

The Concept and Measurement of Savings: The United States and Other Industrialized Countries

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Introduction

1. It has long been recognized that conventionally measured saving ratios differ widely between countries, and that among the 24 member countries of the OECD the U.S. economy is the one with the lowest national saving ratio. It is also true—though probably less well publicized—that any definition of saving is to some extent arbitrary, and that given a specific definition, institutional differences between countries may result in differences in saving ratios between economies which otherwise display identical characteristics and behavior. The present paper analyzes the question of how important institutional differences are in explaining observed differences in official saving ratios between the United States and other industrialized countries, and how sensitive this difference is to alternative definitions of saving and income. This analysis will be carried out for both the aggregate national saving ratio and the household saving ratio. A separate treatment of the household sector seems justified, given the dominating share this sector contributes to total national savings in most countries, and the focus on household behavior in theoretical discussions of savings determinants.

2. The various possible modifications of the official definition of savings discussed here result in a large number of alternative savings concepts. Which of these alternatives is the “correct” one will of course depend on the question analyzed. Special attention will be given in this paper to the savings concept most relevant for the analysis of economic growth.

3. Part I of the paper discusses basic definitions and briefly presents the actual data on official national and household saving ratios, concentrating on long-term averages rather than year-to-year fluctuations in these variables. Part II explores how intercountry differences in (long-term average) saving ratios are affected by institutional differences between countries, both for the household sector and the nation as a whole, given a standardized definition of savings. In Part III, plausible alternatives to the standard definition of savings (and—where appropriate—income) are discussed, and their effect on intercountry differences in household and national saving ratios is explored quantitatively. A discussion of likely effects of further possible modifications to the standard definition of saving, which

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could not be carried out quantitatively in the present study due to data limitations, is presented in Part IV. The final section—Part V—attempts to answer the question of which savings concept is the most relevant in the analysis of economic growth and its determinants.

I. Definitions and Actual Data

4. The savings data in this paper have been compiled according to the *System of National Accounts* (SNA)¹—the international system used by both the OECD and the United Nations for reporting comparable national accounts data. In the SNA, saving is the residual item in the income and outlay accounts where it is obtained by subtracting current disbursements from current receipts. Table 1 lists the transactions that enter into the SNA income and outlay accounts for the nation as a whole and for each sector of the economy.

5. In the United States National Income and Product Accounts (NIPA) saving is similarly defined as the balance between current receipts and disbursements. However, there is some disagreement between the SNA and the NIPA as to what constitutes current (as opposed to capital) transactions, and as a result the two systems generate somewhat different measures of saving. As regards *household* (or personal) saving the only difference concerns the treatment of estate and gift taxes, which are regarded as current outlays in the NIPA whereas the SNA treats them as capital outlays which are financed by running down assets. As a result, household saving according to the SNA is higher than on a NIPA basis by the value of such taxes.

6. As regards *national savings* there are a number of differences between the NIPA and SNA definitions, the most important of which is that in the NIPA all government purchases are treated as current consumption, whereas the SNA takes the more conventional view that government construction and purchases of equipment (excluding military hardware) constitute investment. As a result, national saving in the NIPA is substantially lower than according to the SNA. The resulting U.S. saving ratios compiled according to the NIPA and SNA rules are depicted in the top two lines in Table 2.

7. In the SNA, entrepreneurial incomes of unincorporated enterprises and operating surpluses of corporate enterprises are always calculated after deducting consumption of fixed capital. Consequently, saving is also shown net of capital consumption. The drawback of this approach is that calculating the consumption of fixed capital creates both practical and theoretical difficulties, which are particularly severe in periods of inflation. Since the procedures to compute capital consumption are not standardized across countries, net saving is usually considered a less reliable statistic in international comparison than gross saving, and so this latter concept is

¹United Nations, *A System of National Accounts*, Series F, No. 2, Rev. 3 (New York: United Nations, 1968).

used throughout this paper. When reference is made below to saving and disposable income "on an SNA basis," it should be understood to mean gross rather than net saving as strictly required in the SNA.

8. Table 2 shows the extent to which national and household saving ratios differ internationally even after all country figures have been standardized to conform to the SNA definitions. Average net national saving ratios during the period 1970 to 1980 ranged from a high of 33 percent for Luxembourg to a low of 8 percent for the United States with an unweighted area mean of 16 percent and a coefficient of variation for the country averages of 32 percent. On a gross basis Luxembourg and the United States again represent the extremes—40½ percent and 18½ percent, respectively. The OECD average rises to 24 percent and the relative dispersion is reduced to 21 percent, although the coefficient of variation may exaggerate the resulting convergence.² As regards the household sector the United States has again a relatively low ratio on a net basis—8 percent compared to an average of 13 percent for the 18 countries covered. When capital consumption is added, the U.S. ratio increases to 12½ percent—the fourth lowest of the 11 countries included in Table 2.

9. *National* saving ratios are sometimes calculated with Gross Domestic Product at market prices (GDP) or Gross National Product (GNP) as the denominator. Here the economically more meaningful approach of using Gross National Disposable Income is preferred; this is the sum of gross saving plus private and government final consumption expenditure. It exceeds GNP by net receipts of current transfers from abroad (a relatively small negative number in most OECD countries), and exceeds GDP by these same transfers plus net receipts of property income and compensation of employees from abroad (again a relatively small number for most OECD countries). For *household* saving ratios the denominator used is gross disposable income, which in the SNA is defined as gross saving plus consumption expenditure.

²The coefficient of variation is the standard deviation of the saving ratios expressed as a percentage of their mean, and thus shows the intercountry variation of saving ratios relative to their average level. An adjustment (e.g., the transition from net to gross ratios) may result in greater *absolute* differences between the ratios while still reducing the *relative* standard deviation as measured by the coefficient of variation.

Table 1
Current Transactions Included in Income and Outlay Accounts According to the SNA

Current Receipts		Current Disbursements	
Nation	X	Nation	
Nonfinancial enterprises	X	Nonfinancial enterprises	
Financial institutions	X	Financial institutions	
General government	X	General government	
Private nonprofit institutions	X	Private nonprofit institutions	
Households (including unincorporated enterprises)	X	Households (including unincorporated enterprises)	
TRANSACTIONS		Compensation of employees	
		Operating surplus of corporate enterprises	

X	X	X	X	X	X	X	Entrepreneurial income of unincorporated enterprises						
	X	X	X		X	X	Withdrawals from entrepreneurial income of quasi-corporate enterprise		X				
	X	X	X	X	X	X	Property income		X	X	X	X	X
	X	X	X	X	X	X	Casualty insurance claims			X			
		X					Net casualty insurance premiums		X	X	X	X	X
			X				Direct taxes		X	X		X	X
X			X				Indirect taxes						
							Subsidies	X		X			
			X				Compulsory fees, fines, penalties		X	X	X	X	X
			X				Social security contributions						X
						X	Social security benefits				X		
						X	Social assistance grants				X	X	
						X	Unfunded employee benefits		X	X	X	X	
	X	X	X	X	X	X	Unfunded employee welfare contributions imputed						X
							Final consumption expenditure	X			X	X	X
					X		Current transfers to private nonprofit institutions				X	X	X
					X	X	Current transfers n.e.c.—residents		X	X	X		X
X	X	X	X	X	X	X	Current transfers n.e.c.—rest of world	X	X	X	X	X	X

X Indicates transaction is included.

Table 2
Saving Ratios Averaged from 1970–1980, Compiled According to SNA

	National Saving Ratios		Household Saving Ratios	
	Net ^a	Gross ^b	Net ^a	Gross ^b
United States (NIPA)	6.7	16.0	7.2	12.1
United States (SNA)	7.8	18.6	7.7	12.6
Canada	12.3	22.1	9.5	13.8
Japan	25.1	35.0	20.7	25.0
Australia	18.1	22.3	14.1	16.8
New Zealand	16.7	22.5	—	—
Austria	18.4	27.9	9.9	—
Belgium	14.0	22.1	16.6	—
Denmark	13.2	20.3	—	—
Finland	13.1	25.9	6.3	11.9
France	15.0	24.1	13.4	16.7
Germany	15.5	25.1	14.7	—
Greece	19.3	24.7	19.2	—
Iceland	14.0	25.4	—	—
Ireland	14.1	21.3	19.7	21.7
Italy	11.6	22.3	21.5	25.1
Luxembourg	33.2	40.5	—	—
Netherlands	17.1	24.9	14.1	14.6
Norway	14.1	27.2	—	—
Portugal	15.7	19.1	14.7	—
Spain	15.1	22.5	10.2	—
Sweden	12.4	21.5	4.2	8.3
Switzerland	20.1	28.7	12.8	—
Turkey	14.1	18.2	—	—
United Kingdom	8.9	19.0	8.0	10.9
Arithmetic mean	15.8	24.2	13.2	16.1
Coefficient of variation	0.32	0.21	0.38	0.33

^aNet saving as percent of net disposable income.

^bGross saving as percent of gross disposable income.

Country order: In this and subsequent tables, the non-European OECD countries appear first, followed by the European members of OECD in alphabetical order.

II. Intercountry Differences in Saving Ratios Due to Institutional Differences

10. Saving ratios may differ between countries for three main reasons:
- (i) because different definitions have been used for income and saving;
 - (ii) because of differences in institutional arrangements; and
 - (iii) because social, economic, historical and cultural factors have combined to produce different underlying propensities to save.

As already noted the savings data used here have been compiled according to standard definitions so that the first possible cause of intercountry differences has been eliminated. It is attempted here to identify institutional differences between countries that may affect saving ratios and provide adjusted saving ratios that are institutionally neutral. Remaining intercountry differences in these adjusted ratios must then be due to differences in the underlying savings propensities with respect to the common definition of savings adopted.

11. The institutional factors considered in this section are:
- (i) the relative size of the unincorporated enterprise (small business) sector;
 - (ii) the relative importance of social security pensions versus private pension and life insurance schemes;
 - (iii) the relative importance of health and education services provided by government; and
 - (iv) the relative importance of taxes on consumption expenditure as compared with taxes on income.

12. All four of these institutional factors may affect *household* saving ratios which are therefore considered first; only the last one has any impact on *national* saving ratios. The analysis to follow includes saving ratios for the United States, Canada, Japan, Australia, Finland, France, Italy, Sweden, and the United Kingdom. While the choice of countries was limited by data availability, the economies included in the analysis are believed to constitute a representative sample of the more industrialized OECD countries.

(a) Household Saving Ratios

Relative size of unincorporated business

13. In the SNA the household sector as defined for the income and outlay accounts contains some unincorporated enterprises in addition to households. The enterprises concerned are those for which the owners do not keep a *complete* set of accounts, covering financial and capital transactions in addition to production operations. The reason why such companies are grouped together with households is that the lack of a complete set of business accounts indicates that the owners will usually be unable to distinguish between receipts and outlays arising from business operations and from household transactions. Unincorporated enterprises that keep com-

plete sets of accounts are termed "quasi-corporate" in the SNA and are, in principle, included in the corporate enterprise sector.

14. There are sound practical reasons for including unincorporated businesses in the household sector, and the SNA approach is in fact common to most national accounting systems. There are, however, several differences between countries as regards both the relative importance of unincorporated enterprises and the way national accountants interpret the SNA guidelines for distinguishing quasi-corporate from other unincorporated enterprises. Clearly, these differences make international comparisons difficult, and it seems, therefore, worthwhile to attempt estimating saving ratios for "pure" household sectors.

15. The entries in the income and outlay accounts which cannot readily be split between households and unincorporated enterprises include *entrepreneurial income*, which is partly wage income and therefore a household receipt, and partly operating surplus which is a business receipt, *income taxes* which should similarly be divided between taxes on employment income and business profits, and *property income receipts* earned on assets that may be held by either the household or the business. Even if these flows could be correctly divided it would still be necessary to calculate how much of the operating surplus is withdrawn by households as a form of property income, and how much is retained in the business. Several different, equally plausible assumptions could be made to solve these various allocation problems, and the meaning of the resulting "pure" household savings figure would be quite arbitrary.

16. Instead of trying to allocate each individual flow between businesses and households, a single "global" assumption can be made about the savings of unincorporated business included in the household sector. This has the advantage that the results have an unambiguous interpretation. This is the approach used here, where it is assumed that unincorporated businesses save enough each year to maintain their stock of fixed assets. In other words, their gross saving is exactly equal to consumption of fixed capital; net saving is zero and any additions to their fixed assets are financed by borrowing from either the owners themselves or from financial institutions.

17. "Pure household" saving ratios, obtained by applying this adjustment, are shown in column 2 of Table 3. These are the average ratios calculated as the arithmetic means of the ratios for each year 1970 to 1980. Table 3 shows that the effect of the adjustment is to reduce the SNA gross ratios by between 3 to 5 percentage points. Judging by the coefficient of variation for the nine country ratios, this adjustment tends to widen differences between countries. In most cases the adjusted ratios tend to rise more slowly than the SNA ratios and for the United States the atypical decline in the SNA household saving ratio is even more marked after the adjustment.

18. An alternative way of dealing with the problems of unincorporated business included in the household sector is to treat the whole operating surplus of the enterprise sector (rather than only the distributed or withdrawn part of it) as income of the household sector. Admittedly, this is cir-

Table 3
Average Household Saving Ratios (\bar{x}) and Linear Trends (T) for the Period 1970–1980:
SNA basis and standardized for institutional differences

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)	
	SNA gross saving ratio		Excluding saving of unincorporated enterprises		Including net saving of corporate enterprises		Excluding net equity in pension and life insurance funds		Including saving of social security funds		Adjusted for government health and education services		Adjusted for taxes on expenditure		Totally (*) standardized method A		Totally (*) standardized method B	
	\bar{x}	T	\bar{x}	T	\bar{x}	T	\bar{x}	T	\bar{x}	T	\bar{x}	T	\bar{x}	T	\bar{x}	T	\bar{x}	T
United States	12.6	-0.22	7.7	-0.35	15.0	-0.14	9.6	-0.41	13.7	-0.29	11.9	-0.21	13.4	-0.25	4.5	-0.56	15.8	-0.22
Canada	13.8	0.38	9.5	0.46	20.0	0.68	9.4	0.06	15.3	0.39	—	—	16.0	0.39	5.4	0.11	24.3	0.63
Japan	25.0	0.28	20.7	0.16	27.8	-0.36	22.8	0.29	27.6	0.25	23.7	0.25	26.3	0.33	18.4	0.25	30.4	-0.42
Australia	16.8	-0.10	14.1	0.10	20.0	-0.15	—	—	—	—	15.3	-0.18	18.7	-0.08	—	—	—	—
Finland	11.9	0.07	6.3	0.15	16.4	0.06	11.7	-0.19	12.4	0.08	10.6	0.03	15.2	0.12	6.3	—	18.0	0.11
France	16.7	-0.16	13.4	-0.15	18.1	-0.44	16.3	-0.19	17.6	-0.15	—	—	20.2	-0.23	15.6	-0.27	22.6	-0.55
Italy	25.1	0.22	21.5	0.10	25.2	0.20	24.1	0.52	24.8	0.15	23.0	0.16	28.1	0.19	21.2	0.30	25.4	0.06
Sweden	8.3	0.12	4.2	0.08	12.5	-0.01	7.3	0.16	14.4	-0.03	6.8	0.00	10.4	0.15	2.8	0.02	17.8	-0.46
United Kingdom	10.9	0.62	8.0	0.57	13.5	0.57	4.6	0.41	11.4	0.67	9.0	0.37	12.5	0.70	1.1	0.21	13.4	0.57
Coefficient of variation	0.36	—	0.50	—	0.26	—	0.51	—	0.32	—	0.43	—	0.32	—	0.77	—	0.25	—

The *coefficient of variation* is the ratio of the standard deviation to the mean. It shows whether the adjustments made have increased or reduced intercountry differences in average saving ratios.

(*) See text (para. 33) for explanation of methods A and B.

cumventing rather than solving the disaggregation problems, but as it is arguable that the level of household saving is not independent of the wealth formation in the enterprise sector, this approach can certainly be justified.³

19. Because it seems unlikely that households' spending behavior will be affected by the level of consumption of fixed capital in the corporate sector, the adjusted saving ratios in column 3 of Table 3 include only the *net* operating surplus of (financial and nonfinancial) corporate enterprises. As is to be expected, the combined sector saving ratios are generally significantly higher than those for the household sector alone, except for Italy where during the 1970s the corporate sector recorded on average net operating deficits. Otherwise, the average increase varies between 1.4 percentage points for France and 6.2 points for Canada with the coefficient of variation dropping from 36 to 26 percent. For the United States this adjustment results in an increase of 2.4 percentage points in the average saving ratio—after Italy and France the lowest increase among the countries included in the sample.

20. The marked reduction in intercountry variability when saving ratios are adjusted in this way could be interpreted as supporting the hypothesis that, in making their decisions about savings, households take account of earnings retained by companies in which they have an equity holding. An alternative explanation for the sharp reduction in intercountry variability is that households may have a higher propensity to save dividend income than other current receipts. If so, in countries where a high proportion of profits are distributed, household saving ratios will tend to be high and enterprise savings low; the reverse would be true where most profits are retained within the enterprise sector. Combining the two sectors will obviously produce more equal saving ratios across countries.

Relative importance of social security pensions

21. Households may provide for pensions and other retirement benefits either by contributing to a government social security system, or by participating in a private pension or life insurance scheme. While both kinds of schemes serve the same purpose from the household's point of view, the SNA (and most national systems of accounts) considers that transactions between households and social security schemes are *current* in nature, while those with private schemes are mainly *capital* transactions. This implies major differences in the way these transactions are treated in the income and outlay account of households, and hence their impact on household saving. As a result SNA data are difficult to use for comparisons between countries that differ in the relative importance of social security versus private schemes.

³Several theoretical and empirical studies argue indeed that household and business savings are close substitutes, cf. Paul A. David and John Scadding, "Private Savings: Ultra-rationality, Aggregation and 'Denison's Law'," *Journal of Political Economy*, 82 (March/April 1974), 225–49 and several empirical studies quoted therein.

22. Treating households' transactions with private schemes in the same way as their transactions with social security schemes involves the following adjustments:

- (i) Adjust current receipts (R) by adding pension receipts (P_p), and by deducting (imputed) receipts of interest and other property income earned on pension and life insurance funds (I_p).
- (ii) Adjust current disbursements (D) by adding contributions (C_p) and by subtracting service charges (A_p).

Adjusted saving (S') is therefore equal to:

$$S' = (R + P_p - I_p) - (D + C_p - A_p) \quad (1)$$

which can be rearranged to yield:

$$S' = (R - D) - [(I_p + C_p) - (P_p + A_p)] \quad (2)$$

From (2) it is clear that saving on an SNA basis ($R - D$) is to be adjusted by subtracting the difference between the receipts ($I_p + C_p$) and the outlays ($P_p + A_p$) of private pension and life insurance funds. This difference is the surplus available to the fund for investments, and is referred to in the SNA as the increase in the "net equity of households in pension and life insurance funds."

23. Gross disposable income—the denominator in the saving ratio—consists of gross saving plus final consumption expenditure of households. The latter should be adjusted by deducting service charges (A_p) for administering private pension schemes. Unfortunately, SNA statistics do not show this item separately, and this adjustment is therefore not made to the saving ratios shown below. However, data for the United Kingdom suggest that these service charges amount to less than 1 percent of household consumption expenditure, and so the omission of this adjustment is unlikely to cause serious distortions.

24. The adjusted ratios in column 4 of Table 3 are lower than the SNA ratios by between 0.2 and 6.3 percentage points. The adjustments tend to be particularly large for countries with low SNA household saving ratios (e.g., the United Kingdom and Sweden) and relatively unimportant for countries with high SNA ratios (e.g., Italy and Japan), indicating that private life insurance and pension schemes tend to accumulate assets more rapidly in low- than in high-saving countries. As a result the adjustment increases the intercountry disparity in saving ratios. As regards changes over time, the effect of the adjustment is generally to reduce the rate of increase, and in the United States the removal of household saving in private pension and insurance funds nearly doubles the rate of decline, while reducing the average ratio by 3 percentage points.

25. An alternative approach to standardizing the treatment of pensions is to treat social security pension fund transactions in the same way as transactions with private pension and life insurance funds. This involves the following adjustments:

- (i) Adjust current receipts (R) by deducting pensions received (P_s) and by adding interest and other property income earned on the social security pension fund assets (I_s).
- (ii) Adjust current disbursements (D) by deducting pension contributions (C_s), and by adding service charges (A_s).

Adjusted household savings therefore becomes:

$$S' = (R - P_s + I_s) - (D - C_s + A_s) \quad (3)$$

which can be rearranged to yield:

$$S' = (R - D) + [(C_s + I_s) - (P_s + A_s)] \quad (4)$$

This adjustment consists of the addition of savings of pension funds managed by the social security administration to savings on an SNA basis ($R - D$).

26. Disposable income should also be adjusted by adding the service charges for administering social security pension schemes. Unfortunately, in the SNA statistics no distinction is made between the administrative costs of pension schemes and for other social security branches and in the table below no adjustment is therefore made to disposable income. This will tend to overstate the adjusted saving ratios, but the error is not likely to be very large.

27. The adjusted saving ratios in column 5 of Table 3 are higher in all countries except Italy, where social security pension funds generated negative savings in 6 of the 11 years covered. Otherwise the adjustment increases saving ratios by between 0.5 (United Kingdom) and 6.7 (Sweden) percentage points, and tends to slightly reduce intercountry differences. For the United States the adjustment results in an increase in the household saving ratio by 1.1 percentage points.

Relative importance of public health and education expenditures

28. In all OECD countries health and education services are paid for partly by private households and partly by government. In the national accounts only private purchases of these services are included in household consumption expenditures and the value of government health and education services that households "purchase" indirectly through taxation are included in government consumption expenditure. As there are marked differences between countries in the extent of government involvement in these activities, it seems worthwhile to consider the effect on household saving ratios of transferring government expenditures on health and education services to household consumption.

29. Such a transfer will increase household current disbursements by the amount of government expenditure on health and education. How this affects household saving depends on how the government finances such ex-

penditure and how government revenues would respond to the transfer. It has been assumed here that the expenditure is financed by direct taxes on households, and that these taxes are reduced by an identical amount when the expenditure is transferred to the household sector, increasing its disposable income by the same amount. Thus, household saving is not changed. Saving ratios on the other hand will fall because of the rise in disposable income, the denominator of the saving ratio.

30. The adjusted saving ratios in column 6 of Table 3 show the percentages saved out of household disposable income grossed up to include the tax reduction entailed by transferring government expenditure to the household sector. The differences between the adjusted and SNA ratios reflect the relative importance of government outlays in the fields of health and education. The differences between the two ratios range from less than 1 percentage point (United States) to just over 2 points (Italy). The adjustment reduces the trend growth of saving ratios in all countries except the United States, indicating that government health and education expenditures were rising more rapidly over the period than household disposable income.

Tax structure

31. Governments may raise revenue from households either by direct taxation—income taxes and social security contributions—or by taxes on consumption—value-added taxes, import duties, sales taxes, etc. Household *saving* is not affected by the choice of tax used since both kinds enter into current disbursements, but saving *ratios* are reduced by the imposition of consumption taxes because total consumption expenditure is part of disposable income, which appears in the denominator. Since the relative importance of direct versus consumption taxes varies between countries, it is interesting to see what saving ratios would look like if all countries adopted the same system of taxation. The adjusted ratios in column 7 of Table 3 are obtained by deducting all consumption taxes from the denominator. They thus show how saving ratios would change if consumption taxes were replaced by direct taxes.⁴

32. The adjusted ratios are mostly between 2 to 3 percentage points higher than the SNA ratios. The differences are rather larger in France and Finland where consumption taxes are relatively more important than in, for example, the United States and Japan. The 1970–1980 growth rates are virtually unchanged, and the coefficient of variation indicates that this adjustment brings only a small reduction in intercountry differences in saving ratios.

⁴The tax data used for this adjustment are taken from *Revenue Statistics of OECD Countries*, an annual OECD publication prepared by the Directorate for Financial and Fiscal Affairs. They are described as “taxes on production, sale, transfer, leasing and delivery of goods and rendering of services.” They consist mainly of value-added taxes, sales taxes, excises, and customs and import duties, but they also include some export and investment taxes which should properly be taken out. The amounts involved, however, are insignificant for the nine countries considered here.

Combined adjustments

33. The last two columns of Table 3 bring together the various adjustments described above and show what happens to household saving ratios when all the adjustments are made simultaneously. Alternative procedures were discussed above both for adjusting saving ratios for the relative importance of unincorporated enterprises, and for the adjustment with regard to social security versus private pension and life insurance schemes. As a result there are four possible methods of calculating "totally standardized" saving ratios, and two of these—the lowest and the highest—are shown in Table 3 as Methods A and B respectively.

34. Method A gives what may be termed "pure household" saving ratios, obtained by deducting both savings of unincorporated enterprises and net equity in private pension and life insurance funds from SNA household savings. This implies that households take a myopic view of what constitutes their saving, and are skeptical about their claims on retained business profits and supposed rights in pension and life insurance funds. Ratios resulting from Method B, on the other hand, are obtained by adding in both corporate savings and savings of social security pension funds, and thus come close to national saving ratios. This Method B implies that households have a more sophisticated ("rational") attitude, and adjust their consumption behavior in the light of the savings accumulated on their behalf by the business sector and the social security system.

35. The choice of method not only produces drastically different saving ratios, but also affects the country ranking except for the United Kingdom which remains the lowest saver whichever method is used. The coefficient of variation increases (is reduced) significantly if Method A(B) is used, but the absolute difference between the highest and the lowest household saving ratio increases in either case compared to SNA ratios. Neither adjustment method seems to improve the relative position of the United States in the ranking order. A feature common to both methods A and B is that in most cases they tend to reduce the trend growth, or accentuate the trend decline, observed in SNA household saving ratios over the period 1970–1980.

(b) National Saving Ratios

36. Of the four institutional factors listed in paragraph 11 above, the first three involve only the allocation of income and saving between sectors, and therefore cancel out at the national level. However, since national disposable income includes consumption taxes, the tax adjustment is also relevant for national saving ratios. Column 2 of Table 4 shows national saving ratios adjusted for a standard treatment of expenditure taxes. Compared with the SNA ratios in Column 1 the standardized ratios are between 1 (United States) and 4 (Finland) percentage points higher. In all countries except Australia the standardized ratios were falling more rapidly over the period 1970 to 1980 indicating the decreasing relative importance of consumption taxes during that period. In contrast with the household ratios,

Table 4
Average National Saving Ratios (\bar{x}) and Linear Trends (T) for the Period 1970–1980: SNA basis and standardized for institutional differences

	(1)		(2)	
	SNA gross saving ratios		Adjusted for taxes on expenditure	
	\bar{x}	T	\bar{x}	T
United States	18.6	0.01	19.6	0.00
Canada	22.1	−0.04	24.3	−0.08
Japan	35.0	−0.93	36.7	−1.10
Australia	22.3	−0.97	25.8	−0.67
Finland	25.9	−0.37	29.9	−0.38
France	24.1	−0.48	27.6	−0.59
Italy	22.3	−0.05	24.4	−0.09
Sweden	21.5	−0.82	24.3	−0.93
United Kingdom	19.0	−0.11	20.9	−0.14
Coefficient of variation*	0.20	—	0.19	—

*See note to Table 3.

standardizing national saving ratios has virtually no effect on intercountry differences as measured by the coefficient of variation of the sample, though the saving ratios of individual countries may be affected noticeably by the adjustment.

III. Effects of Alternative Definitions of Income and Saving

37. The SNA definitions of income and saving are uncontroversial in the sense that virtually all national systems of accounts use identical or very similar definitions. They are, however, in the nature of general-purpose definitions, and it may well be that somewhat different definitions are more appropriate for particular topics in economic analysis. Some alternative concepts are discussed below and their impact on saving ratios is shown. For the *household sector* the following changes are considered:

- (i) treating expenditure on consumer durables as capital rather than current outlays;
- (ii) treating private education expenditure as a capital outlay; and
- (iii) including inflation-induced capital gains and losses on financial assets as a component of income.

For the *national saving ratios* the changes considered are:

- (i) treating expenditures on consumer durables as capital outlays;
- (ii) treating private and government expenditures on education as capital outlays; and
- (iii) treating research and development expenditures by enterprises as capital outlays.

The inflation adjustment made to household saving ratios is less relevant at the *national* level because inflation gains and losses mainly affect the allo-

cation of saving between sectors and largely cancel out with respect to national savings.

(a) Household Saving Ratios

Classifying consumer durables as capital

38. In the SNA, final consumption expenditure of households includes outlays on consumer durable goods such as household appliances and motor vehicles. Since these goods provide services over a number of years it is frequently argued that they should be treated like producer durables and included in capital rather than current expenditure. Since the share of household expenditures devoted to consumer durables varies substantially between countries, it seems interesting for purposes of international comparison to examine the effect of the alternative classification on household saving ratios.

39. Treating purchases of consumer durables as capital rather than current expenditure means that households are regarded like unincorporated enterprises that produce "consumer durable services" for their own consumption. This is of course exactly the approach presently used with regard to owner-occupiers who are treated like enterprises producing, for their own use, "housing services" equal to the sum of consumption of fixed capital, net operating surplus, and intermediate consumption. Adopting the same approach for consumer durables involves the following changes to the SNA household income and outlay account:

- (i) Adjust current receipts (R) by adding the (imputed) net operating surplus (O) generated by the production of "consumer durable services," and by adding consumption of fixed capital in respect of durable consumer goods (C).
- (ii) Adjust current disbursements (D) by deducting purchases of consumer durables (P), by adding (imputed) consumption of the "consumer durable services" (V) that households are deemed to be providing to themselves, and by deducting intermediate consumption (I), involved in the production of these services. The latter, consisting of repairs and maintenance of consumer durables, is presently included in final consumption expenditure, but must now be treated as a business outlay (i.e., intermediate input).

40. Using the above notation gross saving (S') should now be calculated as:

$$S' = (R + O + C) - (D - P + V - I) \quad (5)$$

which can be rearranged to yield:

$$S' = (R - D) + (O + C + I - V + P) \quad (6)$$

The value of "consumer durable services" (V) is of course the sum of net operating surplus (O), consumption of fixed capital (C) and intermediate consumption (I), so that the second term in (6) reduces to (P). Saving on an

SNA basis is therefore to be increased by the value of purchases of consumer durables.

41. Gross household disposable income—the denominator in the saving ratio—consists of gross saving plus household consumption expenditure (X). The latter must be adjusted by deducting purchases of consumer durables (P), by adding (imputed) consumption of “consumer durable services” (V), and by deducting intermediate consumption (I). Gross household disposable income (YD') should therefore be calculated as:

$$YD' = (R - D + P) + (X - P + V - I) \quad (7)$$

Since V is equal to $O + C + I$, (7) can be written as:

$$YD' = (R - D) + (X + O + C) \quad (8)$$

42. As information is not available from the national accounts on the values of the net operating surplus or the consumption of capital for consumer durables, some simplifying assumptions are required. As regards *net operating surplus*, this could be taken as equal to the interest that could have been earned by investing in alternative assets (e.g., bonds) instead of purchasing consumer durable goods.⁵ Although there is always some opportunity cost in the decision to invest in consumer durables, the simplifying assumption has been made here that opportunity costs, and therefore net operating surplus, is zero; in other words providing consumer durable services for own consumption generates no income above what is needed to replace the using up of the assets concerned.

43. Concerning the *consumption of fixed capital* another simplifying assumption has been made, namely that its value each year is equal to purchases of new consumer durables. This implies that the net stock of consumer durables is stable. If, as is generally thought to be the case, the net

⁵Ruggles and Ruggles argue that ideally the value of consumer durable services should be determined on the basis of equivalent rental values, but since these are not available for many consumer durables, it is necessary to approximate rental values by the sum of capital consumption and imputed interest on the capital value; cf. Richard Ruggles and Nancy Ruggles, *The Design of Economic Accounts* (New York: National Bureau of Economic Research, 1970). More recently the United States Bureau of Economic Analysis has published comprehensive estimates of the value of consumer durable services, obtained as the sum of imputed interest, capital consumption plus repairs and maintenance costs; cf. Arnold Katz and Janice Peskin, “The Volume of Services Provided by the Stock of Consumer Durables, 1947–77: An Opportunity Cost Measure,” *Survey of Current Business*, Vol. 60, no. 7, (July 1980), 22–31.

stock is actually growing, the adjustment ratios given in column 2 of Table 5 are too low because the denominators are overstated. Data for the United States suggests, however, that the errors involved are not very large.⁶

44. Table 5 shows that the exclusion of consumer durable goods from household consumption expenditure has a marked impact on saving ratios; their period-averages increase by between 3 (Japan) and 10 (Canada) percentage points, and in some years the adjusted saving ratios are twice as high as the SNA ratios. In general the increases are most marked for countries with low SNA ratios, with the result that the adjustment tends to reduce intercountry differences significantly. For the United States the ad-

Table 5
Average Household Saving Ratios (\bar{x}) and Linear Trends (T) for the Period 1970–1980:
SNA basis and adjusted for different concepts of saving and income

	(1)		(2)		(3)		(4)	
	SNA gross saving ratio		Including expenditure on consumer durables		Including private expenditure on education		Including inflation gains and losses	
	\bar{x}	T	\bar{x}	T	\bar{x}	T	\bar{x}	T
United States	12.6	-0.22	20.7	-0.15	14.4	-0.24	10.7	-0.40
Canada	13.8	0.38	23.8	0.32	16.3	0.36	12.0	0.33
Japan	25.0	0.28	28.2	0.18	26.2	0.30	21.1	0.44
Australia	16.8	-0.10	—	—	17.3	-0.15	—	—
Finland	11.9	0.07	19.2	0.10	—	—	—	—
France	16.7	-0.16	23.6	-0.17	17.0	-0.15	13.3	-0.22
Italy	25.1	0.22	28.6	0.58	25.4	0.21	—	—
Sweden	8.3	0.12	16.2	0.09	8.5	0.12	—	—
United Kingdom	10.9	0.62	17.9	0.60	12.7	0.60	4.0	0.55
Coefficient of variation*	0.36	—	0.19	—	0.33	—	—	—

*See note to Table 3.

⁶The United States is one of the few countries that publishes estimates of gross and net capital stock of consumer durable goods. A description of these data is given in John Musgrave, "Durable Goods Owned by Consumers in the United States, 1925–1977," *Survey of Current Business*, Vol. 59, no. 3, (March 1979). Using alternative denominators gives the following saving ratios:

	1970	1972	1974	1976
Using capital consumption	20.9	21.2	21.7	21.0
Using purchases of consumer durables	20.7	20.6	21.3	20.6

In countries where the replacement component of durable purchases is markedly smaller than in the United States the error will, however, be bigger.

justment considerably dampens the decline in the household saving ratio recorded between 1975 and 1978, suggesting a switch from financial savings to purchases of consumer durables during this period.

Classifying education expenditures as capital outlays

45. While education expenditures do not create physical assets they result in "major alterations" to an existing asset—the "stock of human capital"—which greatly enhance its productivity. Alterations of this kind are treated in the SNA as investments when they are made to physical capital goods, and here the effect on household saving ratios is examined if this treatment were extended to human capital.

46. Treating household expenditure on education as a capital outlay requires a similar kind of adjustment to the accounts as was made earlier for consumer durable goods. Households are treated as though they were unincorporated enterprises that purchase an intangible capital asset—education—which is then used to produce "human capital services." There is, however, an important difference between consumer durable and human capital services, in that the latter are not primarily for own consumption, but are sold to other households, enterprises, or government. This greatly simplifies matters since household disposable income already includes, as part of wages and entrepreneurial income, the gross operating surplus ($O + C$) generated by "human capital services," while such income had to be separately imputed in the case of consumer durable services. As a result the only adjustment required is the addition of education expenditures to the numerator of the saving ratio.⁷

47. Column 3 of Table 5 shows that the adjustment raises household saving ratios by between 0.2 (Sweden) and 2.5 (Canada) percentage points. The increase for the United States amounts to 1.8 percentage points, reflecting the above-average importance of households' educational expenditure in this country. There is a small reduction in intercountry differences as measured by the coefficient of variation.

Inflation gains and losses

48. In the SNA, gains and losses on liabilities and assets are shown in the balance sheet accounts where they appear as a reconciliation item between the opening and closing stocks. Some of these gains and losses arise from exceptional events such as physical destruction of assets (i.e., natural disasters or business failures) but gains and losses arising from holding financial assets and liabilities during periods of persistent inflation are regular and predictable and there is a *prima facie* case for treating these particular gains and losses as current flows and including them in income and savings.

⁷By ignoring the opportunity cost of forgone earnings by students, this may considerably underestimate the actual investment in human capital taking place.

49. Households hold durable goods—notably dwellings—equities, and other financial assets, and they incur nonequity liabilities. Holding gains and losses may arise with respect to any of these assets and liabilities, but for reasons of data availability it is only possible to consider inflation gains and losses on nonequity assets and liabilities, i.e., basically assets and liabilities denominated in money terms such as bank deposits, mortgages, and bonds, but excluding shares. Jack Hibbert⁸ has recently prepared for five OECD countries estimates of the gains and losses in terms of current-year purchasing power during the period 1970–1979.

50. For the household sector, nonequity financial assets tend to exceed liabilities so that net capital gains due to inflation are negative, i.e., capital losses, in the case of households. As a result, household saving and disposable income are both reduced by inflation losses in calculating the adjusted saving ratios shown in the fourth column of Table 5. The saving ratios fall by between 6.9 (United Kingdom) and 1.8 (Canada) percentage points. In all countries except Japan the inflation adjustment reduces the growth or accentuates the decline of saving ratios over the period, with a particularly marked fall in the case of the United States.⁹

(b) National Saving Ratios

Classifying consumer durables as capital

51. The rationale behind the classification of expenditure on consumer durables as a capital outlay was discussed above. Column 2 of Table 6 shows that when this adjustment is followed through to the national saving ratios, there is a marked reduction in the difference between countries with the coefficient of variation falling from 20 to 15 percent. The 3.7 percentage point increase in the United States is the second highest (after Canada) in the sample, compared with only a 2.0 percentage point increase for Japan.

Classifying education expenditures as capital outlays

52. This is a similar adjustment to that made above to household saving ratios, except that for the national saving ratio both government and private education expenditures are included in the numerator. Column 3 of Table 6 shows that the adjustment substantially increases the national saving ratios and increases their growth (or reduces their decline) during the 1970s. The increase is the highest for the United States (6.1 percentage points) thus reducing the “savings gap” generally diagnosed for this country.

⁸Jack Hibbert, *Measuring the Effects of Inflation on Income, Saving, and Wealth*, forthcoming publication of the OECD and the Statistical Office of the European Communities.

⁹In these countries inflation-induced holding losses have apparently not been neutralized by reinvestment of inflated nominal interest earnings. In fact, if inflation is not anticipated, the increase in nominal returns will not occur and the holding loss will correspond to a real loss.

Table 6**Average National Saving Ratios (\bar{x}) and Linear Trends (T) for the Period 1970–1980: SNA basis, and adjusted for different concepts of income and saving**

	(1)		(2)		(3)		(4)	
	SNA gross saving ratio		Including expenditure on consumer durables		Including expenditure on education		Including expenditure on research and development ^a	
	\bar{x}	T	\bar{x}	T	\bar{x}	T	\bar{x}	T
United States	18.6	0.01	24.3	0.05	24.7	0.11	19.5	0.02
Canada	22.1	–0.04	28.4	–0.03	—	—	22.3	–0.03
Japan	35.0	–0.93	37.0	–0.93	39.4	–0.79	36.1	–1.00
Australia	22.3	–0.97	—	—	26.2	0.28	—	—
Finland	25.9	–0.37	29.8	–0.33	—	—	26.3	–0.37
France	24.1	–0.48	28.9	–0.41	—	—	24.6	–0.49
Italy	22.3	–0.05	25.5	–0.28	26.7	–0.03	22.6	–0.05
Sweden	21.5	–0.82	25.6	–0.79	27.1	–0.73	22.1	—
United Kingdom	19.0	–0.11	23.4	–0.12	24.5	–0.08	19.3	0.08
Coefficient of variation*	0.20	—	0.15	—	0.18	—	0.21	—

*See note to Table 3.

^aBy enterprise sector only.*Treating R&D expenditures as capital outlays*

53. Research and development (R&D) expenditures are treated in the national accounts as current outlays—either as intermediate consumption if they are made by enterprise, or as final consumption if made by government or nonprofit organizations. However, it can be argued that they should properly be regarded as capital outlays, since people who finance R&D probably think of themselves as making an “investment” in some sense, and expect the outlays to produce a return over a period of years. On the other hand, while R&D may be undertaken in the expectation of future benefits, that expectation is qualitatively different from the kind of reasonable certainty that motivates the acquisition of financial or tangible assets. In what follows a compromise position has been taken, and only R&D that is both carried out and funded by enterprises (i.e., excluding government- and university-funded R&D) will be considered as a capital outlay. This kind of research and development will presumably have been subjected to some form of cost/benefit analysis so that the future returns must be both quantifiable, and likely to accrue within a reasonable time-span.

54. The data used for the R&D adjustment are collected through regular surveys by the OECD Directorate for Science and Technology. They

are compiled according to the definitions and classifications of the "Frascati Manual"¹⁰ and, at the aggregation level used here, they are both reasonably consistent over time and comparable between countries. The main problem for present purposes is that they exclude outlays on mineral prospecting; these are obviously important outlays in several OECD countries and if they were also treated as capital outlays, the adjusted ratios of Table 6 would be substantially higher for Canada, the United States, Australia and the United Kingdom—particularly towards the end of the period.

55. Treating enterprises' R&D expenditures as capital outlays increases the gross operating surplus because R&D outlays which were formerly included in intermediate consumption are now treated as self-financed capital formation, which is part of final output. Both gross national savings and gross national disposable income—the denominator in the national saving ratio—are therefore increased by the value of enterprise expenditure on R&D. The results of the adjustment are shown in the last column of Table 6. The adjusted ratios exceed the SNA ratios by between 0.2 (Canada) and 1.1 percentage points (Japan). Within countries the differences were remarkably stable during the 1970s, and so have a negligible effect on the growth rates over the period.

IV. Further Considerations (items not quantified)

56. The modifications of the savings definition considered in the preceding section by no means exhaust all possible changes in the definition of savings which might appear desirable for particular topics in economic analysis. In this section additional modifications of the savings concept will be explored, though a quantification of their effects on the saving ratio has not been possible for the present study due to the lack of comparable data for a sufficiently large group of countries. Still in many cases available qualitative information permits educated guesses on how the relative position of the United States in the international savings league would be affected by the adjustment discussed. Several of the adjustments considered here are controversial and the discussion only scratches the surface of problem areas which have been analyzed more intensively elsewhere, though not necessarily in the context of saving ratios.

Military Hardware

57. The SNA treats government expenditure on military construction and equipment as public consumption. It can be argued that such purchases represent investment and add to the stock of "defense capital" which will produce "defense services" in future periods. To maintain consistency, such a reclassification would require the national income concept to be supplemented by an estimate of the imputed return to the properly computed stock of defense capital. In principle, such treatment should be

¹⁰OECD, *The Measurement of Scientific and Technical Activities* (Paris: OECD, 1980).

analogous to that of investment in other tangible assets which produce non-marketed output for final consumption, like owner-occupied dwellings.¹¹ Since the United States has the largest expenditure on military hardware (both absolute and in terms of GNP) in the OECD area, such an adjustment would increase the U.S. national saving ratio relative to other OECD countries.¹²

Production Excluded from National Accounts

58. The SNA definition of output does not include all production activities in the economy. Production may be excluded deliberately (e.g., productive activity of housewives) because of inherent difficulties of measurement, or because it is (illegally) concealed from the authorities for reasons of tax evasion (i.e., the "underground" or "black" economy).¹³ Enlarging the concept of production (and thus income) to include activities hitherto not included—if it could be done—would also affect saving ratios. How big and in what direction such a change would be obviously depends on the volume of the added production, and on which part represents consumption (e.g., self-supplied domestic services) and investment (e.g., black market construction) respectively. It thus seems impossible to predict in what direction—let alone by how much—international differences in saving ratios would be affected by such an adjustment without a detailed empirical study. As to the relative size of unrecorded production activities, a recent OECD study¹⁴ suggests that the volume of the "black" or "underground" economy excluded from the national accounts is much smaller than the volume of activities concealed from tax collectors. This is because national accountants use a variety of sources and methods to cross-check their estimates for activities where "black" transactions are likely to be important.¹⁵ However, the relative size of domestic production activities deliberately excluded from the production and income accounts is likely to be quite large and thus their inclusion may conceivably affect intercountry differences in saving ratios significantly if the relative size of such production differs between countries. Assuming that all these activities are directed to the out-

¹¹Nonmilitary government investment not considered as producer durables should in principle also be treated in this fashion.

¹²A major reason why military hardware is classified as consumption in the SNA is that great uncertainty attaches to the length of its service life. Under normal peace-time conditions, however, it appears legitimate to argue that its destruction in the relatively rare armed conflicts that do occur should be treated as capital losses, in line with the treatment of civilian capital assets lost in floods and earthquakes.

¹³A third category of transactions excluded from the National Accounts consists of illegal activities like gambling and drug trade; these items are ignored in this paper.

¹⁴Cf. Derek Blades, "The Hidden Economy and the National Accounts," *OECD Economic Outlook, Occasional Studies*, (June 1982), pp. 28–45.

¹⁵Recent studies in the United States and the United Kingdom suggest that the value added by "black" activities omitted from the national accounts might amount to *at most* 3 percent of GDP, cf. Blades, *ibid.*

put of consumption goods and services (which seems questionable), their inclusion should *ceteris paribus* lower the saving ratios most in those countries where the labor participation rate of married women is relatively low.

Use of Nonrenewable Resources

59. Many production processes require (directly or indirectly) inputs of raw materials. Where these raw materials are taken from a limited (though unknown) stock of nonrenewable resources, it can be argued that the value-added share corresponding to this input (i.e., the rents received by the resource owner) do not represent net output but should be treated as negative investment (and savings) much like the running down of conventional inventories. A corresponding adjustment to the income and product statistics would imply a relatively larger downward adjustment of the saving ratio in those countries where the share of rental income from the use of nonrenewable resources is relatively large, e.g., Norway, Canada, and the United States. In quantitative terms the adjustment would, however, be likely to be small because—contrary to moderately widespread opinion—the share of pure rental income from the use of depletable national resources in total income is minute in most OECD countries, or at least has been prior to the oil price shocks in the seventies.¹⁶

60. Analogous reductions in official income measures may be appropriate with respect to the declining quality of agricultural land due to (over-) use and more generally with respect to deterioration in quality of the environment (e.g., air pollution) caused by various production activities. In the latter case quantification is particularly difficult because due to undefined property rights, no rental income identifiable with the resource use (e.g., clean air, water, etc.) accrues, but rather the benefits are widely dispersed through suboptimal product prices not reflecting total (social) cost of production. Apart from the difficulties of measurement, the appropriate adjustment to the income and product accounts can have quite different implications for the saving ratio: where the environmental externalities represent a permanent damage (the stock of resources is permanently decreased, as in land erosion) income and *savings* should be lowered by identical amounts, entailing a *decline* in the saving ratio. Where the environmental damage is transitory (e.g., most types of air pollution) resources are not depleted and income and *consumption* (i.e., of clean air) should be lowered by identical amounts, leading to an *increase* in the saving ratio.

¹⁶Estimates by E. Denison for the share of total land rents in national income are 2.6 and 3.6 percent for the United States and Northwest Europe, respectively, in the early sixties. Only a fraction of this would correspond to the use of nonrenewable resources; cf. E. Denison, *Why Growth Rates Differ* (Washington, D.C.: The Brookings Institution, 1967), Table 4-2.

Learning-by-Doing

61. It has been argued in part III above that educational expenditure can justifiably be redefined as gross savings to the extent that it maintains or increases the stock of human capital, and thus adds to productive capacity. Formal education is, however, not the only activity generating human capital. Many skills are accumulated through learning-by-doing and on the job training. If these activities do, therefore, increase the stock of human capital (defined as increased capacity to produce in the future), the question arises how this phenomenon can be adequately recognized in an economically more meaningful definition of savings. For jobs which effectively entail human capital formation (in this wider sense), total labor and capital cost represent only a part of total value-added. Additional income is distributed "in kind" to the employee in whom the newly created human capital is embodied and thus saved, and total income estimates should be supplemented by the amount of human capital thus created.¹⁷ Doing so would obviously increase the gross saving ratio by increasing the adjusted income and gross savings measures by identical amounts. In international comparison such an adjustment would raise the saving ratio most for those countries which have been most successful in integrating additional members of society into the labor force. A casual look at international employment statistics suggests that on this basis the U.S. and Canadian saving ratios would probably improve significantly relative to most European economies where employment stagnated or even declined during the last decade.

Rearing Costs and Health Expenditures

62. An even more drastic extension of the human capital concept has been suggested by J. Kendrick.¹⁸ He includes under the definition of "tangible human capital," the cumulated rearing and maintenance cost of individuals, roughly identifying these items with "necessary" consumption and health care expenditures respectively. As a consequence, these expenditures would have to be reclassified as investment rather than consumption which would, of course, increase the saving ratio. In production analysis, tangible human capital and intangible human capital embodied in the former would replace labor as a production factor, and gross returns on these types of capital correspond to labor income in conventional analysis. The Kendrick methodology produces an adjusted national saving ratio for the United States which increases gradually from 43 percent in 1929 to 50 percent in 1969. No comparable studies are available for other countries but given the more rapid population growth in the United States than in most

¹⁷The time profile of income during a (professional) life might be interpreted as *prima facie* evidence of the amount of human capital formation specific to a job: a flat (steeply increasing) time profile would suggest no (large) human capital formation.

¹⁸John Kendrick, *Formation and Stocks of Total Capital* (New York: Columbia University Press, 1976).

other OECD countries, such an adjustment is likely to favor the relative position of the United States in an ordering of countries according to the size of the national saving ratio.

Different Relative Prices of Investment Goods

63. All the previous adjustments discussed referred to changes in the definition of savings and/or income. The reasoning that follows is qualitatively different in that it considers the effect of relative prices on savings ratios. In countries where the relative price of investment and consumption goods differs significantly, identical physical amounts of investment and consumption would imply different investment ratios, the latter being ratios of value aggregates rather than of quantities. Since empirically investment ratios and saving ratios in most OECD countries are close to identical in the medium run,¹⁹ this implies that saving ratios may differ considerably between countries with an identical composition of physical output allocated to consumption and investment.²⁰ The assumption of perfectly competitive world markets would weaken but not completely eliminate this possible source of differences in saving ratios. As long as production factors are immobile internationally and there are nontradeable goods and/or differential transportation costs, the relative price of investment goods may still differ between countries.

64. It seems difficult to say a priori whether such a relative price effect plays a significant role in observed intercountry saving ratio differences and—if so—in which direction it influences these differences. A recent careful international comparison of relative prices of major GNP components shows, however, that intercountry relative price differentials are substantial and that the relative price of investment goods is lower in the United States than in most other OECD countries.²¹ This implies that the low U.S. saving ratio can be interpreted simply as a reflection of the fact that “investment comes cheap” in the United States rather than entailing low investment (relative to consumption) in physical terms. The policy implications of this finding would appear to be that the saving ratio may indeed be low, but that this is nothing to worry about as far as the *volume* of investment is concerned.

¹⁹Cf. M. Feldstein, and C. Horioka, “Domestic Saving and International Capital Flows,” *The Economic Journal*, 90 (June 1980), 314–329.

²⁰This phenomenon has been implicitly recognized in discussions of the high Japanese household saving ratio, where the latter is partially explained by the high relative price of housing in Japan; cf. J. Shiba, “The Personal Savings Function of Urban Worker Households in Japan,” *Review of Economics and Statistics*, 161 (May 1979), 200–213.

²¹Cf. Irving Kravis, Alan Heston, and Robert Summers, *World Product and Income* (Baltimore: John Hopkins University Press, 1982), p. 20.

V. Savings Concept Relevant for Economic Growth

65. Applying different combinations of the various adjustments to the SNA saving definition discussed earlier, results in a large number of alternative savings concepts differing considerably in size as well as the speed and even direction of change over time. For the economic policymaker it is important to know which of these alternative concepts is the most relevant with respect to the policy targets he pursues.²² This section discusses the question of which definition of the national saving ratio is the most appropriate to use in the analysis of economic growth and its determinants.²³ While this relationship seems to be of primary concern in the United States, it is by no means the only important policy aspect of savings: in many LDCs, and recently also in several industrialized European countries, policies aiming to increase savings are primarily motivated—at least according to explicit statements by politicians—by the desire to create employment opportunities through capital-widening investment. Though closely related, output and employment growth targets need not have a one-to-one correspondence and would indeed imply different definitions of savings as the relevant concept for policy analysis.

66. Limitation of the discussion to the national saving ratio makes it unnecessary to review those adjustments discussed above which only affect the sectoral composition of total savings, while leaving the overall saving ratio unaffected. These adjustments include the adjustment for inflation-induced capital gains and losses on financial assets, and all adjustments for differences in institutional arrangements except for the method of raising tax revenue (i.e., direct vs. consumption taxes). The latter entails differences in national saving ratios only if disposable national income is measured at market prices rather than at factor cost, and this suggests that international comparisons of national saving ratios should be based on the latter concept rather than on income measures including indirect taxation.

²²While this study is limited to the discussion of saving *ratios*, it may be useful to remind the reader that annual changes in total national savings due to variation in the saving ratio usually do not exceed changes accounted for by variations in the level of income. Thus, policies to achieve full capacity utilization would appear equally relevant if the policy objective is an increase in total savings. Of course, full capacity utilization and high saving ratios are not mutually exclusive policy objectives. In fact, there seems to be an empirically robust positive correlation between the two variables over the business cycles.

²³Notwithstanding the concentration on total (or national) savings, it is recognized that with imperfect capital markets the sectoral distribution of savings will affect the composition of capital formation and probably the speed of income growth associated with a given overall saving and investment ratio. The sectoral distribution of a given amount of savings may thus itself become a legitimate policy concern.

67. In neoclassical growth models it is normally the *net saving ratio* which codetermines the absolute growth of the capital stock, given the growth rates of population and technical progress. There are at least two problems with such a paradigm:²⁴

- It is the increase in the gross rather than the net capital stock which codetermines the growth in productive capacity.²⁵ Whenever scrapping differs from depreciation (the normal case in a growing economy), net savings will not be equal to the increase in the gross capital stock and thus fail to be a proper indicator of capacity growth.²⁶
- If embodied technical progress is important and the official measure of investment fails to take full account of the increased productivity of new investment, the capital stock (measured in efficiency units) may rise even if net savings is zero. In this case a vintage capital model may be the appropriate tool for analyzing growth, in which case gross savings (and investment) becomes a relevant variable.²⁷

These examples suggest that both the gross and the net saving ratio may be relevant in a realistic and detailed analysis of growth, rather than one or the other.

68. In standard neoclassical growth theory, the rate of output growth is in the long run independent of the saving ratio. Changes in the latter exert an influence on output growth only during the transition period from one steady state to another. To avoid getting unduly involved in a discussion of the policy relevance of such models, it thus appears useful to replace the question of which savings concept is relevant for growth analysis by the related (but not identical) question of which wealth concept is relevant for the determination of income levels.²⁸ Once the appropriate wealth concept is determined, the relevant savings concept is likewise determined as its derivative with respect to time. Inspection of the various adjustments

²⁴In the real world further complications arise from the openness of the economy (which may entail discrepancies between national savings and domestic investment) and ex ante disequilibrium in the goods market, entailing unintended increases in inventories, i.e., investment which does not increase productive capacity. Implications of these complications are not pursued here.

²⁵If fixed capital loses part of its productive capacity already during its lifetime (i.e., before final scrapping), the relationship becomes even more complicated but the arguments to follow still hold.

²⁶Along a steady-state growth path the *relative* growth of the net and the gross capital stock will, however, be the same.

²⁷Putty-clay technology equally requires the use of vintage models and thus of gross savings for growth analysis.

²⁸In said neoclassical growth models, the saving ratio in the long run determines the *level* of (per capita) wealth which in turn determines the *level* rather than the growth of (per capita) income.

to the definition of savings discussed above shows that in some cases these changes would require concomitant changes in the concept of income (or output) to maintain consistency in the national accounts. In these instances the question of which is the relevant savings or wealth concept translates directly into the question of what is the relevant income concept. Thus, if services provided by consumer durables are deemed to be a legitimate part of a "comprehensive" or "correct" measure of income, then the "relevant" wealth concept must include the stock of consumer durables, and savings should be redefined to include consumer durable purchases. An analogous argument applies to the savings adjustment on account of government purchases of military hardware.²⁹

69. Little discussion is required with respect to the "black economy" adjustment: it attempts to reduce measurement errors, and the smaller these errors are kept the better.³⁰ Whether production activities presently deliberately excluded from the SNA (e.g., housewives' services and do-it-yourself activities) should be included in the income definition, thus lowering (raising) the saving ratio in the case where these activities represent consumption (investment), depends on what the income concept is supposed to measure. Where income is used as a proxy variable for welfare, inclusion would seem desirable.³¹ If, however, the aggregate output measure is used as an indicator determining demand pressure in the labor market or the size of the tax base, to mention a few examples, inclusion would not be justified. Since welfare considerations are the primary objective in promoting growth, it follows that the saving and income concepts chosen should be rather more comprehensive than the concepts presently used. The inclusion of hitherto ignored production activities which qualify as investment would for consistency require the computation of a corresponding capital stock whose (imputed) rate of return would, of course, add to current income appropriately redefined whenever this capital renders consumption services.³²

²⁹Note, however, that as these changes are implemented, the resulting savings concept becomes rather uninteresting for analysts concentrating on the supply of loanable funds by the household sector: financial planners may find little comfort in being told that the household saving ratio is unchanged, if households have switched from investing in financial assets (e.g., stocks and bonds) to buying consumer durables.

³⁰All adjustments are discussed here with respect to their economic justification, ignoring statistical difficulties of implementing any suggested adjustment. In that respect the present study differs from the rationale underlying the SNA which attempts to strike a balance between what is conceptually desirable and practically feasible.

³¹The resulting concept would still be a rather imperfect indicator of welfare, ignoring important aspects of welfare such as leisure time, income distribution, and relevant social indicators like crime rates, incidence of sickness, etc.

³²In the United States this is presently done only with respect to owner-built houses. Where the capital renders production services (e.g., human capital), the returns are reflected in higher productivity (as conventionally measured) and no imputed return should be added to income.

70. Generalizing this type of reasoning, it seems difficult to escape the conclusion that the part of education and R&D which permanently increases the productivity of labor and/or capital should be reclassified as investment and thus saving for the purpose of growth analysis. Cumulating these intangible investments would generate an intangible capital stock partly embodied in human beings (skills) and partly embodied in a stock of known production technologies and products. It has been shown that imputing market returns to these types of intangible capital goes a considerable way in explaining labor income differentials and the residual factor in economic growth.³³ The part of education which does not lead to an increase in factor productivity should be treated analogously to investment in consumer durables, where it leads to a permanent increase in knowledge and understanding or as consumption (as is presently done for all education) if no such lasting effects are produced. Human capital formation originating from learning by doing should similarly add to the stock of intangible human capital, implying an equal (imputed) increase in income and savings.³⁴

71. The last item to be considered is whether the value of nonrenewable resources used in current production should be deducted from current income on the grounds that it is equivalent to running down inventories.³⁵ The diversification efforts of economies heavily based on the exploitation of nonrenewable resources (e.g., Nigeria, Venezuela) implicitly recognize the dissaving character of nonrenewable resource use. By saving a substantial part (the rental income equivalent?) of their revenues from these activities and reinvesting it into alternative income-producing assets, they attempt to avoid the erosion of net national wealth defined in a broader way to include the stock of nonrenewable resources.³⁶ Recognizing the same principle explicitly in the national accounts would imply the deduction of rental income from nonrenewable resource use from national income and savings. Doing so would seem in line with economic logic.

³³For a detailed discussion of this topic see John W. Kendrick, *Formation and Stocks*.

³⁴It may well be that the amount of human capital formation foregone due to (youth) unemployment during a prolonged recession matches or even exceeds the output losses conventionally measured, the topic seems certainly worth further investigation.

³⁵Contrary to other stocks of capital which contribute to current output by rendering a production or consumption service in which economic depreciation is an unavoidable fact, a stock of natural resources "only" contributes to output by being used up. There is thus no imputed net return to stocks of natural resources, only cost of depreciation equal to the rental income of the resource owner.

³⁶The asset value of natural resources relative to current income may, in some cases, be so large as to make it economically efficient to lower the wealth income ratio by consuming part of the rental income from resource exploitation—this may presently be the case in countries like Kuwait and Saudi Arabia.

Discussion

Paul A. Wachtel*

That saving rates for the major industrialized countries differ enormously is a well-known puzzle. The careful analysis of the OECD's uniform National Income Accounts by Blades and Sturm suggests that the puzzle will continue to defy solution. This is not to fault their analysis; instead I am inclined to conclude that a full understanding of international differences in saving behavior may not be obtainable from the available data. In this discussion I would like to suggest an alternative framework for analysis of the available data which I think would provide a fuller understanding of the puzzle. Nevertheless, it is clear that answers to all the issues will be very difficult to obtain.

To begin, we can summarize the methodological approach used by Blades and Sturm. Their point of departure is the uniform accounting scheme prepared by the OECD. They note that the conceptual definition of saving in those accounts can be criticized for a number of reasons. For each of these they make adjustments to the data and note that with conceptually improved definitions of saving, the intercountry variation in average saving rates for the 1970s is reduced slightly.

Although the adjustments to the data that they suggest are always reasonable, the corrections made do not go very far towards solving the puzzle. For example, Table 3 in Blades and Sturm shows that with the SNA definition of gross household saving rates, Italy and Japan have the highest saving rates and Sweden and the United Kingdom have the lowest. Some six adjustments later, we find that the same rankings hold (totally standardized saving rate, method A). The rank correlations for all nine countries in the sample of the SNA average saving rates with the two alternative totally standardized measures are .90 and .85. Although the adjustments affect different nations differently, the overall picture is invariant. In a few countries a fifth or more of disposable income is saved, while in some the rates are only a fraction of that amount.

The emphasis in the paper is on the appropriate definition of the aggregate saving ratio, whether it is national saving or household saving. This, I think, is the major failing of the study. It compares the overall picture—the forest for each country. Instead, I suggest more emphasis on individual trees from each nation's forest. The puzzle of international differences in saving rates is not solved by comparing the vast forest of savings in each country. However, within each forest there are individual trees which are similar to or different from the corresponding trees in other forests. Per-

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haps more can be learned from a comparative study of different types of saving activity and motivations for saving.

Blades and Sturm present aggregate saving ratios after various adjustments are made. My contention is that the adjustments themselves merit more attention. They typically represent specific types of saving behavior and the extent to which countries differ with respect to these activities may shed light on the differences in the standard or common core definitions of saving. It is difficult to examine the magnitudes of the saving components used for the adjustments with the data in their tables which include adjustments to both the numerators and denominators in saving rates.

The emphasis on household saving here and in the Blades and Sturm paper needs to be justified. Saving by households is of particular interest because the household sector is generally a surplus sector. That is, its net financial investment represents resources available to other sectors for capital formation. The extent to which the household sector is releasing resources to the rest of the economy can be measured even with SNA data on personal saving. That is, simply subtract net housing investment from personal saving. I think that this calculation would provide a valuable addition to the material presented in the article.

Using the household saving data in Table 3 as an example, the interrelationship between SNA saving and the saving of unincorporated enterprises, corporate enterprises, pension funds, social security funds and government expenditures on human capital should be of interest. Thus, some simple questions could be addressed like: Do countries with high public pension saving have low private pension saving? Do countries with a lot of saving by unincorporated enterprises have less household saving? The emphasis on a comprehensive saving ratio obscures such questions. It is important to know whether differences in standard saving rates are due to particular components or to similar variation in all the components.

A decomposition of household saving cannot be done easily with NIPA data, but for the United States at least there is an alternative data source which is particularly useful, the Flow of Funds data. A breakdown of the Flow of Funds data on household saving which would be useful for the type of analysis that I am proposing is found in Table 1. Average ratios to disposable personal income for 1970-81 are shown, along with the slope coefficient from a trend equation.

Table 1
Composition of Household Saving, United States 1970–81

	Average Ratio to Disposable Income ^a	Trend ^b
Net acquisition of financial assets	14.3	.41 *
Deposits and credit market instruments	11.7	.31 *
Life insurance and pension fund reserves	4.1	.14 *
Net investment in noncorp. business	-1.4	-.05
Miscellaneous	-.1	-.01
Net increase in liabilities	7.5	.29
Home mortgages	4.9	.27 *
Other	2.6	.03
Net physical investment	6.1	-.06
Residential construction	3.0	.05
expenditures	5.0	.12
capital consumption	2.0	.06 *
Consumer durables	3.1	-.12
expenditures	12.6	-.07
capital consumption	9.4	.05 *
Net financial investment	6.8	.11
Net saving	13.0	.05
Personal saving (NIPA)	7.0	-.23 *
Personal saving (FOF)	9.8	.17 *

^aFollowing FOF convention, capital gains dividends and credits from government insurance are added to the NIPA definition of DPI.

^bSlope coefficient of regression of saving rate on a time trend; t-statistics greater than two are indicated by an asterisk.

The importance of the disaggregation is clear from Table 1. Any measure of household aggregate saving is composed of a diverse set of activities which exhibit very different trends over the decade of the 1970s. The major changes seem to be due to increases in the acquisitions of money market instruments and of mortgage liabilities. It is also interesting to note that the FOF aggregate measures exhibit positive trends over the decade while the trend in the personal saving rate using the NIPA is negative.

It would be logical to assume that a similar variety of behavior would be found with data for other countries. Although, to my knowledge, there is no comparable standard set of FOF accounts, I imagine that entries for all or some of the items in the Table could be found for many of the industrialized countries. At the very least, it may be possible to isolate the residential construction sector and its associated items, capital consumption and mortgages. The U.K. National Accounts include some FOF data. The following breakdown for the United Kingdom is readily available; it is shown with the average percentages of net income for 1970–75:¹

¹These data are taken from "Private Saving in the Provision of Social Security in Britain" by David Burros in George von Furstenberg, ed., *Social Security versus Private Saving*, (Cambridge, Mass.: Ballinger, 1979). This volume also includes essays on the relationship between social security and saving in Canada, Sweden, France, W. Germany and the United States. See also K. Cuthbertson, "The Measurement and Behavior of the U.K. Saving Ratio in the 1970s," *National Institute Economic Review*, February 1982.

Personal Saving	11.2
Gross physical investment	6.1
Net financial investment	5.1
contractual assets	5.6
other financial assets	6.0
net increase in liabilities	6.5

However, we should not underestimate the task of constructing comparable tables of the components of saving. The U.K. data shown are similar to the breakdown suggested for the United States, but not necessarily comparable.

Analysis of saving behavior of individuals in different countries usually centers around institutional differences. Particularly, the public and private ways of providing retirement income are considered very important. Blades and Sturm address this issue in part by adjusting the saving ratios to either exclude the surplus of private pension funds or to include the surplus of social security funds. However, neither of these surpluses is relevant for analyzing the effect of pension saving on individual saving behavior. The surpluses of pension funds are their contribution to national saving or the extent to which resources are set aside for capital formation. Individuals' saving will be affected by the extent to which pension funds accumulate expected future liabilities. Since both private and public pension funds are rarely fully funded, the surpluses may not correspond with the accumulation of implicit or explicit pension promises. It is these promises of future pensions that may substitute for individuals' saving rather than the extent to which the pension funds run a current surplus.

Thus, the relevant measure of saving by pension funds depends on the question at hand. The surplus represents their contribution to national saving or capital formation. If, however, we are interested in the role of pension funds as a creator of pension wealth which substitutes for individuals' saving, a different measure is needed. A calculation of the unfunded liabilities must be added to the assets of the pension funds or a calculation can be made of pension wealth along the lines used in the United States to estimate social security wealth. It would be interesting to know whether those countries with low asset accumulation by households have high levels of private or public implicit pension promises. Although there have been calculations of implicit pension wealth in the United States, I do not know whether similar data are available for other countries.

A large part of the saving behavior of individuals is related in one way or another to the provision of housing. The housing sector affects financial asset accumulation (for downpayments), liabilities (mortgages), and capital expenditure (construction). Countries differ enormously in the institutional structures that determine saving for these purposes. Furthermore, there are differences in the extent to which housing services are provided by the public sector, the business sector, and by owner-occupiers. The institutional structure of the housing sector will affect the level of net financial investment and resources available for capital formation elsewhere. Thus, an analysis of the housing sector could help answer many important questions.

For example, could low productivity growth in the United States be due to a large allocation of saving to housing rather than other capital formation?

The overall conclusion to be drawn from these comments about personal saving behavior is that it is not informative to make international comparisons of personal saving rates. For the analysis of national saving, an aggregate saving rate may be of greater interest. An overall measure of the propensity of various countries to set aside resources for capital formation is an important determinant of future growth. It is interesting to observe (Blades and Sturm Table 2) that the coefficient of variation in gross national saving (.21) is only two-thirds as large as the coefficient of variation for gross household saving (.33). (Gross saving is preferred to net because of the differences in depreciation calculations.) The remaining inter-country differences are large and some disaggregation would still provide a useful framework.

Disaggregation of the national saving data provides important information about which sectors are providing the resources for capital formation and which are using them. For example, government deficits absorb the savings of other sectors. Generally, the household surplus is absorbed by business needs to finance its investment. It is also useful to measure the extent to which the housing sector absorbs savings and whether the foreign sector is an absorber or supplier of resources. The FOF scheme in the United States provides savings tables for each of the major sectors in the economy which can be used to analyze patterns of capital formation and savings flows.²

A useful breakdown of gross saving and investment in the United States can be found in the NIPA as shown in Table 2. The U.S. data indicate that the government sector absorbs saving while the foreign sector provides resources. However, the behavior of the important sectors is very variable although there is no apparent trend.

²See for example the author's "Financial Prerequisites for Economic Growth" in M. Polakoff and T. Durkin, eds., *Financial Institutions and Markets* (Boston: Houghton-Mifflin, 1981).

Table 2
Composition of National Saving, United States, 1970-81

	Average Ratio to GNP	Trend ^a
Gross Saving	15.9	.10
Gross Private	16.9	.07
Personal saving	4.9	-.16*
Undistributed profits	2.0	.00
Capital consumption	9.9	.23*
Government Surplus	-1.0	.03
Gross Investment	16.0	.08
Gross Private Domestic Investment	16.0	.10
Residential construction	4.4	-.03
Nonresidential fixed and inventories	11.5	.14
Net Foreign Investment & Capital Grants	.1	-.02

^aSlope coefficient of regression of saving rate on a time trend; t-statistics greater than two are indicated by an asterisk.

Data to fill out such a scheme should be obtainable for most countries and the contrasts among the entries seems more interesting to me than just concentrating on the first entry. In addition, data are often available to make some logical additions to this scheme. For example, consumer durables can be added to personal saving and a government capital account can be added to the scheme (as is done in Canada). There are also probably large differences among countries in the proportion of GNP devoted to household physical investment (housing and consumer durables) and to government capital formation (military capital, research and development, public enterprises and social infrastructure).

Also of interest in this context are differences in the size of capital consumption allowances. These are in part due to variation in the accounting procedures used by national income statisticians which would probably be very difficult to evaluate. More importantly differences in the age and composition of the capital stock would also affect the size of depreciation allowances. An understanding of this issue would help explain why in certain countries (with a small or young stock of capital) a given amount of non-consumption (gross investment) makes a larger contribution to the growth potential of the economy.

An advantage of looking at capital formation (investment) by type of activity is that we can take a look at items which may or may not be classified as investment expenditure. Saving may be low in those countries which have large expenditures on near-investments (research and development, education and health). It is not always clear that such expenditures should be added to the saving rate (Blades and Sturm hesitate to do so) and disaggregation keeps the analysts' options open.

Although saving is one of the most important elements of any national accounting scheme, it is also the most problematic because saving is usually measured as the residual entry in the accounts. Thus any measure of saving is subject to large errors of measurement. Differences among countries in

the size of such errors may make comparison of saving levels and trends very inaccurate. However, it would be very difficult to pinpoint exactly the type or direction of errors that may appear in the accounts.

An example of a data error which affects the international comparison of saving rates is the size of the underground economy. If nations differ in the size of the underground economy as they probably do, then the comparison of saving rates can be very inaccurate. Of the countries in the sample, I guess that the severest underestimation of income occurs for Italy. But Italy already has a high personal saving rate and if income is underestimated and consumption accurately measured, then the saving rate is even higher.

An indication of the size of the errors that creep into saving data are the discrepancies that appear in the accounts. A glaring example is the difference between U.S. personal saving calculated from the NIPA and from the FOF accounts (using financial data). Using a September 1982 FOF table we find that the average absolute discrepancy was \$5.7 billion for 1970-75 and \$39.8 billion for 1976-81. In recent years the FOF indicates substantially more saving; the FOF personal rate is 2.3 percentage points higher than the NIPA calculation for 1976-81.

A related problem that is more tractable is the revision of data. Since saving is a residual measurement it can change substantially when data revisions are made. I do not know how revisions have affected the accounts of other countries, but recent data revisions have all but wiped out the capital shortages that seemed to appear in the United States in the 1970s. For example the revision to the accounts published at the end of 1980 increased the average personal saving rate for 1968-79 to 7.1 percent from 6.4 percent.³ The revisions released this summer (July 1982) increased both personal saving rates and the share of business investment in GNP over the past five years. For 1977-81, the personal saving rate is now at 6.0 percent, 0.6 percent higher than reported earlier. The ratio of private fixed investment to GNP increased by 0.4 percent to 16.1 percent.

To recapitulate my major criticism of the Blades and Sturm analysis is that the accounting adjustments they make to overall saving rates leave the overall puzzle unsolved. I suggest more emphasis on specific concepts of economic activity rather than on overall saving rates. This amounts to a comparative study of the structures of various economies. I am confident that such studies would provide a partial solution to the puzzle. Still lacking is a study of differences in the proximate causes of saving. An example of this is the role of demographic structure in determining personal saving.

³See D. Jamroz, "Highlights of the Recent National Income and Product Account Revisions," *Quarterly Review*, Federal Reserve Bank of New York, Spring 1981.

My own research showed that this issue is not well understood in the United States and I think that this is the case elsewhere as well.⁴ It is clear that a great deal more work remains to be done. Although Blades and Sturm may not have solved the puzzle, we can be appreciative of their efforts in providing a comprehensive catalog for future attempts.

⁴See "Household Savings and Demographic Change: 1950-2050," Research Paper for the President's Commission on Pension Policy (1981) and "Age Structure and Personal Saving Behavior," with Charles Lieberman, in *Social Security versus Private Saving*.

Discussion

Edward F. Denison*

That this is a valuable paper hardly needs stating; it always is interesting to calculate how a change in definition alters differences among places. Blades and Sturm provide several such calculations for saving rates, as well as evaluations of the effect of different institutional arrangements. These results speak for themselves.

I shall concentrate on questions as to what definitions are most appropriate. Blades and Sturm say the correct definition of saving depends on the question analyzed and that their paper gives special attention to analysis of economic growth (par. 2). I accept this as a starting point.

Saving in the Whole Economy

I shall devote most of my time to saving in the economy as a whole. It is axiomatic that total saving should equal total investment if data for saving are to be useful in analyzing economic growth or stabilization. Consequently, I shall use the terms "saving rates" and "investment rates" interchangeably. To equal investment in the national accounts, saving must not include revaluations of existing assets. The authors' discussion of continuing inflation in their par. 48 raises a question as to whether they agree with this, and I would welcome clarification.

Geographic Coverage

National income and product, around which the U.S. NIPAs are organized, include net factor income from abroad so that the income, consumption, and saving of residents and the ratio of their saving to their income are not affected by the geographic origin of their income. OECD statistics, in contrast, center on gross *domestic* product, which confuses these relationships. Blades and Sturm are right to adjust them to a GNP basis. More debatable is their addition of net current transfers from abroad to GNP for use as the denominator of the saving ratio. Although it seems sensible to suppose that *recipients* add transfers from abroad to income before deciding how to divide income between expenditures and saving, it also seems likely that *payers* consider international transfers part of their expenditures rather than a deduction from income. At least, I believe Congress thinks this way.

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Market Price or Factor Cost

Blades and Sturm do not directly consider whether valuations should be at market price (as in their table 2) or at factor cost, but the question is implicit in their discussion of the effects of consumption taxes on personal saving rates (pars. 31–32). There is reason to prefer factor cost because it will not help future growth if the investment rate is increased by taxes on investment goods that raise their relative price rather than by diversion of resources from consumption to investment. Unfortunately, at present we are forced to use market prices because of the absence of a division of GNP at factor cost between investment and consumption and of capital consumption at factor cost. In their studies for OECD in the 1950s Gilbert and Kravis, and Gilbert and Associates, did provide comparable gross output data for nine countries at both factor cost and market price.¹

National or Uniform Prices

The studies just cited showed that the choice between factor cost and market price is less important than the choice between using its own prices for each country and using the same prices for all countries. Later studies by Kravis, Heston, and Summers for the United Nations also show the importance of differences in price relationships. For example, consider Japan and West Germany. In 1970, gross investment was 31 percent of GDP in Germany when prices in marks were used and 40 percent in Japan when prices in yen were used but when the same prices, international dollars, were used for both countries the German percentage was 37 and the Japanese 38, only one-tenth as large a difference. Similarly, in 1973 the gap was 11 percentage points in national prices and 2 points in international dollars. From 1973 to 1975 the situation changed. The Japanese percentage fell 7 percentage points in yen but only one point in international dollars while the German percentage fell sharply in both marks and international dollars. As a result, in 1975 the Japanese percentage was much above the German by either measurement.²

¹Milton Gilbert and Irving B. Kravis, *An International Comparison of National Products and the Purchasing Power of Currencies: A Study of the United States, the United Kingdom, France, Germany, and Italy*. Paris: Organisation for European Economic Cooperation, 1954. Milton Gilbert and Associates (Wilfred Beckerman, John Edelman, Stephen Marris, Gerhard Stüvel, and Manfred Teichart), *Comparative National Products and Price Levels: A Study of Western Europe and the United States*, (Paris: Organisation for European Economic Cooperation, 1958).

²Irving B. Kravis, Alan Heston and Robert Summers, *International Comparisons of Real Product and Purchasing Power*, (Baltimore: Johns Hopkins University Press, 1978), tables 1.5 and 1.6, and *World Product and Income: International Comparisons of Real Gross Product*, (Baltimore: Johns Hopkins University Press, 1982), tables 1.6 and 1.7.

Investment has been cheap in the United States. In the 1950s and 1960s the U.S. gross investment ratio was much higher, compared to other countries, when the same prices were used for all countries than when national prices were used. In 1975 the relative price of capital formation continued to be lowest in the United States although the difference from most other countries had narrowed.³

Although Blades and Sturm mention differences in relative prices, they do not refer to the wealth of data about them nor indicate clearly what prices they consider appropriate (pars. 61–62). Since it is not yen, marks, and dollars but structures, equipment, and inventories that contribute to production, it seems to me that if international comparisons of any saving ratios can contribute to analyses of levels or growth of output, it must be ratios based on the same prices that are appropriate. In *Why Growth Rates Differ* I took this position but suggested data in national prices should be used to appraise national effort in the form of “abstinence.” (Of course, it was net saving that was appropriate.)⁴

A Look at Table 2

If one postulates a few dozen other-things-being-equals, a persistently *high* gross saving rate leads to a large capital stock and hence a high level of output, while a sharply *rising* gross saving rate leads to a high growth rate of capital stock and hence a rapid growth of output. International differences in gross saving rates have, for the most part, persisted for a long time now so, if they can indicate anything about international differences in capital stock and output, it is about their levels. But can they?

I have ranked the countries from 1 to 24 by their gross saving rates, net saving rates, and capital consumption rates. The first two sets of rates were taken from Table 2 of the paper. The third was obtained by subtraction, which isn't exactly right but should be close enough to rank the countries correctly. The rankings by gross and net saving rates put the same countries at the top and bottom, although the correspondence vanishes once one leaves the extremes. There is no correspondence between capital consumption rates and gross saving rates. Luxembourg is first in gross saving and 17th in capital consumption. The next three countries by gross saving rank are 7th to 13th by capital consumption rank. The United Kingdom and United States rank 22nd and 24th, respectively, by gross saving but the United Kingdom ranks 6th and the United States 4th by capital consumption. On the other hand, Portugal and Turkey rank in the last four by both measures so the relationship is not consistently inverse.

One has to wonder whether the numbers make sense. Firmer assurance about comparability of data than is provided by the authors' assurance in par. 10 that data were compiled according to standard definitions would be comforting. Has government capital consumption been included

³For 1975 price ratios see *ibid.*, table 1.8.

⁴Edward F. Denison, *Why Growth Rates Differ: Postwar Experience in Nine Western Countries*, (Washington, D.C.: The Brookings Institution, 1967), esp. chapter 10 and p. 344.

in gross saving in all countries, although it seems not to be in *National Account Statistics*? Do service lives and depreciation formulas bear the same ratio to the truth in all countries? What about the international flow of retained earnings of corporate subsidiaries? Are government and private capital consumption always valued at reproduction cost? (Par. 8 cautions they are not.)

On the other hand, if the trouble is not, or not only, with the data, it may mean that gross saving rates differ from those in the past; or that the distribution of capital stock among inventories, international assets, and depreciable assets in each service-life class differs among countries; or that actual service lives vary from country to country. Any of these would prevent even accurate gross saving rates from indicating the ranking of countries by capital-output ratios and leave a large question as to what useful information they do convey. International differences in the composition of investment or capital stock or in service lives would not, in themselves, destroy *net* saving rates as an indicator of relative capital-output ratios. Nevertheless, to analyze differences in output levels it is far better to develop even crude estimates of capital stock than to rely directly on either gross or net saving rates. To analyze either intercountry differences in output levels or output growth rates in my own studies, I have always relied on capital stock estimates rather than saving rates.

Gross Versus Net Saving

I agree with the authors that there are contexts in which both gross and net saving data have uses. However, I consider gross saving to be decidedly the subordinate series, as does the SNA. Although Blades and Sturm do emphasize household saving, a net saving series, they seem to give priority to gross saving, I shall comment on three points they make in behalf of the gross concept.

In par. 67 Blades and Sturm point out that it is the increase in gross rather than net capital stock that co-determines the growth of productive capacity, and that net saving does not equal the increase in the gross stock if discards differ from depreciation. From this they conclude that gross and net saving are both relevant to growth analysis. This is a nonsequitur, because net saving almost always comes closer than gross saving to the change in gross stock. In the same par. the authors argue in behalf of gross saving that a vintage capital model may be appropriate for analyzing growth. The case against vintage models is decisive, in my opinion.⁵ But even if a vintage model were desired, I fail to see how gross saving ratios could substitute for the age distributions that vintage models require. In par. 7 the authors introduce the statistical argument that net saving is less reliable than gross because capital consumption is not estimated by standard procedures. It should be noted that this argument favors gross saving only for business

⁵See, e.g., Edward F. Denison, *Accounting for Slower Economic Growth: The United States in the 1970s*, (Washington, D.C.: The Brookings Institution, 1979), pp. 57–58.

depreciation. It favors net saving with respect to government and nonprofit depreciation, which must be estimated and added, and would do so with respect to depreciation on consumer durables if that were to be included. In any case, if net saving is the appropriate series, the cure is to introduce standard procedures, not to substitute gross saving. Obviously, I do not imply that the authors could have done so for this paper.

Scope of Investment

Suppose output is measured by net national product and the present scope of output is retained. What should be counted as net saving or investment?

Two concepts may be distinguished. One measures additions to the stock of capital that yields future services, whether or not these services will be counted in future net national product. At the least it would include Blades' and Sturm's net saving (i.e., business capital formation including owner-occupied houses, net domestic capital formation by nonprofit institutions and general government, and net foreign investment) plus net acquisitions of consumer and military durables.

The second, narrower concept measures additions to the stock of capital that yields future services that contribute to the net national product as measured. This is approximately the same as net saving in the U.S. NIPAs minus capital formation by nonprofit institutions plus capital formation by government enterprises.⁶ General government and consumer capital are excluded. As a minor qualification to exclusion of general governmental capital let me note that in countries that add a small imputed interest-type return on government capital to their national product series, it is arguable that government capital should be included. I prefer to exclude such income, a highly arbitrary number, from output.

Blades and Sturm discuss the possible reclassification of certain intangibles from consumption to investment and the possibility of enlarging the scope of national product so as to raise both consumption and investment. I shall not evaluate here the desirability of such proposals when output is measured by net national product. I do strongly oppose all proposals to enlarge the scope of investment in the NIPAs if output is to be measured by GNP. Gross output is a duplicated measure that there is no reason to maximize. Insofar as large output is a proper goal of society, it is net output that measures success in achieving this goal. Neither is there reason to want a high level of gross saving (insofar as this differs from net saving). Capitalization of government durables adds to the duplication already present in the NIPA concept of GNP and makes it a worse output measure. Addition of consumer durables would go much further. For example, in 1978 consumers actually spent \$199 billion for consumer durables in the United States, but consumer durables would be counted as \$413 billion of GNP if

⁶For isolated analysis of U.S. growth, capital formation by government enterprises probably should be excluded. See Edward F. Denison, *Accounting for United States Economic Growth 1929-1969*, (Washington, D.C.: The Brookings Institution, 1974), pp. 53 and 273-75.

they were capitalized. Most of the difference is depreciation, which also adds to gross saving. Capitalizing and depreciating items like R and D and education expense would add further huge amounts of duplication to GNP and gross saving.⁷ If gross series are to be the focus of attention, I would strongly oppose capitalization of any additional expenditures, whether they are now counted like consumption expenditures in the NIPAs or omitted from them.

Sectors

Any division of saving by sector is inherently fragile because the ownership of all assets and the liability for all obligations ultimately rests on individuals. Given this limitation, the cleanest and most significant division is between government saving and private saving. Saving of social insurance funds is the only item discussed in the paper that possibly bears on this distinction. It belongs in government saving, in my opinion, because government determines the receipts and expenditures of the funds and because, in setting budgets, the rest of government saving is not determined independently of social insurance saving. Saving of government enterprises, which is small in the United States but not (algebraically) everywhere, is the only significant item whose proper classification seems uncertain.

Net private saving is usually divided between personal or household saving and corporate or business saving. I think the most useful division would confine corporate saving to corporations organized for profit—and count all other private saving in personal saving. The NIPAs followed this practice in the 1940s and 1950s but certain mutual financial corporations were subsequently reclassified as corporations, mostly because they paid corporate income tax. Blades and Sturm discuss international differences only in household saving. A legitimate question is whether these data are good enough and comparable enough to warrant comparison. A parallel comparison of business saving might help one judge whether the data look sensible.

In fact, the division of private saving between corporations and persons does not greatly interest me because it is difficult, if not impossible, to improve analysis of total private saving by examining its parts. The following facts, which are based on the latest annual data for 1948 through 1981, with stability judged by the use of the *absolute* standard deviation in percentage points, will suggest why. The ratio of gross private saving to GNP is about as stable as the ratio to GNP of each one of its three major components: personal saving; undistributed corporate profits with inventory valu-

⁷See Edward F. Denison, Comment on "Integrated Accounts for the United States, 1947–80," *Survey of Current Business*, May 1982, pp. 60–65.

ation and capital consumption adjustments; and capital consumption allowances with capital consumption adjustment.⁸ (The table shows the data.) The sum of the standard deviations of the components of the gross private saving rate are 3.4 times as large as that for the gross private saving rate itself. Also, the ratio of gross private saving to GNP is considerably more stable than the ratio of personal saving to disposable personal income. So, for that matter, is the ratio of net private saving to net national product. Also to be noted is the presence of negative correlation between year-to-year changes in personal saving rates and corporate saving rates.⁹

You may wonder why I introduce gross private saving here when it is net private saving that matters. It is only because the best way to appraise net saving behavior may be to appraise gross saving behavior first and then to deduct depreciation. To be sure, the gross saving rate is not a great deal more stable than the net but its superiority in this respect is increased if trends are removed.

Selected Saving Ratios for the United States, 1948-81 Averages

Ratio	Mean (percent)	Standard deviation (percentage points)
1. Gross private saving ÷ GNP	16.41	0.76
2. Personal Saving ÷ GNP	4.67	0.70
3. Undistributed corporate profits with IVA and CC Adj. ÷ GNP	2.63	0.81
4. Capital consumption allowances with CC Adj. ÷ GNP	9.07	0.89
5. Wage accruals less disbursements ÷ GNP	0.00	0.01
6. One-half of statistical discrepancy ÷ GNP	0.04	0.17
7. Sum of rows 2 to 6	16.41	2.58
8. Net private saving ÷ NNP	8.07	0.89
9. Personal saving ÷ disposable personal income	6.74	1.01

GNP = gross national product. IVA = inventory valuation adjustment. CC Adj. = capital consumption adjustment.

Note: the statistical discrepancy in the national accounts is divided between gross private saving and gross investment.

Source: Calculated from Bureau of Economic Analysis, *Survey of Current Business* July 1982 and *National Income and Product Accounts of the United States, 1929-76 Statistical Tables*.

⁸The coefficient of variation, a measure of relative dispersion, that Blades and Sturm use, is, of course, far smaller for the total than for any of these three parts. In a footnote to their par. 8 the authors wonder whether they shouldn't use the standard deviation instead of the coefficient of variation. I suggest that they at least tell what this measure shows, since they must have the data.

⁹In a footnote to par. 18 the authors acknowledge that several studies argue, as the data for the United States show, "that household and business savings are close substitutes."