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Saving out of Different Types of Income

IT HAS ALWAYS BEEN A SOURCE of professional pride to me to be able to tell my undergraduate students in macro theory that economists know a lot about what makes consumers tick. However, in light of the experience of the past several years, I now state this proposition much more circumspectly, and perhaps should restrain myself altogether. For the fact is that in the last three or four years, the consumer has done few things predicted of him. To be sure, there have been some new elements in the picture: interest rates at the highest levels in a century; a "roaring" inflation, at least by contemporary U.S. standards; and a temporary tax increase. But even so, the consumer seems to have injected his own element of eccentricity. Among other things, he was thrifty in 1967 and the first half of 1968 on a scale then unprecedented for the postwar period. And while he regained his taste for spending in the last half of 1968, it was rather short-lived. For in the third quarter of 1969, the personal saving rate again began to rise, and from the third quarter of 1970 through the second quarter of 1971, was in excess of the unheard-of level of 8 percent.

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The time seems appropriate, therefore, to begin reassessing the contemporary view of the aggregate consumption function. It is in this spirit that this paper was undertaken, though perhaps appropriately enough, it deals not with a new idea, but with one that goes back at least to Marx and Ricardo. In question is the notion that different marginal propensities to consume attach to different types of income. Usually the distinction intended is between labor income and property income,[1] but this paper focuses on transfer payments, personal contributions to social insurance, and personal taxes. Because of the 1968 surcharge, the liberalization of social security benefits in early 1970 and again in 1971, the 1970 increase in payroll taxes, and the 1970 recession, these three determinants of disposable income in recent years have all experienced fairly abrupt changes, and accordingly it seems appropriate to look to them in trying to explain the unusual recent behavior of personal saving.

I should like to warn the reader at the outset that he is likely to be somewhat shocked by the results. For one thing, probably nearly every fiscal policy economist believes that one of the quickest and surest ways to stimulate consumer spending is to increase transfer payments. If taken literally (and I shall argue they should not be taken literally), the results here suggest the contrary—that only about 15 cents of each dollar of increased transfers is spent within three months of the increase. For another thing, the results indicate that a dollar increase in employee payroll taxes leads to a prompt reduction of more than two dollars in personal saving, thus indicating a superrationality on the part of the consumer that may seem counterintuitive. Finally, the results suggest that in the short run the bulk of the

1. In the theoretical literature, see especially Nicholas Kaldor, "Marginal Productivity and the Macro-Economic Theories of Distribution: Comment on Samuelson and Modigliani," *Review of Economic Studies*, Vol. 33 (October 1966), pp. 309–16, and "Alternative Theories of Distribution," *Review of Economic Studies*, Vol. 23 (1955–56), pp. 83–100. In the empirical literature, see Lawrence R. Klein and A. S. Goldberger, *An Econometric Model of the United States, 1929–1952* (Amsterdam: North-Holland, 1955); Lawrence R. Klein and J. Margolis, "Statistical Studies of Unincorporated Business," *Review of Economics and Statistics*, Vol. 36 (February 1954), pp. 33–46; Irwin Friend and Irving B. Kravis, "Entrepreneurial Income, Saving and Investment," *American Economic Review*, Vol. 47 (June 1957), pp. 269–301; Irwin Friend and Stanley Schor, "Who Saves?" *Review of Economics and Statistics*, Vol. 41 (May 1959), pp. 213–48; and H. S. Houthakker, "An International Comparison of Personal Savings," *Bulletin de l'Institut de Statistique International*, Vol. 38-2 (November 1961), pp. 55–69, and "On Some Determinants of Saving in Developed and Under-Developed Countries," in E. A. G. Robinson (ed.), *Problems in Economic Development* (London: Macmillan, 1965).

adjustment to a change in personal taxes falls on saving rather than consumption.

I, too, have reservations about these findings: (1) They obviously contradict much current conventional wisdom; (2) they are based only on aggregate time series data; and (3) they are derived in the context of one particular model. But I believe that they have sufficient validity to raise serious questions about what Arthur Okun has recently termed the "fundamental premise" of fiscal policy economics—the notion that a dollar of income is basically a dollar of income regardless of its source.[2]

The Model

The analysis begins with the following identity from the national income accounts: Disposable personal income equals labor income (L) plus property income (P) plus transfer payments (TR) less personal contributions for social insurance (SI) less personal tax and nontax payments (T). Labor income is defined as the sum of wage and salary disbursements and other labor income, while property income consists of proprietors' income, rental income of persons, dividends, and personal interest income.

Since the national income accounts do not break down saving in a manner corresponding to disposable income, it is not possible to estimate a saving function for each category of income taken separately.[3] As a result, separate values of the marginal propensities to save must be estimated as the coefficients in an equation in which total saving is regressed on the several components of disposable income.

The analysis has in general been conducted in the framework of the "zero-depreciation" theory of saving elaborated by H. S. Houthakker and myself.[4] According to this theory, personal saving is assumed to be a linear function of the existing stock of financial assets and income:

$$S(t) = a + bA(t) + sY(t), \tag{1}$$

2. Arthur M. Okun, "The Personal Tax Surcharge and Consumer Demand, 1968–70," *Brookings Papers on Economic Activity* (1:1971), p. 171.

3. It would also be desirable to have taxes broken down by type of income, but these data, too, are not available.

4. H. S. Houthakker and Lester D. Taylor, *Consumer Demand in the United States: Analyses and Projections* (2nd ed., Harvard University Press, 1970).

where

S = personal saving
A = stock of financial assets
Y = disposable personal income,

all quantities being assumed to be measured at time t. S and Y are flows, while A is a stock. The stock of financial assets is assumed to be nondepreciating—thus giving the model its name—with the result that the relationship between the stock and its flow is given by

$$\dot{A}(t) = S(t), \tag{2}$$

the "dot" on A denoting the rate of change of the stock of assets with respect to time.

The basic notion underlying this model is that the consumer (considered as a fictive representative individual) adjusts his saving so as to bring his stock of financial assets into line with his level of income. The model can thus be interpreted as embodying a Stone-Nerlove stock adjustment process on the stock of wealth, with the proviso that the depreciation rate on this stock is zero. An important consequence of this assumption is that in a long run, steady-state equilibrium, saving is zero.[5] Accordingly, the concept of a marginal propensity to save must have reference to some limited interval of time. More particularly, s refers to the instantaneous marginal propensity to save defined by the condition that the underlying stock of financial assets is constant; that is, s measures the response of saving to a change in disposable income in the interval before the stock of assets is affected by the change in saving. This interval will be referred to as the short run, and is not to be confused with a period of one quarter.

The present approach is controversial in denying that saving is determined passively as the difference between disposable income and consumption. Indeed, the model in (1) leaves consumption to be determined residually. Hence, the presence of real inventories in the case of durable goods, and of psychological factors giving rise to inertia in the case of services and some nondurables, does not enter into the determination of the saving rate. These quantities play an important role in determining the allocation of total consumption among goods and services, but for total consumption the stock adjustment operates with respect to the stock of financial assets.

5. The steady state is defined by the condition that the stock ceases to change. Since the stock does not depreciate, saving must be zero.

RELATIONSHIP TO THE MODIGLIANI-BRUMBERG LIFE CYCLE HYPOTHESIS

Additional insight into the model can be gained by noting its kinship to the consumption function evolving from the life cycle hypothesis of saving originally formulated by Modigliani and Brumberg.[6] The saving function expressed in equation (1) can be made equivalent to the Modigliani-Brumberg consumption function simply by replacing current disposable income (Y) by its value expected in the future and assuming a to be zero. In this case, the coefficients b and s must be interpreted as depending upon the length of the life cycle and the age distribution of the population.

However, the relationship of the two models in their long-run limiting forms is even closer and does not depend upon the identification of current with expected income. A well-known implication of the life cycle model is that in the context of steady exponential growth in income, the saving rate is proportional to this rate of growth.[7] This is also true for the present model, for it be can shown[8] that in conditions of long-run dynamic equilibrium, or "golden age" growth, the saving-income ratio approaches the value

$$\frac{\hat{S}(t)}{Y(t)} = \frac{sg}{g - b}, \tag{3}$$

where s and b are coefficients as defined for (1), g is the exponential rate of growth in income, and the "hat" on S denotes the golden age.

DISAGGREGATION OF DISPOSABLE INCOME

The particular objective of this inquiry requires disaggregation of disposable income into the components listed at the beginning of this section,

6. See Franco Modigliani and Richard Brumberg, "Utility Analysis and the Consumption Function: An Interpretation of Cross-Section Data," in Kenneth K. Kurihara (ed.), *Post-Keynesian Economics* (Rutgers University Press, 1954), and "Utility Analysis and Aggregate Consumption Functions: An Attempted Integration" (unpublished paper, 1953). This section does not imply that the model reported in this paper is based on life cycle notions. Its purpose is merely to note that, especially in the context of steady growth, the present model has life cycle implications.

7. See Franco Modigliani, "The Life Cycle Hypothesis of Saving, the Demand for Wealth and the Supply of Capital," *Social Research*, Vol. 33 (Summer 1966), pp. 160–217.

8. See Houthakker and Taylor, *Consumer Demand*, pp. 288–89.

postulating a separate short-run marginal propensity to save for each. Thus,

$$(4)\quad S(t) = a + bA(t) + s_1L(t) + s_2P(t) + s_3TR(t) + s_4SI(t) + s_5T(t).$$

Since savings are the epitome of a durable good, b should be negative, which is to say that the stock of wealth is expected to influence saving in the same way that the stock of automobiles influences the purchase of new cars. The coefficients s_1 and s_2 are, of course, expected to be positive, and on theoretical grounds s_2 should be greater than s_1, as will be discussed below.

As for the other coefficients, s_4 and s_5 are naturally expected to be negative. Since contributions to social insurance leave the contributors with a claim to future income—rather than just a tax receipt—the size of s_4 will depend upon the extent to which social insurance substitutes for regular saving. At an extreme, s_4 could be in the neighborhood of -2, since employees' contributions are matched dollar for dollar by employers. Finally, according to the prevailing view, s_3, the short-run marginal propensity to save out of transfer income, is fairly small.

THE STEADY-GROWTH SAVING RATE

While, as has already been noted, the long-run marginal propensity to save out of all types of income is zero in a steady-state static equilibrium, it is positive for a regime in which each component of disposable income grows at some constant exponential rate. Thus, analogously to the golden-age saving rate given in equation (3) for nondisaggregated disposable income, it can be shown that, in such a regime,

$$(5)\quad \frac{S}{Y} = \frac{s_1g_1}{g_1 - b}\frac{L}{Y} + \frac{s_2g_2}{g_2 - b}\frac{P}{Y} + \ldots + \frac{s_5g_5}{g_5 - b}\frac{T}{Y},$$

where g_1 is the rate of growth in labor income, g_2 the rate of growth in property income, and so forth. Consequently, the steady-growth saving rate is seen to depend on each of the s parameters as well as on b and the share of each component of disposable income in the total.

Since in particular the steady-growth saving rate depends upon s_1 and s_2, it is important to recall the theoretical reasons why the marginal propensity to save out of property income is expected to be higher than that out of labor income. The literature provides at least three. One, stressed by Klein and Goldberger, assumes that labor income and property income represent different points on the income distribution.[9] The argument is that

9. Klein and Goldberger, *An Econometric Model of the United States.*

those receiving property income have higher incomes on the average than those receiving labor income. The higher marginal propensity to save out of property income then follows from the assumption that the marginal propensity to save increases with income.

The second and third arguments, which, though venerable, are most closely identified in the recent literature with Kaldor and Samuelson and Modigliani, stress the functional rather than the size distribution of income.[10] Samuelson and Modigliani appear to believe that the higher marginal propensity to save out of property income is an attribute of the class receiving the income, while Kaldor argues that it is intrinsic to the nature of the income. In Kaldor's view, the prosperity of business enterprise requires continual expansion, and, for a variety of reasons, it is necessary that a portion of the capital required be generated internally.[11]

ESTIMATION FORM OF THE MODEL

As formulated, the model contains a quantity, the stock of financial wealth (A), which can be measured only with difficulty, and accordingly, it is desirable that this quantity be eliminated. Moreover, the model is formulated in continuous time and must be translated into discrete time intervals.[12] Once all this is done, the reduced-form estimation equation, with an error term (u) added, is:

$$(6)\quad S_t = B_1 S_{t-1} + B_2 \Delta L_t + B_3 \Delta P_t + B_4 \Delta TR_t + B_5 \Delta SI_t + B_6 \Delta T_t + u_t.$$

The estimating equation is thus seen to have a particularly simple form, requiring only the regression of personal saving on its own value in the preceding period and on the first differences of the components of disposable income. The coefficients, $B_1, \ldots, B_6$ are functions of the structural parameters $b, s_1, \ldots, s_4$ (a unfortunately is indeterminate), and estimates of the former are readily transformed into estimates of the latter.[13]

10. Kaldor, "Alternative Theories of Distribution," and "Marginal Productivity"; and Paul A. Samuelson and Franco Modigliani, "The Pasinetti Paradox in Neoclassical and More General Models," *Review of Economic Studies*, Vol. 33 (October 1966), pp. 269–301.

11. Neither the Kaldor nor the Samuelson-Modigliani argument rules out the Klein-Goldberger effect arising from the size distribution of income. Wealthy property owners may save a higher proportion of their incomes than do their poor brethren, and the same may also be true of wealthy and poor wage earners.

12. The details of this elimination and translation are set out in Houthakker and Taylor, *Consumer Demand*, pp. 13–17.

13. For the formulas, see *ibid.*, p. 17.

However, the finally estimated model contains one additional variable, the first difference of the yield on Baa bonds. This variable will be denoted by r and its coefficient in the structural equation (2) by m. The reasons for including an interest rate in a model of personal saving are evident and need no elaboration.

DATA AND PERIOD OF ESTIMATION

With the exception of the yield on Baa bonds, which is published in the *Federal Reserve Bulletin*, the data are taken from Table 2.1, "Personal Income and Its Disposition," of the national income accounts, published in the *Survey of Current Business* and its supplements. The national accounts data are seasonally adjusted and expressed as annual rates. They have been deflated by the implicit deflator for personal consumption expenditures, and are thus expressed in constant (1958) dollars. Two models have been estimated. In the first, the data have been deflated by the population, while in the second, they are left as aggregates. In each case, the observations are quarterly, and cover the period 1953:1 through 1969:4. The sample period thus involves sixty-eight quarterly observations.

Empirical Results

The empirical results are tabulated in Tables 1 and 2. Coefficients and measures of goodness-of-fit for the estimating equations are given in Table 1 and structural coefficients and their standard errors in Table 2.[14] Six equations have been tabulated. Equation (1) represents the full model; it is based on the disaggregation of disposable income discussed above and includes the yield on Baa bonds as an additional predictor. Equation (2) is intended as a benchmark for comparison, and differs from equation (1) in that disposable income is not disaggregated. Equations (4) and (5) correspond to (1) and (2) except that saving and income have not been deflated by the population. Finally, since, as it turns out, the short-run marginal propensities to save out of labor and property income cannot be distinguished statistically from one another, the models have been reestimated in equations (3) and (6) with labor and property income combined (hereafter referred to as gross income), and with the coefficient on gross income denoted by s_1'.

14. The standard errors for the structural coefficients are only approximate and are calculated according to the procedure described in *ibid.*, pp. 51–52.

Table 1. Equations Estimating U.S. Personal Saving, Per Capita and Aggregate, Quarterly, 1953–69

Equation	Personal saving (S_{t-1})	Changes[a]							Coefficient of determination R^2	Standard error of estimate S_e
		Labor income (ΔL)	Property income (ΔP)	Transfer income (ΔTR)	Personal contributions to social security (ΔSI)	Personal tax and nontax payments (ΔT)	Yield on Baa bonds (Δr)	Disposable personal income (ΔY)		
					Per capita (dollars)					
(1)	0.971	0.429	0.340	0.863	−2.200	−0.908	18.311	...	0.845	10.75
	(58.28)	(4.18)	(1.08)	(2.73)	(−3.33)	(−4.78)	(1.95)			
(2)	0.951	...	...	...	...	...	13.85	0.416	0.799	12.15
	(61.19)						(1.46)	(4.61)		
(3)	0.971	0.414		0.860	−2.212	−0.900	19.231	...	0.845	10.67
	(59.60)	(5.20)		(2.75)	(−3.39)	(−4.85)	(2.26)			
					Aggregate (billions of dollars)					
(4)	0.955	0.449	0.277	0.893	−2.159	−0.901	3.651	...	0.899	2.01
	(43.79)	(4.21)	(0.86)	(2.86)	(−3.30)	(−4.87)	(2.03)			
(5)	0.922	...	...	...	...	...	3.161	0.455	0.869	2.26
	(47.67)						(1.77)	(5.01)		
(6)	0.953	0.418		0.890	−2.194	−0.884	4.011	...	0.899	2.00
	(45.27)	(5.11)		(2.87)	(−4.92)	(−4.92)	(2.50)			

Sources: Derived from data in U.S. Office of Business Economics, *The National Income and Product Accounts of the United States, 1929–1965: Statistical Tables* (1966); *Survey of Current Business*, various issues; *Federal Reserve Bulletin*, various issues.

Note: The numbers in parentheses are *t*-ratios.

a. First differences were used.

Table 2. Structural Coefficients for U.S. Personal Saving, Quarterly, 1953–69[a]

Equation	*Stock of financial assets* (*b*)	*Labor and property income* (s_1')	*Transfer income* (s_3)	*Personal contributions to social security* (s_4)	*Personal tax and nontax payments* (s_5)	*Yield on Baa bonds* (*m*)	*Aggregate saving* (*s*)
(2)	−0.051	...	...	...	...	14.202	0.427
	(0.016)					(9.78)	(0.086)
(3)	−0.030	0.420	0.873	−2.245	−0.913	19.518	...
	(−0.017)	(0.076)	(0.313)	(0.658)	(0.189)	(8.684)	
(5)	−0.082	...	...	...	...	3.290	0.474
	(0.021)					(1.86)	(0.084)
(6)	−0.048	0.428	0.912	−2.247	−0.905	4.108	...
	(0.022)	(0.074)	(0.312)	(0.661)	(0.184)	(1.65)	

Source: Same as Table 1.

a. The numbers in parentheses are standard errors. They are approximate only, and have been calculated according to the formulas described in H. S. Houthakker and Lester D. Taylor, *Consumer Demand in the United States: Analyses and Projections* (2nd ed., Harvard University Press, 1970), pp. 51–52.

THE STATISTICAL GAIN FROM DISAGGREGATION

From a comparison of equations (1) and (2)—or, alternately, of (4) and (5)—the gain from disaggregation is seen to be fairly considerable. The coefficient of determination (R^2) for equations (1) and (2) is increased by about 4½ percentage points, and the standard error of estimate (S_e) is correspondingly reduced by about $1.50 per capita. In equations (3) and (6), in which labor and property income are combined, all t-ratios are substantially in excess of 2 (in absolute value) and each sign is as expected a priori.

THE POPULATION EFFECT

Comparison of equations (1) and (4) shows that it makes little difference to the results whether the data are expressed per capita or in the aggregate, since, except for the yield on Baa bonds, the coefficients are nearly the same. While the R^2 is higher in the aggregate equation, this improvement in fit is only apparent. When the R^2s are computed on a comparable basis, they are virtually identical.[15]

THE EFFECT OF THE RATE OF INTEREST

Disaggregating disposable income increases the statistical importance of the yield on Baa bonds, for the t-ratio for this variable is only 1.46 in equation (2) but is 2.26 in equation (3). A priori one cannot say whether the sign on the rate of interest should be positive or negative, for it can be either depending upon whether the income or substitution effect predominates. The positive sign indicates that the substitution effect is the stronger —that is, that an increase in the rate of interest brings substitution of future for current consumption.[16] The elasticity of saving with respect to r (calcu-

15. "Comparable basis," in this context, means that both refer either to per capita saving or to aggregate saving. In terms of the latter, equations (3) and (6) both yield an R^2 of 0.899.

16. This result is at variance with the recent findings of Warren E. Weber, "The Effect of Interest Rates on Aggregate Consumption," *American Economic Review*, Vol. 60 (September 1970), pp. 591–600, and "Interest Rates and the Short-run Consumption Function," *American Economic Review*, Vol. 61 (June 1971), pp. 421–25. They also diverge from an earlier result, reported in Houthakker and Taylor, *Consumer Demand*, pp. 293–96. In both cases, however, the period of fit ends before interest rates took off to their historic highs of 1970—in 1965 for Weber and in 1966 for Houthakker and Taylor.

lated at the point of means) from equation (3) is 0.78, while from equation (6) it is 0.88.

Because the rate of interest is included as a nominal rather than a real rate, I have considered some equations in which current and past (percentage) changes in the implicit deflator for personal consumption expenditures are included as predictors. When the current price change is in the model, it takes on a coefficient of 13.87 with a t-ratio of 2.42, while the coefficient of Δr drops to 5.54 with a t-ratio of 0.54. The sum of the coefficients is 19.41, which is very close to the coefficient of Δr in equation (3). A statistically strong positive price effect in this case would have to be interpreted as a strong real-balance effect that operates practically instantaneously. While nothing in the logic of the model forecloses this, I am inclined to discount it and to view the price change as a proxy for the change in the rate of interest rather than the reverse. Accordingly, I have done no further experimentation with current price changes.

Past price changes, however, were included with a lag of up to five quarters, but the results made little sense. The most plausible results were those obtained using the percentage change in the deflator for personal consumption expenditures over the preceding four quarters. The coefficient is positive, thereby giving evidence of a real-balance effect, but its t-ratio is only 1.18 and that for Δr falls to 1.61.

STRUCTURAL COEFFICIENTS

Table 2 reveals that b is negative as expected, but that in equation (3) it is smaller in relation to its approximate standard error than the other coefficients. This may reflect a misspecification arising from the assumption that b is the same for all types of income. However, it is impossible to eliminate this assumption without a disaggregation of saving corresponding to that of disposable income.[17]

17. In his discussion of this paper, James Duesenberry noted that the coefficient on S_{t-1} is close to unity and offered that as one reason to suspect that stock adjustment evaporates. However, in equations (3) and (6), $1 - b$ has t-ratios of 1.83 and 2.25, respectively, which does not suggest the absence of stock adjustment. Furthermore, I have estimated the counterpart to equation (3) with a constant term (the constant is absent from the estimating equation because of the assumption that the depreciation rate is zero; however, one can be justified if the error term u in equation (6) is assumed to have a nonzero mean). The result is a b of 0.866 with a standard error of 0.062. This yields a t-ratio for $1 - b$ of 2.16. Once again stock adjustment would not seem to be absent.

As has already been mentioned, the s coefficients should be interpreted as short-run marginal propensities to save and m as the short-run response in saving to a change in the yield on Baa bonds.[18]

Discussion and Defense of the Results

Some of the results presented in Table 1 may be regarded as unusual or even anomalous:

(1) A marginal propensity to save out of property income that is lower than that out of labor income.[19]

(2) A short-run marginal propensity to save out of transfer income that is exceedingly high.

(3) A very large negative coefficient on personal contributions to social insurance.

(4) A large negative coefficient on personal tax and nontax payments.

THE LOW COEFFICIENT ON PROPERTY INCOME

Of the several unusual coefficients, that on the change in property income is perhaps the easiest to rationalize. The arguments summarized earlier, in particular those of Kaldor and of Samuelson and Modigliani, referred to the income earned by property owners rather than the income actually received. Business retentions and capital gains typically make the latter considerably lower than the former. And because the difference between the two is in effect entirely saved, it is not surprising to find a fairly low marginal propensity to save out of the income actually received. An additional

18. Recall that the short run in this context is defined by the condition that the underlying stock of financial assets does not change, and should not be confused with a time period of one quarter; for implicit in the procedure that approximates the continuous-time model (4) with the discrete version (5) is the assumption that the feedback of an increase in the stock of assets on saving begins in a period shorter than one quarter. On the other hand, if the short run is defined as one quarter, then the short-run coefficients are those given by the estimating equations. In the discussion that follows, these two "short runs" will often be used ambiguously. The context will make clear which is intended.

19. This hypothesis is tested through a t-test on the difference of the two coefficients. This difference is 0.089, with a t-ratio of 0.31, substantially below that required, at conventional levels of significance, to reject the hypothesis. However, neither equation (1) nor (4) supports rejection of the hypothesis that the marginal propensities to save out of labor and property income are the same.

influence arises from the significant portion of property income that is imputed as the rental income from owner-occupied housing. Since an identical amount is also imputed to consumption, saving out of this part of property income is zero.

THE HIGH COEFFICIENT ON TRANSFER INCOME

Unfortunately, no such ready explanations present themselves for the large coefficient attaching to the change in transfer payments. Theoretically, part of the explanation could stress the fact that any part of transfers allocated to retire existing debt would be saved in its entirety, but as a factual matter this can hardly be of significance. The permanent income hypothesis could also provide an explanation if one were willing to argue that transfer income is viewed as temporary, but since transfer payments are heavily composed of social security benefits, medicare, and aid to dependent children, this, too, seems a dubious argument.

The question, therefore, is whether any plausible argument can account for this high coefficient. One might try to rationalize the findings along the following lines: Assume that there are only two categories of individuals 65 or over who receive transfer payments, rich and poor. There is little reason to suppose that the rich will spend an increase in retirement benefits immediately, for such income is likely to be viewed like any other income. Indeed, for the very rich, increased social security benefits are unlikely in the short run even to be much noticed. Thus a high coefficient on transfers to the rich should not be found unreasonable.

For poor retirees, on the other hand, the dominant consideration is probably uncertainty—about the number of years still to live and about the adequacy of income from all sources. In short, what is present is one of Irving Fisher's classic motives for saving, namely, uncertainty of the future. Consequently, for poor retirees as well as for the rich, a high short-run marginal propensity to save out of transfer income need not be viewed as implausible.

Finally, the only other study that I know of that treats transfer income separately from other income (in this case using survey data) also finds a high short-run marginal propensity to save out of transfers, though not quite as high as that reported here.[20] In view of the argument just made, it

20. Robert Holbrook and Frank Stafford, "The Propensity To Consume Separate Types of Income: A Generalized Permanent Income Hypothesis," *Econometrica*, Vol. 39 (January 1971), pp. 1–21.

is of particular interest that the Holbrook-Stafford result is based on data excluding social security and other retirement benefits.

THE COEFFICIENT ON PAYROLL TAXES

The coefficient on personal contributions to social insurance can be read as implying that the typical consumer sees socialized saving as regular saving. As already noted, since the contributions by employees are matched by employers, a coefficient in the neighborhood of -2 is to be expected, given that view by the taxpayer.[21] On the other hand, if households view these contributions as a tax that will never be recovered, the coefficient on ΔSI should be close to that on ΔT. Thus, the results seem to support strongly the view that households consider contributions to social insurance a form of saving and even offset it slightly more than dollar for dollar.[22]

However, before accepting this conclusion unreservedly, at least three other factors must be considered. First, the relationship between changes in payroll taxes (with respect to both rate and base) and future benefits is extremely loose at best. In this case, a coefficient of -2 requires the consumer to have either a "highly sophisticated irrationality," or a strong implicit trust that the government will return later what it takes now—and with interest. Secondly, increased payroll taxes in the aggregate can come about in any of four different ways: (1) increased incomes, (2) a higher tax rate, (3) a higher maximum wage base subject to taxation, or (4) increased coverage.

21. This result, incidentally, is consistent with a recent finding of R. J. Gordon about the effect of increases in payroll taxes on money wage demands. In "Inflation in Recession and Recovery," *Brookings Papers on Economic Activity* (1:1971), pp. 121–22, Gordon concludes that, while in the long run the incidence of these payroll taxes—the employer's contribution as well as the employee's—is borne by the employee, in the short run he attempts to escape the tax through an increased money wage. If this is so, the fact that the burden of the tax in the short run is borne entirely by saving is precisely what should be expected.

22. George Katona, in *Private Pensions and Individual Saving* (University of Michigan, Institute for Social Research, Survey Research Center, 1965), claims to have shown with survey data that pension plans stimulate voluntary saving. This would not be the first time that cross-section and time series analyses of saving have led to an apparent contradiction, but in this instance, the matter is obscured by Katona's unusual definition of saving (see his p. 44). He defines saving as the change in liquid assets, thus disregarding nonliquid assets (such as houses and equities in life insurance and pension funds) and liabilities. In Katona's regressions, moreover, only certain dummy variables, loosely related to the amount of saving, but never the actual amount of saving itself (even on his definition), are used as dependent variables.

Obviously all four of these have operated over the period of the sample, but because they have proceeded sporadically and at differential rates, the large negative coefficient on ΔSI could result from unknown errors of aggregation. Finally, in a year when the maximum wage base for the payroll tax increases, the actual collection of payroll taxes is affected for the most part only in the third and fourth quarters. However, in anticipation, the Office of Business Economics changes its seasonal factors, with the result that, when seasonally adjusted, the data will show a change in the first and second quarters as well as the third and fourth. This practice, too, could bias the estimate of the coefficient.

Unfortunately, the effects of these factors are uncertain and could, in principle, lead the coefficient to be too low rather than too high. Their importance, therefore, remains at this time a matter of judgment.

Finally, it should be noted that because of the way personal saving is defined in the national income accounts, the results on payroll taxes are somewhat inconsistent with the basic logic of the zero-depreciation model, which holds that in the (static) long run saving is zero. Since payroll taxes are included neither in disposable income nor in saving, this result implies that when the official estimate of saving is zero, actual saving is equal to the sum of employees' and employers' contributions to social insurance.[23]

THE COEFFICIENT ON PERSONAL TAXES

Arthur Okun has recently observed:

> Ever since economists have become interested in fiscal policy, they have operated generally on the fundamental premise that changes in after-tax income resulting from a change in personal tax rates are basically equivalent in their influence on consumption to changes in income arising from other sources.[24]

The large negative coefficient on ΔT—which in absolute value is significantly different statistically from the coefficient on gross income—strongly contests this view. However, as Okun notes in the sentence following that just quoted, the support for the "fundamental premise" is primarily analytical. As far as previous empirical support is concerned, the experience following

23. In principle, one could allow for the long-run coefficient on personal contributions to social insurance to be other than zero by including in (6) the past level of SI as well as its first difference. This makes long-run equilibrium saving in (6), when $S_t = S_{t-1}$, a function of the level of equilibrium SI. I tried this, but the result made little sense (even to me).

24. Okun, "The Personal Tax Surcharge," p. 171.

the big tax cut in 1964 is consistent with the premise, but the evidence surrounding the surtax in 1968 is somewhat mixed.[25]

In principle the model should allow a separate tax coefficient for each type of income. Since the unavailability of a breakdown of tax payments according to income source makes it impossible to do this, the coefficient on ΔT will therefore be an amalgam of the coefficients attaching to all of the components of personal income, but especially to labor and property income, since they are the most important.

In an effort to allow for the errors in aggregation introduced by the use of a single variable,[26] I have experimented with including a trend in the coefficient on ΔT. This coefficient was negative, possibly reflecting the growing importance of labor income in the total, but its t-ratio was less than 1, and consequently I have not tabulated the results. In light of this and also of the fact that the marginal propensities to save on labor income and property income do not seem to be very different, my opinion is that no serious error is involved in using a single variable for tax payments.

Perhaps more seriously, my estimates implicitly assume that variations in tax payments arising from changes in the general level of economic activity have the same influence on saving and consumption as variations arising from changes in tax rates. This, unfortunately, is a tough question to isolate, because the extent to which the assumption is valid will depend upon what happens to asset values, consumers' expectations, and the income distribution when tax rates are changed, and also upon the particular goods affected by the public expenditure (or lack thereof).

Any final assessment of the coefficient on ΔT—indeed, of all of the coefficients in this model, except that on S_{t-1}—must take account of the fact that it refers only to developments within one quarter of any change. In the (static) long run, the fundamental postulate, cited by Okun, that consumers behave rationally with respect to their budget constraints is necessarily satisfied since all disposable income is consumed irrespective of source. In this context, saving is a transitory phenomenon, and, accordingly, I find no

25. See *ibid.*; and Robert Eisner, discussion of Okun's paper, *Brookings Papers on Economic Activity* (1:1971), pp. 207–09, and "Fiscal and Monetary Policy Reconsidered," *American Economic Review*, Vol. 59 (December 1969), pp. 897–905.

26. No errors of aggregation would arise if (1) a common tax parameter attached to all types of income, or (2) all types of income grew at the same rate. There is little a priori basis for assuming the first, and the second is factually incorrect since labor income has grown somewhat relative to property income during the postwar period.

a priori reason why it should be influenced in the same way by a change in taxes as by a change in earnings.[27]

Further Analysis of the Results

The results appearing in Table 1 have been subjected to further tests. First, I have investigated the pattern of intercorrelation among the variables. Next I have split the sample period at 1962, estimating the model for 1953–61 and then again for 1962–69 in order to test for homogeneity of underlying structure over the entire sample period. And finally, I have experimented with a more flexible lag structure.

THE PATTERN OF INTERCORRELATION

One possible explanation of the anomalies that have been found is that they are purely statistical phenomena arising from an unfortunate pattern of intercorrelations among the predictors. While the magnitude of the *t*-ratios argues against this as a likely factor, it deserves more explicit investigation. Table 3 records the correlations for the variables appearing in equations (1), (2), and (3) of Table 1. The simple correlations among the independent variables appearing in equation (3) are quite small, and accordingly there is no picture of a system of predictors that is highly interdependent. Hence it seems reasonable to take the coefficients as reflections of real phenomena rather than simply as statistical flukes arising from poor experimental design on the part of history.[28]

27. Robert Hall has pointed out that, while the s's in the structural equation represent short-run derivatives, the long-run asset-income ratio is determined by their ratios to b (see Houthakker and Taylor, *Consumer Demand*, p. 288). To illustrate this, suppose the model is simplified to $S = bA + s_1Y + s_2T$. In the (static) long run, $S = 0$, so that

$$\frac{A}{Y} = \frac{s_1}{b} - \frac{s_2}{b}\left(\frac{T}{Y}\right),$$

which shows that, since both b and s_2 are negative, the ratio of financial wealth to before-tax income varies inversely with average tax rates. At a glance, this does not seem implausible. On the other hand, the high ratio implied for transfers is puzzling, as Hall states.

28. Because of the presence of the lagged dependent variable as a predictor, the Durbin-Watson coefficient has not been provided as an indicator of the presence or absence of autocorrelation in the error term. Instead, autocorrelation has been tested for by the new method recently proposed by James Durbin, "Testing for Serial Correla-

HOMOGENEITY WITHIN THE SAMPLE PERIOD

Splitting a sample period into two or more subperiods permits a test of the hypothesis that the underlying structure governing the phenomena being studied is homogeneous over the entire period of the sample. In the current context it is of particular interest and importance to find out whether the coefficients attaching to the changes in transfer payments, personal contributions to social insurance, and personal taxes might be due simply to a few isolated extreme observations. The vehicle for making this determination is a well-known test involving the analysis of covariance.[29] The procedure is to estimate the model for each of the subperiods and then to examine by means of an F-test whether doing so produces a significant reduction in unexplained variance as compared with estimation of the model over the entire period.[30]

The equations for the two subperiods are as follows (data are per capita):

1953:1–1961:4

$$(7)\quad \underset{}{S_t} = \underset{(45.62)}{0.966\ S_{t-1}} + \underset{(4.18)}{0.482\ (\Delta L + \Delta P)_t} + \underset{(2.33)}{1.410\ \Delta TR_t} - \underset{(-2.11)}{2.176\ \Delta SI_t} - \underset{(-1.70)}{0.729\ \Delta T_t} + \underset{(0.05)}{0.579\ \Delta r_t}.$$

$$R^2 = 0.690,\ S_e = 8.89.$$

1962:1–1969:4

$$(8)\quad \underset{}{S_t} = \underset{(21.41)}{0.974\ S_{t-1}} + \underset{(1.68)}{0.353\ (\Delta L + \Delta P)_t} + \underset{(1.69)}{0.722\ \Delta TR_t} - \underset{(-2.38)}{2.216\ \Delta SI_t} - \underset{(-3.74)}{0.930\ \Delta T_t} + \underset{(2.36)}{31.93\ \Delta r_t}.$$

$$R^2 = 0.839,\ S_e = 12.58.$$

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tion in Least-squares Regression when Some of the Regressors Are Lagged Dependent Variables," *Econometrica*, Vol. 38 (May 1970), pp. 420–21. For several of the equations, there is a suggestion of slight negative autocorrelation, but this can be dismissed as being of no consequence.

29. For a description of the test and its underlying theory, see Gregory C. Chow, "Tests of Equality between Sets of Coefficients in Two Linear Regressions," *Econometrica*, Vol. 28 (July 1960), pp. 591–605; and Franklin M. Fisher, "Tests of Equality between Sets of Coefficients in Two Linear Regressions: An Expository Note," *Econometrica*, Vol. 38 (March 1970), pp. 361–66.

30. The sample period was split at 1962 because (1) it is near the mid-point of the sample; (2) it can be taken as marking the real start of the sustained upward movement of the 1960s; and (3) the two subperiods coincide almost exactly with occupancy of the White House by different parties.

Table 3. Correlations of Variables in Equations Estimating U.S. Personal Saving

Variable	S	S_{t-1}	*Changes*							
			ΔL	ΔP	$\Delta L + \Delta P$	ΔTR	ΔSI	ΔT	ΔY	Δr
Personal saving (S)	1	0.85	0.32	0.04	0.29	0.22	0.10	0.20	0.29	0.46
Lagged personal saving (S_{t-1})	...	1	0.21	−0.01	0.19	0.19	0.26	0.40	0.03	0.39
Changes										
Labor income (ΔL)	...	...	1	0.36	0.97	−0.19	0.24	0.48	0.81	0.28
Property income (ΔP)	...	...	...	1	0.57	−0.04	0.20	0.13	0.56	−0.23
Labor and property income ($\Delta L + \Delta P$)	...	...	...	...	1	−0.18	0.26	0.46	0.04	0.19
Transfer income (ΔTR)	...	...	...	...	...	1	0.21	−0.01	0.09	−0.10
Personal contributions to social insurance (ΔSI)	...	...	...	...	...	...	1	0.28	0.00	0.07
Personal tax and nontax payments (ΔT)	...	...	...	...	...	...	...	1	0.09	0.18
Disposable personal income (ΔY)	...	...	...	...	...	...	...	...	1	0.86
Yield on Baa bonds (Δr)	...	...	...	...	...	...	...	...	...	1

Source: Same as Table 1.

Here and in the following equations, the numbers in parentheses are *t*-ratios. These two equations are to be tested against equation (3) of Table 1. The data for the analysis of covariance are set out in Table 4.

To reject the hypothesis that the two subperiods have a common structure requires an *F*-ratio of at least 3.80 (at the 0.05 level of significance with 56 and 6 degrees of freedom). Consequently, since the observed *F* is only about one-third of this value, the hypothesis cannot be rejected.

The biggest difference revealed in a comparison of values of individual coefficients for the two subperiods is in the coefficient for the change in the yield on Baa bonds. Indeed, the interest rate has no influence at all in the earlier period, and its importance in the equation for the entire period clearly derives from the observations at the end of the sample period when interest rates were taking off to their historic highs in 1970.

The coefficient on the change in personal contributions to social insurance shifts little between the two subperiods, and, though the difference between the two coefficients on the change in personal taxes is sizable, the value of -0.73 in the earlier subperiod is still much larger (in absolute value) than that on gross income. Another coefficient with contrasting values is that on the change in transfer payments. But here again, even the smaller of the two values—0.72—is remarkably large.

Table 4. Analysis of Covariance Test for Stability of Coefficients of Saving, 1953:1–1961:4, and 1962:1–1969:4

Equation and statistic	*Period*	*Residual sum of squares*	*Degrees of freedom*	*Mean square*
(3), Table 1	1953:1–1969:4	7061.57	62	113.90
(7)	1953:1–1961:4	2360.24	30	78.67
(8)	1962:1–1969:4	4115.22	26	158.28
Sum of residual sum of squares "within" regressions	...	6475.46	56	115.63
Reduction in residual sum of squares due to different regressions	...	586.11	6	97.69
		$F = \frac{115.63}{97.69} = 1.18$		
		$F_{0.05}(56, 6) \simeq 3.80$		

Source: Based on data in Table 1.

A MORE FLEXIBLE LAG STRUCTURE

The lag structure implicit in the model expressed in equation (4) is very restrictive. It allows a change in any of the components of disposable income to have only one direct shot at saving; any retarded effect is reflected in the adjustment of saving to changes in the underlying stock of financial wealth. In addition to this simplicity, the lag structure is also rather inflexible in that each component of disposable income is forced into the same pattern of adjustment. In view of these possible defects in specification, I have estimated an equation in which the current and two most recent past changes are included as predictors for the components of disposable income and the yield on Baa bonds. This inclusion, of course, consumes quite a number of degrees of freedom, and, even more serious, multicollinearity is likely to accompany the introduction into the system of so many new independent variables. Still, since these are all first differences, possible problems with multicollinearity would not seem to be so great as to preclude estimating the model. The results are as follows (data are per capita):

$$
\begin{aligned}
(9)\quad S_t = {} & \underset{(38.90)}{0.951}\, S_{t-1} + \underset{(4.66)}{0.431}\, (\Delta L + \Delta P)_t + \underset{(2.94)}{1.071}\, \Delta TR_t \\
& - \underset{(-2.33)}{1.633}\, \Delta SI_t - \underset{(-5.16)}{1.095}\, \Delta T_t + \underset{(2.02)}{22.043}\, \Delta r_t - \underset{(-0.93)}{0.102}\, (\Delta L + \Delta P)_{t-1} \\
& + \underset{(1.15)}{0.448}\, \Delta TR_{t-1} + \underset{(1.14)}{0.780}\, \Delta SI_{t-1} + \underset{(1.93)}{0.406}\, \Delta T_{t-1} + \underset{(0.22)}{2.628}\, \Delta r_{t-1} \\
& + \underset{(0.85)}{0.097}\, (\Delta L + \Delta P)_{t-2} - \underset{(-1.02)}{0.368}\, \Delta TR_{t-2} + \underset{(0.38)}{0.258}\, \Delta SI_{t-2} \\
& - \underset{(-1.42)}{0.315}\, \Delta T_{t-2} - \underset{(-0.22)}{2.614}\, \Delta r_{t-2}.
\end{aligned}
$$

$$R^2 = 0.871,\ S_e = 10.46.$$

These results do not support a conclusion that the rather rigid lag structure implicit in equation (4) amounts to a serious misspecification, for none of the lagged terms appears with a t-ratio of 2 or greater. Lagged effects (except for the geometric lag implicit in the presence of S_{t-1}) seem to be absent altogether for the change in gross income and in the yield on Baa bonds, and to be only weakly present for the change in transfers and in personal contributions to social insurance. Only for the change in personal taxes do lags of any importance appear, but the switching of signs suggests that multicollinearity might be a factor.

All in all, the tests of this section do not vitiate the results obtained with the model embodied in equations (2), (3), and (4). The large coefficients on transfer payments and personal taxes remain intact, and the large coefficient on personal contributions to social insurance is not greatly modified. Only the yield on Baa bonds exhibits a basic change in structure within the sample period, and this is consistent with the view that only in the most recent quarters of the sample have interest rates been sufficiently high to influence saving discernibly.

Forecasts of the Personal Saving Rate for 1971:1–1972:4

Table 5 presents estimates and projections of the personal saving rate using the equations tabulated in Table 1 for the sixteen quarters 1969:1–1972:4. These quarters involve three separate periods: 1969 is the last year of the sample period, and the forecasts for these four quarters are simply the fitted values from the equations converted to saving rates. The figures for the period 1970:1 through 1971:2 are forecasts beyond the period of fit, and use actual values for disposable income and its components and the yield on Baa bonds, but predicted values of lagged saving. In current parlance, the simulation for those six quarters is thus dynamic rather than static. Finally, the numbers for 1971:3–1972:4 are projections. For disposable income and its components beginning in 1971:3, I have used the values, somewhat modified, appearing in the Wharton Mark III Model forecast of May 21, 1971. The Baa bond rate is also based on the Wharton forecast of that date.[31] The values of the predictors are also given in Table 5.

Two features of these forecasts are particularly worthy of note: the marked difference between the equations with disposable income disaggregated and those with disposable income taken in the aggregate; and the especially good performance of the disaggregated saving functions—especially equation (3)—over the six quarters of actual forecast 1970:1–1971:2.

The disaggregated equations signal strongly the sharp increase in the saving rate between the last quarter of 1969 and the third quarter of 1970. The nondisaggregated functions, on the other hand, anticipated this rise scarcely at all. The factor making for the sharp increase in the saving rate forecast for 1970:2 by equations (3) and (6) is the $7 billion increase in transfers re-

31. I am grateful to Michael McCarthy for making these numbers available to me.

Table 5. Forecasts and Projections of the U.S. Personal Saving Rate, Quarterly, 1969–72, and Values of the Predictors, Quarterly, 1970–72

Dollar amounts in billions of 1958 dollars

Year and quarter	Saving rate					Predictors					
	Equation										
	(2)	(3)	(5)	(6)	Actual	Labor and property income ($L + P$)	Transfer income (TR)	Personal contributions to social insurance (SI)	Personal tax and nontax payments (T)	Disposable personal income (Y)	Yield on Baa bonds (r)
1969:1	6.4%	5.7%	6.3%	5.7%	5.3%	...	...	...	...	...	...
2	5.6	5.5	5.5	5.5	5.3	...	...	...	...	...	...
3	5.8	6.1	5.8	6.0	6.6	...	...	...	...	...	...
4	6.5	6.8	6.5	6.7	6.6	...	...	...	...	...	...
1970:1	6.5	7.1	6.5	7.1	6.9	$581.9	$55.9	$21.52	$91.7	$524.6	8.76%
2	6.7	8.1	6.7	8.1	7.9	583.1	63.0	21.60	91.7	532.8	8.98
3	6.8	8.7	6.7	8.5	8.2	582.7	62.5	21.79	87.4	536.0	9.41
4	6.0	8.2	5.8	8.0	8.3	577.5	64.4	21.56	87.5	532.8	9.28
1971:1	5.9	7.9	5.7	7.6	8.1	584.7	66.1	23.23	84.7	542.9	8.53
2	6.0	8.4	5.8	8.1	8.4	588.4	71.5	23.31	84.8	551.8	8.39
3	5.5	7.8	5.8	7.3	...	598.3	68.4	23.39	87.7	554.6	8.23
4	5.3	7.5	5.8	7.1	...	607.7	69.2	23.62	91.1	562.2	8.23
1972:1	5.1	6.5	5.6	6.0	...	612.7	71.1	26.20	93.2	564.4	8.22
2	4.9	6.4	5.6	6.0	...	620.1	71.8	26.40	95.3	570.2	8.25
3	4.7	6.8	5.7	6.3	...	625.9	75.8	26.59	97.5	576.6	8.30
4	4.6	6.8	5.8	6.3	...	633.1	77.0	26.76	99.6	583.7	8.36

Sources: Based on equations and sources cited in Table 1. Beginning with 1971:3, disposable income and its components and the Baa bond rates are based on values supplied by Michael McCarthy that appear in the Wharton Mark III Model forecast of May 21, 1971. See text for additional details.

sulting from the liberalization of social security benefits at that time. The further liberalization that went into effect in the second quarter of 1971 accounts for the jump in the forecast saving rate for that quarter. On the other hand, the small drop in the saving rate forecast for the first quarter of 1971 is accounted for by the increase in payroll taxes that went into effect January 1.

Finally, the projections for the remainder of 1971 and 1972 show the saving rate decreasing during the final two quarters of 1971 to around 7 percent and then taking a fairly sharp further fall, primarily as a result of an additional increase in payroll taxes, in 1972:1. Thereafter little movement is projected.

Final Assessment

If the results of this paper were taken at face value, current views regarding the use of fiscal instruments in short-run stabilization of the economy would be due for major reassessment. However, in their present form, the results quite clearly cannot—and should not—be taken at face value. A great deal more testing is required before this can be done, and in its course, some (or even all) of the puzzles may disappear. The additional testing should involve cross-section as well as time series data, and should employ alternative, and perhaps more suitable, definitions of saving and income.[32] The analysis here has ignored any effects of capital gains on saving, and these, too, require investigation. Finally, there is the whole question of announcement effects, which may cause consumers to adjust their saving prior to the time that policy changes actually occur.

Nonetheless, I am quite convinced that the results obtained here are of sufficient validity to raise legitimate questions about the view that a dollar of income is a dollar of income no matter what its source. Indeed, this is the principal conclusion that I wish to draw.

32. Of the several suggestions for definitional changes, the easiest to execute is one by George Jaszi to augment the official measure of saving by the statistical discrepancy. Doing this yields, among other things, an increase in the coefficient on ΔTR to 1.24 and a decrease in the coefficient on ΔSI to -2.34.

Comments and Discussion

James Duesenberry: I am a little perplexed in commenting on Lester Taylor's paper. I think it is a very interesting and valuable study, but it produces some startling results that I am not prepared to accept. Yet the results have a certain robustness; they stand up when collinearity, additional lags, and subperiods are investigated.

There is something here, in my judgment; but the interpretation may not be exactly what the author has in mind. At first glance, the model appears to be a standard stock adjustment model with the special feature that the assets are supposed to be limited to financial ones. In fact, that limitation is not quite true since equity in houses and unincorporated businesses must be included. On a closer look, however, it is not really a stock adjustment model, because as a result of some transformations and a shift to first differences, the asset term evaporates and is replaced by the lagged saving flow variable. Since that variable does not accurately measure the change in wealth, since strong serial correlations so often appear in time series analyses, and since the coefficient on lagged saving is very close to unity, I suspect that the result is very close to a first difference model in flows rather than a stock adjustment model.

What does it mean? If the stock adjustment theory is to be taken seriously, one would have to be concerned about durable goods purchases, capital gains, and other elements that make the increase in household wealth different from the official concept of personal saving. Instead, Taylor allows the asset effect to evaporate so that it has little or nothing to do

with the results. That procedure has some significance for the meaning of the coefficients. As Taylor pointed out, what he presents are impact coefficients. These coefficients try to tell us what happens to saving (and presumably to consumption) in a single quarter if there is an increase of a certain type of income in that quarter.

Factors that might influence the basic longer-run propensity to save are irrelevant in this context. In the case of property income versus labor income, for example, the question of relative class positions or of different levels of family income really has little to do with impact effects. One would expect the short-run differences to be dominated by timing considerations or the stability of the variables. If entrepreneurial income were very unstable, one certainly would expect to find a high propensity to save out of one-quarter changes in it. In fact, the broader concept of property income contains several very smooth series, including, as Taylor pointed out, the imputed income from housing, and also including much of the imputed financial income, interest credited at savings banks not directly received by depositors, and corporate dividends. It is, therefore, not surprising that the property income coefficient does not behave the way one would expect entrepreneurial coefficients to behave. In general, what governs the one-quarter bang from a particular type of buck may be different from what determines how much people are going to spend over a couple of years of the dollars they get from some particular source. It is important to bear this in mind in interpreting the results.

Future investigations building on Taylor's findings should devote more attention to the longer lags. More attention will also have to be paid to incorporating the asset effect. The coefficients of Taylor's study implicitly leave a lot of money unspent. One of two things has to happen: Either the longer lags will reveal that people respond directly by spending this income over time, or else the income has to pass through the asset accumulation mechanism and enter the spending stream through wealth effects. In the latter case, it would be very difficult to strain out the impact on assets of particular sources of income, since data would have to be collected on assets by the composition of income of the asset holders.

When one recognizes clearly that the coefficients measure only the one-quarter impact, some of the results seem less implausible. It may well turn out that people do not spend much out of increased transfer payments in the initial quarter, even though they might, over a year, spend considerably more than people receiving income from some other source. That remains

an open question, because Taylor's interesting test for lags is too limited to be conclusive.

Taylor offers very sensible observations as to why the impact saving coefficient on transfer income might be particularly high. Suppose low income people with modest amounts of assets are trying to stretch their means out over a long period of time, and meanwhile inflation has squeezed them into depleting their asset holdings. When they get an increase in social security benefits, it might well go initially to replenish the asset pot that has been drawn down.

A number of additional factors could influence the results on transfer payments. For one thing, there may be some anticipation effects on consumption that distort the coefficient, since people often know a couple of quarters ahead of time that a social security increase is forthcoming. Second, medicare has contributed much to the growth of transfers in recent years. Medical expenses are very closely related, I think, to asset management and saving. Without medicare, payments for some very large medical costs would have required dipping into assets. Medicare has reduced the need for dissaving and thus, almost mechanically, has bolstered personal saving.

The results on social insurance contributions are too good to be true. There is, in fact, no close relationship between expected social security benefits and contributions. There is only a very loose kind of connection, depending on the recipient's age, how many quarters he has paid at the ceiling in the past, and other considerations. Nobody knows exactly what he is ultimately going to get out of social security. Even though people generally get out a lot more than they put in, there is a lot of slippage between the inflows and outflows. It would be a remarkable coincidence if people acted as though they were saving the contribution and responded as Taylor's coefficients indicate. The technical problem, which Taylor notes, about the way in which increases in the wage base for social security taxes are recorded in the national income accounts, may have something to do with the finding that the net coefficient is changed substantially by considering a couple of lagged quarters.

I cannot offer any solid explanation for the high saving coefficient on personal taxes. I do not know why there should be virtually no impact on consumption in the particular quarter in which taxes are changed while there is a sixty-cent impact per dollar in any quarter in which labor income changes. This result may reflect another complication in the bookkeeping.

There is a difference between the tax accruals and tax payments in the personal income tax, creating another seasonal adjustment complication, which may influence the coefficient. Finally, the interest rate coefficient is very suspicious, and I would be inclined not to pay too much attention to it, since it does not show up at all in the 1953–61 subperiod, but only in the 1962–69 period.

In summary, these results certainly ought to be followed up. They make a good running start on determining the impacts on saving and consumption of income by component, particularly those components that can be manipulated by fiscal policy. A good deal more information is necessary, however, before policy can be guided on the basis of these coefficients. This is particularly true since they are limited mainly to the impact in the current quarter, and tell us very little about what happens subsequently.

Robert Hall: In reading Taylor's paper, I hoped to be enlightened about the peculiar recent behavior of saving, and I am frankly disappointed. I do not find Taylor's explanation of the high saving rate in 1970–71 at all convincing. The basic explanation offered is that transfers have gone up remarkably and that a particularly large fraction of transfer payments is saved. Consequently, the saving rate rises when the composition of income shifts toward transfers. I just do not believe that. Instead of providing reliable information about saving out of different components of income, the paper really shows, as I see it, that an aggregate consumption or saving equation that looks pretty good superficially begins to crumble apart once one probes beneath the surface. What we discover in taking apart such aggregate equations is that they ignore many important things and do not perform as well as we initially thought.

There are several sources of trouble in the paper. The first is an ambiguity about what those saving coefficients measure. This is an acceleration theory of asset accumulation, which implies that, if income is steady, the level of assets will also ultimately be steady. According to the theory, the structural coefficients measure the long-run relationship between the income flows and the corresponding asset stocks, and not merely the impact effect. In particular, they imply that a certain level of assets corresponds to each component of income. And the specific estimates for transfers imply that the assets held by a person who receives transfer income are very much higher than those held by people with the same level of income coming from other sources. I believe that peculiar discovery cannot be ra-

tionalized along the lines of the theory. Hence I read it as a possible symptom of some pathological condition in the whole equation.

Second, I feel that a life cycle model ought to take account of the demographic composition of the population. I have no reason to believe that the demographic shifts of the last few years would contribute to an explanation of the high saving rate. On the contrary, the increase in the relative number of young people in the working population might be expected to lower the saving rate. Nonetheless, I am concerned that the age make-up of the population is ignored in spite of the very strong importance assigned to it in the life cycle kind of theory that motivates this work.

A further and serious source of difficulty is the reliance on the definition of personal saving embodied in the national income accounts. That view fundamentally identifies the wealth of consumers with the real wealth of the economy. The stock market, for example, is ignored, and owners of equities are taken as simply owning the real assets of corporations. That occurs because capital gains and losses are ignored, and saving is taken as equal to investment. In actuality, there is a substantial gap between the real wealth of the economy and the market valuation of the assets owned by consumers. The stock market was fluctuating over this period and may have contributed to the peculiarly high saving rate of 1970 and 1971. A treatment of that issue would require a definition of saving different from the one in the national income accounts.

Additional problems arise from the use of the definition of consumer durables in the national income accounts. Purchases of consumer durables should not be considered consumption expenditures. Rather, durables should be treated the same way as housing with the flow of services regarded as consumption expenditures. That approach smooths out the fluctuations in purchases of durables that have taken place in the last few years.

Finally, the national income accounts do not treat corporate retained earnings as income to the consumer and thus do not take account of the substantial fluctuations in retained earnings of recent years. I'm not sure of the right way to handle retained earnings, but certainly the problem should be confronted rather than ignored.

A fundamental problem in this study is the econometric problem of identification. Nothing in the equation specifies it as a saving equation rather than an investment equation. Since saving equals investment (with some adjustment), the equation could be relabeled an investment equation

and it would represent an accelerator model of investment rather than an accelerator theory of saving. Given all these problems, it seems to me that one cannot trust the conclusions, which seem so vastly different from what common sense suggests. Hence, after I finished reading Taylor's paper, the peculiar behavior of personal saving in the past three years remains a mystery to me.

George Jaszi: I want mainly to supply added emphasis to a few points that have already been raised about the data and concepts. Duesenberry mentioned that some of the quarterly series on income components were smoother than others. Much of the smoothness is a reflection of the way estimates have to be made rather than of the working of the economy. For instance, the quarterly series on property income is very smooth because only annual data are available for many of the items included and the quarterly figures are essentially interpolated. In the case of income of unincorporated enterprises, use is made of quarterly information on sales, but no quarterly data are available on the variation in profit margins. Quarterly information is available on wages, salaries, and transfer payments; they are genuinely fluctuating series and have a minimum of statistical smoothing. All other income items essentially represent, to an extent, an artificial quarterly series. This distinction may have important implications for the regression results.

The treatment of social security taxes is a peculiarly difficult problem. There is no good answer to the problem posed by an increase in the ceiling on wages subject to tax. I know OBE's present procedure is not good, but I much prefer it to any alternative I have heard suggested so far.

There are similar, although not identical, timing difficulties with the treatment of year-end or final settlements on personal taxes. They affect the accounts heavily in the first and second quarters of the year following the year of liability. This creates bulges, if the final settlements are large, or negative bulges if refunds are large. The resulting statistical peculiarity of the series may create problems in a regression analysis.

Since personal saving is measured as a residual within the framework of the national income accounts, one should recognize that personal saving plus the statistical discrepancy is an equally legitimate alternative measurement of household saving. It would be interesting to know whether the results of the regression equations would hold up using that statistical measure of saving.

General Discussion

Several participants argued that the time series data could not provide reliable answers to the important questions posed by Taylor, no matter how much effort and ingenuity he applied. Both Thomas Juster and R. J. Gordon felt that a time span of a single quarter was too short, given the statistical "noise" in the data and the variability of actual consumer behavior. Gordon noted that, because personal saving is measured residually as the difference between income and consumption, the errors of measurement in both income and consumption get built into the saving series; this may introduce spurious correlations. He suggested experimenting with variables measured as average changes over two or three quarters in an attempt to reduce the influence of quarter-to-quarter noise.

Juster warned that even the modest amount of collinearity among variables (reported in Table 3) could create problems in the multiple regression approach. Moreover, the exploration for lagged effects surely ran into serious collinearity problems in an attempt to pick out the relative strength of relationships of particular variables to a current quarter's saving and previous quarter's saving, respectively. Lawrence Klein considered it desirable to build in some a priori constraints on the time series coefficients based on cross-section data from consumer surveys. Although the survey data are not good enough to establish the whole relationship, they can be relied on for pieces of information on either the relative sizes of various coefficients or the magnitude of particular coefficients like that on transfer income. The optimal research strategy, according to Klein, required a blending of cross-section and time series evidence.

The discussion also returned to the conceptual and definitional issues involved in personal saving. Klein noted one hidden virtue of the definition: It was so far removed from investment that he doubted any serious problem of identification remained, in contrast with Robert Hall's concern about this issue. Juster stressed the heterogeneity of personal saving. Very different forces influence such diverse components as the extension and repayment of consumer credit, increases in housing equity, and liquid asset accumulation. It is hard to believe that the forces affecting important parts of personal saving do not influence its total. Hence it seemed doubtful that saving behavior could be adequately explained by means of the components of aggregate income, given the heterogeneity of aggregate personal saving.

Nancy Teeters pointed out that, furthermore, recipients of transfer payments were not a homogeneous group. The behavior of social security beneficiaries, who are not subject to a means test, is probably quite different from the behavior of recipients of welfare and other types of benefit, who are. Lawrence Klein, in turn, questioned the uniformity attributed to the lag structure. Taylor's use of lagged personal saving implied that saving reacted in the same dynamic fashion to changes in the various components of income. There are good reasons to suspect that the time patterns of response might be quite different for different components.

R. A. Gordon suggested that it might be useful to inspect the errors of the equations in those quarters when jumps in some variables occurred as a result of discrete policy changes, such as variations in personal and social security tax rates or in transfer benefit programs. The announcement effects of such policy measures could create disturbances in the saving rate both before and after important policy changes. The dynamic patterns here might differ considerably from those associated with changes in income or in taxes that take place more gradually and continuously.

R. J. Gordon questioned the treatment of the interest rate variable. He contended that it was inconsistent for the interest rate to be scale-free in a regression where all the other variables were expressed as dollar changes. Furthermore, he suggested that the efforts to determine how much of the interest rate effect really stemmed from the difference between nominal and real rates should have employed the second rather than the first derivative of the price level. Presumably, after a time, the *level* of interest rates reflects the *rate of change* of prices; it would be pushed up further only by an *acceleration* of prices. Since the entire impact of the interest rate variable occurs in the second half of the sample period, it raises the possibility that the interest rate variable is recording largely the impact of inflation on saving. Franco Modigliani suggested, however, that the interest rate variable may be picking up some of the effects of large movements of interest rates on stock prices and, via that route, on consumption.

Modigliani stated that, despite all the reservations about the results expressed by the author and the discussants, the equations were impressive in tracking saving behavior in 1970–71. In particular, that recent period was not included in the sample period for fitting the equations. Although Taylor's results may reflect in large measure peculiarities in the way certain components of disposable income are estimated in the national income accounts, his equation may still be useful for short-run forecasting of the national income accounts saving rate.