving rate was low in 1954–64, high in 1966–78, and then slightly below average in 1980–85.

Basically, the same description holds for the adjusted private saving rate, which recently is only slightly below its 1950–85 average but above its value during most of the 1950s and early 1960s. More specifically, the 1984–85 rate exceeds the rate in every year between 1952 and 1963, except 1955. Furthermore, the adjusted private saving rate in 1984–85 is only a quarter percentage point below the 1950–83 average, in contrast to the 2 percentage point difference in the official private saving rate for the same two periods.

In contrast to personal saving, corporate saving has been less volatile than the official statistics indicate. The official rate has been especially low during high inflation periods (1974–75, 1980–82). When the inflation premium correction is added (some of corporate interest expense is simply compensation for declines in the real value of their debt), these low values are smoothed out. The inflation premium corrections, for both corporate and personal saving, have another interesting effect: they remove the negative correlation between personal and corporate saving. For the 1950–85 period, the official personal and corporate saving rates, where disposable personal income is the denominator, exhibit a correlation of -0.23, but the adjusted saving rates, where adjusted disposable income is the denominator, have a correlation coefficient of 0.17. That is, earlier evidence on households "seeing through the corporate veil" reflected measurement errors in the two series (the negatively correlated inflation premia). Households respond rationally to corporate retentions that raise stock prices and thus wealth; they do not irrationally respond to retentions that are not viewed as increasing wealth.

To summarize, private saving has been relatively robust in recent years, according to our adjusted saving series. While the rate is below peak rates in the 1970s, it is up from its early 1980s low and is close to the average rate for the 1950–82 period. On the other hand, the decrease in federal government saving in the 1982–85 period, rather than being a one-time aberration, is simply the continuation of a trend toward larger negative saving starting in the 1960s.

Notes

1. See, e.g., Auerbach (1985), Kane (1985), and Jianakoplos (1985).

2. As straightforward as this definition is, conceptual and practical difficulties exist in the determination of what constitutes an increase in real resources,

not the least of which is measuring changes in unfunded pension wealth (private and social security), a task requiring heroic assumptions about future legislation, tax treatment, and discount rates (see, e.g., Auerbach 1985; and Hendershott and Peek 1985b).

3. See Hendershott and Peek (1985a).

4. Auerbach and Kotlikoff (1983) illustrate how relations that exist (by construction) in individual household data can "disappear" when macroeconomic relations are estimated on data aggregated over the households.

5. Rather than being retained, capital was withdrawn from these enterprises at an annual rate of $64 billion over the 1982–85 period.

6. For a fascinating analysis of the illogic of government accounting methods, including those for social security, see Kotlikoff (1986).

7. We also considered an accelerated-depreciation adjustment for business saving. When capital purchases are written off faster than capital productivity erodes, taxes on current profits are postponed. In effect, businesses are borrowing interest free to reduce current taxes, and thus saving is overstated. The overstatement of saving is the implicit amount firms are borrowing in order to be able to pay the extra taxes that will come due when economic depreciation on today's investment eventually exceeds tax depreciation. However, the extra taxes come due only to the extent that the business shrinks or depreciation allowances are made less generous in the future. For an ongoing concern that does not expect a shortening of tax lives, the implicit amount borrowed is zero; the deferral is a permanent gift.

8. To be complete, we should also impute income from the use of durables to consumption. However, the same imputation would be made to personal income, leaving saving unaffected.

9. Blades and Sturm (1982) claim to have made this adjustment, but we do not know how accrued interest (either the rate of return on social security or the stock of accumulated contributions to which it is applied) could be calculated.

10. For a more detailed discussion of the tax liabilities series, see Park (1986) and articles cited therein.

11. The inflation adjustment was first addressed by Poole (1972). His measure of the inflation premium in disposable income was constructed as

$$\text{YPREM} = \frac{\pi}{\text{RCB}}\,\text{YINT},$$

where π, RCB, and YINT represent the anticipated inflation rate, the corporate bond rate, and net interest income, respectively.

12. Because the NIPA convention treats homeowners as businesses, the other private business component of NIPA interest paid includes mortgage interest on owner-occupied housing. This enters the calculation of personal income (and hence personal saving) through the imputed component of personal rental income. NIPA-imputed rental income is calculated as space rent less certain costs incurred by homeowners such as intermediate goods and services consumed, property taxes, and mortgage interest. Thus, given the value of space rent from the product side of the accounts, a dollar increase in mortgage interest payments would reduce imputed rental income by a dollar.

13. In terms of table 4.1, the asset stock equals the integrated household holdings (col. 3) of other deposits and credit market assets plus life insurance and pension fund holdings of the same assets (which are implicit in household insurance and pension reserves), all at market values. The liability stock equals

the market value of the stock of integrated household liabilities (mortgage debt plus other debt).

14. The TXPER series is constructed from data contained in annual issues of the U.S. Internal Revenue Service's *Statistics of Income*. Following Wright (1969), the tax rate is calculated as a weighted average of the marginal personal income tax rate for each adjusted gross income class. The weight for each class is equal to its share of the total interest received by all income classes.

15. This is not meant to suggest that we think the real interest rate was constant; ample empirical evidence exists that the real rate has varied cyclically (e.g., Hendershott and Huang 1985). However, during the 1950–80 period, this variation has been on the order of only 2 percentage points. Moreover, the variation in the rate built into interest income is substantially less given the lags with which this income reflects rate movements. In contrast, interest income incorporates a major (6–8 percentage point) trend increase in expected inflation between 1950 and 1980.

16. In terms of table 4.1, the asset stock equals nonfinancial corporate (col. 4) other deposits and credit market instruments at market value. The liability stock equals the market value of other debt. The after-tax premium can be calculated directly because the nontaxable interest income of corporations is negligible.

17. Because this study is primarily concerned with private saving, the adjustment to federal government saving is incomplete, e.g., government net investment in tangible capital should be included as net investment in consumer durables is included in household saving. We have made only those adjustments to government saving that are required by our adjustments to private saving.

18. We thank Edward McKelvey for emphasizing the general problem of bias in the estimated coefficients on the adjustment variables. Technically, bias will exist if a variable is correlated with the error term. As noted in the text, this is likely to be true for the consumer durables adjustment but not for the other adjustments.

19. While the real after-tax interest rate has a negligible direct effect on personal saving, this rate has a major indirect effect through capital gains on tangible wealth (Hendershott and Peek 1985a).

20. The Federal Reserve series for government employees pension contributions exhibits surprising volatility (especially troubling is a $4.5 billion decline in the state and local component in 1979 followed by a $10 billion increase in 1980). Holloway (chap. 1, in this vol.) presents an alternative series excluding military federal employees. When we use his series for state and local employees and the Federal Reserve's federal employee's series (about one-quarter of the total), the estimated coefficient rises by 35 percent, and its standard error increases by 50 percent. The pension coefficient is still nearly three standard deviations from zero and less than two standard deviations from minus unity.

21. The coefficient and its level of significance are much higher when Slemrod's nuclear fear variable is included in an equation explaining official NIPA personal saving without the saving adjustments. When combined with the regressors included in col. 1, the coefficient is 0.0049 with a t-statistic of four.

22. Because corporate equities account for such a large proportion of the movement in total household wealth, we reestimated our final equation with wealth separated into two components: corporate equities and noncorporate equity wealth. The noncorporate equity component has the larger effect (-0.0398 vs. -0.0326), but the coefficients are not statistically different (their standard errors are about 0.011).

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Comment

Frank de Leeuw

Hendershott and Peek (HP) are far from the first to redesign the personal sector, but their approach and their resultant saving measure differ from others'. Most of their adjustments can be viewed as moving personal saving closer to a change-in-wealth concept; the adjustments for consumer durable goods and for the "inflation premium" in interest income are clear examples. They could have moved even closer—for example, by changing the treatment of capital gains on real assets—but they chose not to do so.

Some other redesigners of the personal sector, in contrast, have moved personal saving toward a cash basis—for example, by treating

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owner-occupied housing the way the Bureau of Economic Analysis (BEA) now treats consumer durables rather than (as in HP) the reverse. The paper by Richard and Nancy Ruggles presented at the conference (but not included in this volume) redesigns the personal sector in a still different way, moving in the same direction as HP for consumer durables, moving in the opposite direction for pensions, and making no change in the treatment of inflation-induced capital losses.

I think that experimental redesigns of the personal sector have provided, and will provide, useful insights into consumer behavior. Moreover, I believe that HP's strategy of moving closer, but not all the way, to a change-in-wealth concept of personal saving is likely to be one of the more fruitful redesigns. I do, however, have doubts about some of their specific adjustments. I shall focus on the two that seem to me most problematic, the adjustment for social security and the one for the inflation premium in interest income.

Social Security

A change-in-wealth approach to social security imputes to households a stock of social security wealth equal to the present value of future benefits (for the current adult population). It treats additions to the stock as personal saving and treats subtractions from the stock as personal dissaving. BEA's cash approach, in contrast, treats the main source of additions to the stock, social security taxes, as an exclusion from personal income (and hence from personal saving) and treats the main source of subtraction from the stock, benefit payments, as a part of personal income.

It would seem, therefore, that adjusting the present estimates to a change-in-wealth approach would require adding contributions to personal saving and subtracting benefit payments from personal saving as presently measured. It would also require adjustments to reflect other sources of change in the imputed stock, such as interest earnings or legislated changes in benefit formulas (and it would require adjustments in government saving that are the opposite of those in personal saving).

HP's adjustments do add contributions to personal saving, but they do *not* subtract benefit payments from personal saving. This procedure has the peculiar consequence that, if contributions and benefits rise by identical amounts in some year, personal saving rises (and the federal deficit also rises). In support of this procedure, they argue that benefit payments have been offset by increases in the present value of social security wealth, mainly through legislation increasing benefits. They do not, however, offer any evidence that this equivalence holds even on a trend basis, let alone year by year. In fact, they doubt that it holds since 1980 and use a modified procedure beginning in 1981.

Clearly, HP are on weak ground statistically in making this adjustment. I think they are also on weak ground conceptually. If the Congress this year changes the present value of social security wealth—for example, by a change in the retirement age at which full benefits apply, beginning ten years from now—do we wish to classify that change as a component of this year's personal saving? The implication of HP's reasoning, I believe, is that we do. For most purposes, I would prefer to classify it as a revaluation of wealth, akin to capital gains or losses on real assets—revaluations that we should take account of when we try to understand saving behavior but not build into the saving measure itself.

The Inflation Premium in Interest Income

A change-in-wealth approach to interest income recognizes that, in an inflationary period, a portion of the interest income that persons receive serves merely to offset the decline in the real value of their dollar-denominated assets. That portion does not add to personal wealth and hence should not be included in personal income and saving.

HP estimate the inflation premium in interest income by assuming that the average real interest rate on consumer dollar-denominated assets was a constant, equal to the average nominal rate in 1950, from 1950 through 1980. Their adjustment to interest income amounts to substituting this assumed rate times actual assets for currently estimated interest income. They make a similar adjustment to business saving, substituting an assumed real rate times actual net liabilities for currently estimated interest expense (the business adjustment goes in the opposite direction from the consumer adjustment, but not by an equal amount). For both series, the procedure is modified after 1980 because real rates are thought to have risen.

HP's objective of trying to remove an inflation premium from interest flows seems worthwhile to me, but I have doubts about the actual adjustments they make, for two reasons. The first is the obvious one that real interest rates may not have been constant from 1950 through 1980. Some of the movements of nominal interest rates during that period—for example, the drop in 1967—surely reflect changing real rates rather than a change in the inflation premium. These movements should be reflected in interest income and saving.

The second reason for doubt is that HP's procedure may violate the accounting identity between saving and investment (including net foreign investment). They show adjustments only for the personal and the business sectors, and it is possible that corresponding adjustments for the foreign and the government sectors would produce a complete set of adjustments that sum to zero, as they must if the saving-investment

identity is to be preserved. However, it is hard for me to see how the HP methodology would produce this result.

Further Comments

I have some doubts about the regression tests that HP offer in support of the validity of their adjustments. The dependent variables in these regressions are BEA's present measures of saving. The independent variables are of two sorts: variables that cause households to change their saving, such as income growth or rates of return, and the various adjustments that HP advocate. For adjustments that they believe should be added to BEA's measure, they expect to find regression coefficients of -1.0 (for those that they believe should be subtracted, they expect coefficients of $+1.0$). Generally, they find coefficients close to those that they expect.

HP's interpretation of the coefficients is one plausible interpretation, but it is not the only one. The adjustments generally involve removing or adding some piece of presently measured income or outlays; for example, the inflation premium adjustment involves subtracting from saving personal interest income as presently measured (and adding in an alternative measure). An alternative interpretation of the coefficients is that the pieces of income or outlays that enter into HP's adjustments are significant sources of the variance in BEA's measure of personal saving. A regression that included a complete set of pieces of income and outlays—an identity—would produce nothing but coefficients of -1.0 and $+1.0$. HP do not include anything close to a complete set of pieces in their regressions, but their results could still be due to the fact that their adjustments include some of the more variable components of saving.

These questions about the regression results and about some of the adjustments make me much less inclined than HP to refer without qualification to the "conceptual errors" and "measurement errors" of the present series. Nevertheless, I want to stress that in spite of the questions—which it is the function of a discussant to raise—I found this a stimulating paper. Redesigns of the personal sector can contribute to our understanding and can influence official measurement practices. I hope that Hendershott and Peek continue to contribute to this area.