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PART I

Anatomy of Investment Behavior

Consumer Investment Behavior

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I. Determinants of Consumer Investment Decisions

A consumer's investment decision is based on much the same considerations for both real and financial assets and is closely related to if not equivalent to his savings decision. While saving is traditionally thought of as a device for achieving the preferred balance between current and future consumption, given the available opportunities for transforming current dollars into future dollars, it is also used to acquire assets to perform certain specific current and future services that are sufficiently valued by the household to compete with current consumption for the household's resources. For example, currency and demand deposits provide convenience, now and in the future, by bridging differences in the time patterns of receipts and expenditures; insurance provides (on a current and continuing basis) security against certain contingencies, while savings accounts provide security against other types of contingencies; owned homes provide housing, frequently of a sort not readily available otherwise; annuities and equity in private or governmental pension funds generate retirement income (providing for future consumption), while many other types of assets also perform this function.

As with consumption items, and perhaps to a greater extent, we find one type of asset performing more than one service, while a given service frequently may be performed by more than one type of asset. However, there do not appear to be close substitutes for currency and demand deposits in balancing transactions, for insurance in providing protection

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against specific contingencies, or for consumer durables in providing the various services for which they are intended.

The desired stock of assets is derived from the household's demand for the services performed; and we expect, as for consumption, that the primary determinant (aside from tastes) will be the normal or permanent income of the household, defined in some appropriate way.[1] Rational consumer behavior means balancing the utility of an additional dollar's worth of current consumption in each time period against the current and discounted future value of the services of an additional dollar's worth of assets.

The evidence indicates that, particularly for relatively high incomes, the desired stock of assets is large compared to a single year's income. Hence, it is reasonable to suppose that the desired stock may be achieved only gradually over several years and that current saving will be related to the size of the gap between actual and desired assets. Further, it is reasonable to suppose that the gap will be closed more quickly for certain assets rendering important current services than for others rendering primarily future services. In some cases the desired stock of a particular asset may be accumulated quickly by introducing debt, which may be treated as a negative asset, into the portfolio. The negative asset is then gradually eliminated over time.

The simplest assumptions about the form of the relationship between the desired stock of assets, A^*, and normal income, Y_N, are

$$A^* = a + bY_N \tag{1}$$

$$A^* = \alpha Y^{\beta}_N. \tag{2}$$

The second form gives a somewhat better fit for actual income and asset holdings from cross-section data,[2] but the suggested logarithmic trans-

[1] For purposes of the present paper, normal income is defined as the expected value of annual household income over whatever time span is most relevant to the consumption decisions and asset goals of the household. The length of the time span will vary among households and may depend on the specific decision to be made. The span which is most relevant to the average American family for most decisions is an open question. In the present state of our knowledge, it may be no longer than a single year or as long as the entire working life of the head of the household.

For the retired, the desired stock of assets at the end of any year does not necessarily depend on normal income, but is more likely to depend on the actual stock at the beginning of the year, the expected retirement span, and the desired size of bequest. Of course, actual assets at the beginning of the retirement span should be closely correlated with normal income during working life. Furthermore, actual retirement income will be related to current asset holdings, particularly if these are so measured as to include the value of annuities and equity in pension funds.

[2] Based on Federal Reserve Board tabulations of grouped data for 1962 (*Federal Reserve Bulletin,* March 1964, p. 293).

formation is not generally convenient for ungrouped cross-section data because of the frequent occurrence of zero observations for particular types of assets. These relationships suggest, respectively, the following formulations for current saving or the current asset level as a function of normal income and lagged assets or net worth, disregarding capital gains:[3]

$$S_t = r(A^*_t - A_{t-1}) = ra + rbY_{Nt} - rA_{t-1} \tag{3}$$

$$\text{or } A_t = ra + rbY_{Nt} + (1 - r)A_{t-1};$$

$$\frac{A_t}{A_{t-1}} = \left(\frac{A^*_t}{A_{t-1}}\right)^{\rho} = \left(\frac{\alpha Y^{\beta}_{Nt}}{A_{t-1}}\right)^{\rho} \tag{4}$$

or $\log A_t = \rho \log \alpha + \rho\beta \log Y_{Nt} + (1 - \rho) \log A_{t-1}$.[4]

For purposes of this paper we have assumed that r or ρ is a constant, but it may in fact be a function of the size of the gap, of the level of normal income, or of other variables.

In addition, saving, particularly in certain forms, may serve as a buffer, partially absorbing transitory bumps and dips in income receipts or in consumption needs. In this capacity it behaves to some extent as a residual, and one of its primary determinants is expected to be transitory income. There is an implicit assumption here that temporary departures from the desired asset position based on normal income, or from the optimum time path for achieving that asset position, are resisted less strongly than departures from the preferred time pattern of consumption. In fact, one of the functions of the asset stock is to protect consumption against undue deviations from this pattern because of foreseen or unforseen variations in income. This is not to suggest that consumption is independent of transitory income but simply that saving presumably bears more than its share of the brunt of variations in such income. For this reason it is important to measure separately the normal and transi-

[3] Unanticipated capital gains (losses) early in the period presumably have almost the same effect on saving as higher (lower) initial assets, but progressively smaller effects the later they occur in the period. Where data on capital gains are available and savings decisions are assumed to be revised within a single time period, it would be desirable either to add some fraction of unanticipated gains to initial assets or to include such gains as a separate causal variable. To the extent that capital gains are anticipated, however, the average value of such gains should be incorporated in normal income, while positive or negative deviations from the average should be added to transitory income. In other words the expected value of anticipated gains should affect desired assets, while the actual gains affect actual assets.

[4] Another appealing formulation, $S_t = r(\alpha Y^{\beta}_{Nt} - A_{t-1})$ is not considered here because of the difficulty of fitting such a relationship.

tory components of income in saving regressions, and a number of devices for doing so are tested in the present paper.

In the explanation of individual components of saving (i.e., investment in specific types of real or financial assets), the question of portfolio balance assumes considerable importance. The optimum portfolio structure would be expected to depend on the size of the portfolio (and thus on normal income), on tastes (in particular attitudes toward risk), and on relative rates of return and risks of assets which are reasonably close substitutes in the services they perform. Because certain types of assets can only be purchased in rather large amounts and because some items are subject to substantial capital gains and losses, portfolio imbalances are continually created and only gradually eliminated. A significant proportion of the variation in individual components of savings reflects this process, rather than simple adjustments to current variations in income or total net worth. Therefore, we expect investment in a specific type of asset to show a considerably stronger negative correlation with initial holdings of that type of asset than with other assets. In fact, the effect on an individual savings component of total initial net worth may well be positive, when holdings of the relevant specific asset are held constant, since high values of initial net worth tend to be associated with situations where the portfolio is short in the specific asset or long in other assets, while low values of initial net worth tend to be associated with the reverse situation. Futhermore, the household's initial portfolio provides resources which, like income, may be used to build up the holdings of any particular asset to the extent that the household desires to do so.

The role of initial net worth with respect to investment in a specific asset is, in fact, ambiguous, for given initial holdings of the specific asset, unless tastes are also held constant. It is reasonable to suppose that investment in a specific asset varies directly with the gap between the actual and desired holdings of that asset, $(A_i^* - A_{i(t-1)})$ and inversely with the gap between actual and desired holdings of other assets. In a linear model

$$S_{it} = r_1(A_{it}^* - A_{i(t-1)}) - r_0(A_t^* - A_{it}^* - A_{t-1} + A_{i(t-1)}),$$
$$= (r_0 + r_1)(A_{it}^* - A_{i(t-1)}) - r_0(A_t^* - A_{t-1}).$$

Holding tastes constant, we expect low values of A_{t-1} to be associated with high values of $(A_t^* - A_{t-1})$ and thus with low values of S_{it}. The partial correlation of A_{t-1} with S_{it} will then be positive. However, if tastes are not held constant, then for given holdings of the i^{th} asset, low values of A_{t-1} are likely to be associated with a stronger relative preference for

that particular asset (a higher A_{it}*) than high values of A_{t-1} are. A negative partial correlation may then occur between S_{it} and A_{t-1}.

This paper, after reviewing the current literature on consumer saving and investment, attempts to make an integrated analysis of consumer decisions to invest in various types of real and financial assets, utilizing a number of variants of the stock adjustment model outlined above to investigate the influence of permanent income, transitory income, initial asset holdings, and other factors. Because of data difficulties, it has not been possible to complete all the analyses originally planned, and we are continuing this work.

Two serious statistical problems arise in attempting to measure income and asset effects on saving behavior. The first is obtaining separate estimates of the influence of normal and transitory income, since these components cannot be observed directly. The second is separating the effects of actual and desired assets, in view of the high correlation between the two. Thus in a cross-section much of the variance in initial asset positions, even when income is held constant, simply reflects variation in households' tastes for holding assets, rather than any asset disequilibrium, while in time series it is probable that most of the variance in assets (except in highly unusual periods) reflects a planned adjustment to rising levels of normal income. In meeting both problems, panel data, covering the same families over a period of years, are extremely advantageous; and, accordingly, the primary emphasis of our paper is on data of this type.

One method of separating the two income effects is to estimate normal income from information on the income history of the individual household. This has been attempted by others on the basis of time series data, but not systematically on the basis of cross-section panel data.[5] A number of the analyses presented here utilize this type of estimate of normal income in conjunction with a variable reflecting transitory income. However, the transitory income effect may be rather different in the aggregate (where transitory income primarily arises from cyclical variations in employment and profits) than in the cross-section (where a number of other factors may be responsible).

A second device which has been frequently advocated[6] for estimating

[5] Some interesting experiments by Paul Taubman are discussed later.

[6] Irwin Friend and Irving B. Kravis, "Consumption Patterns and Permanent Income," *American Economic Review,* May 1957; Robert Eisner, "The Permanent Income Hypothesis: Comment," *American Economic Review,* December 1958; and Franco Modigliani, Albert Ando, Milton Friedman, Margaret Reid, and Robert Eisner in *Consumption and Saving,* edited by Irwin Friend and Robert C. Jones, Philadelphia, 1960.

the normal income effect is to utilize regressions based on group means, on the theory that, for sufficiently large groups, mean transitory income will approach its expected value of zero, so that mean income for the group is in effect normal income. Some correlation must exist between normal income and the grouping variable for this procedure to be feasible, but transitory income should, of course, be uncorrelated with the grouping variable. There are two difficulties with this approach. First, it is not certain that in any given year mean transitory income approaches zero, though over a period of years it presumably does. In a recession year transitory income is expected to be negative on the average, and in a period of high prosperity it is expected to be positive. Furthermore, the incidence of negative transitory income in a recession (or of positive transitory income in prosperity) is not likely to be constant for groups. Certainly if we group by occupation, education, region, race, or age, it is to be expected that some groups will be affected more seriously than others. Other possible grouping variables are highly correlated with these characteristics, so that similar expectations apply.

Second, and perhaps more serious, it is difficult to find a grouping variable that has no independent effect on consumption or saving and is uncorrelated with any characteristic other than normal income which does have such an effect. Unless both conditions are met, the regression based on group means erroneously attributes to normal income part of the effect of the grouping variable or characteristics correlated with it.[7]

Several regressions of this general type are utilized in our paper, but an attempt is made to avoid the first problem by averaging group income over a five-year period and to avoid the second one by including variables which specifically take account of differences in group tastes or by considering changes in group saving over time. A variable representing deviations from normal income is also included to permit estimation of the transitory income effect.

Finally, normal income for the individual household may be estimated as a multivariate function of the mean income of the occupational, educational, age, and other groups to which the household head belongs, where all grouping variables are believed to be significantly correlated with normal income. Again, it is important to include a variable reflecting tastes to avoid absorbing the effect of group tastes into the estimate of the normal income effect. In future studies we plan to apply this type of normal income estimate to the data analyzed here, since it probably permits the most accurate estimate of transitory income and, therefore,

[7] Jean Crockett, "Technical Note" in *Consumption and Saving*, Vol. II, pp. 220–221.

of the effect on saving of such income. The estimate of the effect of normal income is presumably an average of those provided by single grouping variables.[8]

Separate analyses are carried out for the self-employed and for the retired since the savings behavior of each of these groups may differ significantly from that of the rest of the population. Also in some instances homeowners are studied separately from nonhomeowners. The self-employed may face somewhat greater variation in transitory income than others and certainly are faced with different transformation relationships between current and future income. The retired may well have standards of living based on preretirement income—i.e., income in the fairly distant past—and may in general be reducing rather than building up their asset positions. Homeowners may show quite a different portfolio structure from nonhomeowners, even though total net worth is much the same. For homeowners, larger expenditures for consumer durables, more debt, and perhaps smaller holdings of financial assets for given income levels are to be expected.

II. Prior Analysis

By far the most extensive earlier work on consumer investment decisions has been directed toward determining the over-all propensity to save (or consume), with particular emphasis on the long-run and short-run marginal saving propensities (or elasticities) with respect to personal disposable income. Considerably less work has been devoted to determining the components of saving, i.e., to the allocation of consumers' funds (earned or borrowed) to the major items of real and financial investment. However, in recent years there has been an increasing number of studies of consumer real investment in housing, automobiles, and other durables—with automobiles receiving most attention—and of financial "investment" in money and near-money. There have been fewer studies of consumer investment in other types of financial assets, and only very few have attempted to analyze the entire structure of consumer assets and saving to the extent the available data permitted. The comparative dearth of the latter type of study reflects in part the difficulties of isolating meaningful demand functions for many important items of financial assets (e.g., corporate stock) from time series data, which are

[8] While unbiased estimates of the normal income effect will be obtained from any of the grouping variables if mean transitory income is zero for all groups (see Part III of this paper), estimates may in fact differ depending on the grouping variable used, due to sampling error and to small deviations of group transitory income from zero.

even greater than the corresponding problems for total saving,[9] and in part the limitations of the available cross-section data, which are more serious for the financial than for the real components of saving.

In this prior analysis, both flow and stock relationships have been derived to explain the demand for individual items of saving or investment. It is interesting to note that basically only flow relationships explaining total saving have been used, to the virtual neglect of the demand for total assets or for net worth. To some extent, this neglect can be explained by the greater availability of data on total saving than those on net worth. However, it is probably also attributable to the greater interest in explaining income flows than asset levels and to the tendency in most saving analysis to overlook the close connection between the short-run marginal propensity to save and the long-run marginal propensity to hold assets.

Both time series and cross-section data have been mined intensively.[10] Cross-section data have been used to study the influence of all types of socioeconomic-demographic characteristics on saving and investment, and obviously much of such information could only be obtained in this manner. On the other hand, basically only time series data can be and have been used to study the influence of interest rates and prices. We do not propose to review here the scope and findings of prior analysis of the influence of sociodemographic characteristics (such as occupation, age, size of family, race, education, geographic location, etc.) and of interest rates and related variables on consumer expenditures and saving in view of the availability of earlier summaries, the absence of significant later findings in these areas, and the fact that we will have relatively little new to say in this paper about the influence of sociodemographic characteristics and even less about interest rates. However, it might be useful to point out that, while no one to our knowledge has had much success in isolating an interest rate effect on household saving and only limited success on household investment, this may reflect the concentration in most earlier analyses on the interest rate rather than more broadly on the rate of return on assets. Thus it is quite conceivable that, even though

[9] In addition to the difficulty of distinguishing demand from supply relationships, a further difficulty arises from substitutability among different components of saving.

[10] A very useful summary and bibliography may be found in Robert Ferber, "Research on Household Behavior," *The American Economic Review*, March 1962. One interesting set of studies not covered in that article is discussed in Arnold C. Harberger, ed., *The Demand for Durable Goods*, Chicago, 1963. Another recent summary of other results of research on saving is provided in Irwin Friend, "Determinants of the Volume and Composition of Saving," *Impacts of Monetary Policy*, Englewood Cliffs, 1963.

the interest rate may not play much of a role in influencing the household propensity to save, other types of returns—notably capital gains—may play such a role.[11] It might be also pointed out that there have been several recent analyses covering the postwar period which suggest that the rate of substitution between demand deposits and other types of deposits in response to changes in the structure of rates of return has not been very high, but that the rate of substitution between other types of deposits and between deposits and certain other types of financial investment has been somewhat higher.[12]

Both cross-section and time series data have been used to analyze perhaps the most interesting question relating to consumer saving and investment decisions, viz., the role played by income and assets, which is the problem with which we shall be primarily concerned in this paper. It is extremely difficult to identify the appropriate demand relations and the associated income and asset parameters from time series data because of the small number of independent observations and the difficulties of isolating income from correlated nonincome effects, of distinguishing among different types of income, of recognizing shifts in the demand relations, and of holding constant supply conditions. Hence it may appear surprising that in recent years relatively little effort has been made to integrate the income (or asset) parameters from cross-section data into time series models explaining either income and expenditures as a whole or specific areas of consumer outlay, in spite of the proliferation of such models and the wide range of estimates implied by different models.

There are several reasons why cross-section estimates of saving and investment propensities have been or might be regarded as inferior to the time series estimates, in spite of the very great intrinsic deficiencies

[11] In the related area of corporate investment, we have found that an over-all cost-of-capital variable adjusted for taxes (i.e., an adjusted market-value weighted average of the bond yield and the required rate of return on equity, which is estimated as the sum of the current dividend yield plus the anticipated future growth rate in earnings based on past growth) seems more useful in explaining the demand for plant and equipment than the more customary interest rate, which may at times be negatively correlated with the "cost of equity." However, the rate of capital gains like the interest rate may turn out to be a two-edged sword in its influence on the demand for saving.

[12] See Edgar L. Feige, *The Demand for Liquid Assets: A Temporal Cross-Section Analysis,* Englewood Cliffs, 1964; and Irwin Friend, "The Effects of Monetary Policies on Nonmonetary Financial Institutions and Capital Markets," *Private Capital Markets,* Englewood Cliffs, 1964. These analyses combine household and corporate accounts, though the Feige analysis introduces as an explanatory variable in the combined demand function for demand deposits the ratio of those held by individuals to the total of such deposits. Two other studies bearing on this point will be considered at the end of this section in a discussion of recent work on the determinants of the demand for money.

of the latter. First, and perhaps most difficult to correct, the basic cross-section data for saving, though not necessarily for investment, are subject to much larger statistical biases as well as larger random error than the time series data, especially for cash and deposits,[13] with the troublesome possibility that the known understatement of the average saving-income ratios in survey data might be associated with a similar, though presumably not so great, understatement of the marginal propensity to save. Second, in addition to the statistical inadequacies of consumer survey data, they pose the conceptual difficulties associated with their use for purposes to which they are not well adapted—i.e., inferring intrapersonal behavior over time from interpersonal comparisons at a point of time. One such difficulty is the separation of long-run or normal from short-run or transitory income effects on the basis of survey data which typically measure household income for one year only, though on occasion for a somewhat longer time perspective. As is by now well known, a cross-section observation of income of a household, particularly in the lowest brackets, is much more likely to be affected by transitory income than a time series observation of aggregate income. Assets as well as income may reflect transitory or disequilibrium conditions to a greater extent than is typically true of the time series data. Another conceptual difficulty associated with cross-section data is the need to hold tastes constant in attempting to infer intrapersonal behavior over time from interpersonal behavior.

Both of these conceptual limitations of cross-section data can be avoided in part by using continuous cross-section or panel data where the response of economic behavior to changes in relevant variables can be traced as these variables change over time. (The collection of survey data over a longer period than the customary year also has the potential advantage of cutting down on the impact of random influences on the variables analyzed.) As a result, the statistical analysis in this paper will be largely devoted to the new consumer panel data collected for the 1960, 1961, and 1962 Surveys of Consumer Finances.[14] Some earlier work along similar lines was carried out under our general guidance by Paul Taubman on the basis of a much smaller consumer panel in the

[13] See Irwin Friend and Stanley Schor, "Who Saves?" *Review of Economics and Statistics*, May 1959; and Robert Ferber, "The Reliability of Consumer Surveys of Financial Holdings: Time Deposits," *Journal of the American Statistical Association*, March 1965.

[14] See Richard F. Kosobud and James W. Morgan, eds., *Consumer Behavior of Individual Families Over Two and Three Years*, Ann Arbor, 1964, for a description of the basic data, including copies of the questionnaires used.

Philadelphia area conducted by the Consumer Expenditures Unit of the Wharton School.[15]

Before proceeding with our analysis, it may be useful to discuss briefly the wide range in the estimates of income and asset effects and the major internal inconsistencies which seem to characterize much of the earlier work in this area. To justify our preoccupation with cross-section data in this paper in spite of their substantial deficiencies, only some of which we were able to correct, we might point first to the extremely unsatisfactory nature of the estimates of the marginal propensity to save or to consume derived from time series data—a parameter which might be expected to be relatively stable and which has received an unusual amount of research. There have been as many different estimates of the long-run and short-run marginal propensities to consume obtained from different time series models of income determination as there have been models.[16] This is not surprising since there are virtually an infinite number of possible ways of combining different forms of each of a number of structural equations if the number of equations and the number of forms fitted or tested for each equation are at all large. In contrast, the number of time series observations available for distinguishing among these alternatives is extremely limited. Thus the short-run marginal propensity to consume out of personal disposable income is somewhat less than .55 according to the Klein-Goldberger annual model, .67 according to the Suits' annual model, and for transitory income about .30 according to Friedman, and the variations in the time period covered are hardly sufficient to explain these differences.[17] The long-run marginal propensities are also markedly

[15] See Paul Taubman, "A Synthesis of Saving Theory with Special Reference to the Components of Personal Saving," unpublished Ph.D. dissertation, University of Pennsylvania, 1964, Chapter VI. An earlier paper by Irwin Friend and Paul Taubman, "The Aggregate Propensity to Save: Some Concepts and their Application to International Data," *Review of Economics and Statistics,* May 1966, applied the same theoretical model and general framework of analysis to time series data where countries rather than households were the unit of observation.

[16] The short-run propensity to consume is usually defined as the current response of consumption to an additional dollar of income over a year, half-year, or quarter (with the time period depending on the analysis), irrespective of whether the income reflects normal or transitory influences, and so may be regarded as some average of short-run response to normal and transitory incomes. The long-run propensity to consume is usually defined as the ultimate response of consumption to an additional dollar of income if that income is maintained indefinitely and reflects the effect of normal income after full adjustment.

[17] L. R. Klein and A. S. Goldberger, *An Econometric Model of the United States,* Amsterdam, 1955, pp. 51 and 90; Daniel B. Suits, "Forecasting and Analysis with an Econometric Model," *American Economic Review,* March 1962, p. 113; and Milton Friedman, *A Theory of the Consumption Function,* Princeton for NBER, 1957, p. 147. The Friedman estimate has been adjusted to include durables in consumption for comparability.

different, amounting to .75, .82, and .90, respectively. The more recent Klein quarterly model implies a short-run (quarterly) marginal propensity to consume of .72 and a long-run propensity that is actually less, .60, while the current very large-scale S.S.R.C. quarterly model implies a corresponding short-run consumption propensity between .35 and .53 and a long-run propensity between .53 and .70, depending on which of two sets of equations is used.[18] All of these results other than Friedman's explicitly incorporate a liquid asset variable at least in part as a proxy for initial net worth. The semiannual Friend-Taubman relation of consumption to disposable income, which does not incorporate any asset variable, implies a short-run marginal propensity to consume of .41 and a long-run propensity of .82, while an earlier annual analysis by Friend which does not distinguish between short- and long-run propensities but does incorporate a liquid asset variable points to an income coefficient of .73 (and an assets coefficient of .11).[19] A recent annual analysis by Crockett devoted to consumption of nondurable goods and services pointed to a marginal propensity to consume of .75 out of normal income and .5 to .6 out of transitory income.[20] The latter estimates, which do not incorporate any asset variable, would of course be increased somewhat if durables were included. Not surprisingly in view of the interrelations of assets, income, and consumption, the estimates of the marginal propensity to consume out of normal income tend to be higher in analyses which do not include assets as well as income among the explanatory variables, so that the income effect on consumption includes the associated asset effect.

While there are significant conceptual differences among some of these estimates, the Klein annual and quarterly, the Suits annual, and the S.S.R.C. quarterly estimates are conceptually quite comparable, introducing liquid assets as well as long- and short-run income as explanatory variables. Ando and Modigliani have recently added a large number of new time series estimates to this already rich harvest, using annual current disposable labor income and net worth as their basic explanatory

[18] L. R. Klein, "A Postwar Quarterly Model: Description and Applications," *Models of Income Determination,* Studies in Income and Wealth 28, Princeton for NBER, 1964; and Robert Eisner, "Over-All View of the Model," *Proceedings of the Business and Economic Statistics Section,* American Statistical Association, 1963.

[19] Irwin Friend and Paul Taubman, "A Short-Term Forecasting Model," *The Review of Economics and Statistics,* August 1964, and Irwin Friend (with the assistance of Vito Natrella), *Individuals' Saving: Volume and Composition,* New York, 1954.

[20] Jean Crockett, "Income and Asset Effects on Consumption: Aggregate and Cross Section," *Models of Income Determination.*

variables, and they obtain marginal income propensities ranging from .55 to .79 though their preferred estimates vary only from .55 to .64.[21] The latter figures, like many of the others incorporating asset variables, are considerably lower than those obtained from cross-section data.[22] It might be noted that the much higher marginal than average propensity to save in these relations incorporating asset variables is not necessarily inconsistent with the comparative secular stability in the average propensity which has received so much attention, though according to our model such stability does require either a high degree of constancy of such variables as the desired asset-income ratio, the speed of adjustment to the desired ratio, and the growth rate of disposable income, or approximately offsetting tendencies among these variables.[23] However, if any of the time series estimates are correct, it would be nice to know which. It would appear desirable to explore further the potentialities of cross-section data in this area.

Similar statements might be made about the wide range and unsatisfactory nature of time series estimates of asset effects on consumption (varying from .02 for liquid assets in Klein-Goldberger to .55 in some relationships presented by Suits).[24] While most studies of this type have relied on liquid assets as a proxy for net worth because of their greater accessibility and reliability, the recent analysis by Ando and Modigliani used the more theoretically desirable figures for net worth. It is interest-

[21] Albert Ando and Franco Modigliani, "The Life Cycle Hypothesis of Saving," *American Economic Review*, March 1963, and "Correction" March 1964.

[22] Using the BLS-Wharton 1950 data, Watts and Tobin obtain a marginal propensity to save out of normal income of .23, excluding insurance, and Crockett and Friend a marginal propensity out of measured income of .28 including insurance. (See *Consumption and Saving*, Vols. I and II.) In both results, several initial asset (and liability) variables were held constant. However, tastes were not held constant and it can be shown that in such cross-section regressions of saving on income and initial assets, the absence of an explicit savings-tastes variable biases the income coefficient downward in view of the positive correlation between income and assets and between assets and tastes, assuming no positive correlation between income and tastes.

[23] In our linear model, disregarding capital gains, for a stable average propensity, the normal saving-income ratio $(S/Y) = rbg/(r + g - rg)$, where r is the speed of adjustment, b the desired asset-income coefficient, and g the growth rate in income. Ando and Modigliani, who use a somewhat different saving formulation predicating lifetime planning, implicitly assume that the product of the asset-income ratio and the growth rate has remained relatively constant since the latter part of the nineteenth century. Our normal saving-income ratio approximates bg only if g is small relative to r.

[24] Daniel Suits, "The Determinants of Consumer Expenditure," *Impacts of Monetary Policy*, pp. 30–33. Suits attributes the major part of this variation to the difference in time periods covered and a postwar upward shift in the impact of liquid assets on consumption.

ing to note that their estimates of the net worth coefficient, ranging from .040 to .082 with a narrower range of .072 to .08 for their preferred results, are substantially lower than the rough .12 figure which seems to be implied by their theoretical analysis.[25] Because of the tastes complication, single cross-section analysis is likely to be even less satisfactory than time series analysis for isolating the asset effect on consumption and saving. However, panel data are more promising.

Turning next to consumer real investment, we might review briefly the major results, especially those relating to income and asset effects on automobile demand. Automobile demand has not only received more attention than other areas of consumer investment, but it also illustrates the problems that arise in these other areas. A rather comprehensive summary of prior automobile demand studies[26] shows a range in short- and long-run time series income elasticities from somewhat over 1 to close to 4 (with a correspondingly wide range for price elasticities). Cross-section studies for postwar years generally implied estimates close to 1,[27] with somewhat larger figures for years of high automobile demand than for other periods. By using panel data which are available for automobiles, Houthakker and Haldi lowered somewhat but did not change significantly the customary cross-section income elasticities. However, the asset effects (for stock of automobiles) implied by the panel data were markedly different from those implied by single cross-section analysis, with the asset coefficient changing from −.13 and −.16 in the usual cross-section analysis to −.36 and −.39 for 1952 and 1955, respectively, once tastes were held constant.[28] One last result of some interest was the absence of any difference between the effects of nor-

[25] Similarly, their preferred estimates of the marginal propensity to consume (.55 to .64) seem to be considerably below the value implied by their theoretical analysis, assuming an aggregate income growth rate of about 3 per cent and an assets yield of over 4 per cent (*American Economic Review*, March 1963, p. 60).

[26] H. S. Houthakker and John Haldi, "Household Investment in Automobiles," *Consumption and Saving*, Vol. I.

[27] Houthakker and Haldi derived income elasticities of .87 and 1.02 for 1952 and 1955, respectively. Crockett and Friend obtained 1.18 for 1950 (*Consumption and Saving*, Vol. I), while the results by Watts and Tobin seem to imply a substantially lower result for the same year ("Consumer Expenditures and the Capital Account" in *ibid.*, Vol. II).

[28] Watts and Tobin obtain an even larger absolute value for the asset effect in 1950, but, as they point out, their auto stock variable seems substantially understated.

mal and transitory components of income on gross investment in automobiles.[29]

Perhaps the most comprehensive work on automobile demand based on time series data is that by Gregory C. Chow, whose earlier study was updated in *The Demand for Durable Goods,* which also contains interesting papers on the demand for nonfarm housing by Richard F. Muth and on the demand for refrigeration by M. L. Burstein. According to Chow's results, the long-run income elasticity of demand for automobile stock, which is also the long-run income elasticity of gross investment, is probably somewhere between 1.4 and 2.0, considerably higher than that indicated by either single or continuous (panel) cross-section analysis. The short-run (i.e., the current year's) income elasticity of gross investment implied by his analysis, though not given, seems to be over 2.5, while the S.S.R.C. quarterly model referred to earlier (which, unlike Chow's, does not include an initial auto stock variable) seems to imply a drastically lower figure in the neighborhood of one, with no distinction between short- and long-run effects. The asset or auto stock coefficient in Chow's gross auto investment equations ranges from −.23 to −.30. Though this is somewhat lower in absolute value than the corresponding coefficients in the Houthakker-Haldi panel analysis, the variations could be explained by the differences in measurement used as well as by the differences in time period. Chow shows that the asset coefficient in the auto investment regressions may be regarded as the difference between the depreciation rate (.25 per annum) and the speed of adjustment to the desired level of stock (.48 to .55 of the discrepancy in a year).

Chow's results indicate that, while the measure of normal income he uses performs somewhat better than current annual income in explaining variations in the level of the auto stock, current income performs appreciably better than normal income in explaining variations in auto investment. He points out that the somewhat better performance of normal than of current income in explaining the auto stock may simply reflect the fact that the stock, unlike the flow regressions, assumes complete adjustment of the stock within a year; since this is presumably incorrect, the results may be biased in favor of normal income which, in view of its definition, can (unlike current income) take into account a slow approach of stock to a new equilibrium level. When normal income and

[29] This confirmed an earlier finding by Friend and Kravis, "Permanent Income and Consumption Patterns," *American Economic Review,* May 1957. Watts and Tobin do obtain a higher normal than transitory income coefficient, but the device they use to separate normal from transitory effects seems quite questionable. (See Crockett, "Technical Note," in *Consumption and Saving,* Vol. II, pp. 213–216.)

transitory (current minus normal) income are introduced as separate variables in the stock regressions, the two coefficients are virtually identical.[30]

Largely on the basis of time series analysis, Muth concludes that the income elasticity of stock demand for housing is in the neighborhood of one, considerably higher than that obtained by some of his predecessors, and that the speed of adjustment of the housing stock per annum is around .32. (The housing stock coefficient is somewhat less than .32 in absolute value, reflecting a depreciation rate of about .035.) Burstein derives income elasticities for refrigeration ranging from 1.0 to 3.0 on the basis of time series data, and at the low end of the range on the basis of household cross-section data.[31] The estimates of the adjustment or asset coefficient for refrigeration range from .36 to .73. Muth finds that normal income is superior to current income in explaining variations in housing demand, though the difference does not seem large, while Burstein obtains the reverse results for refrigeration when trend, which is highly correlated with the measure of normal income used, is introduced into the analysis.[32]

Probably the most comprehensive analysis of the entire structure of consumer assets based on single cross-section data is the Watts-Tobin study referred to earlier, which estimated linear relationships of the stocks of automobiles, each of a large number of other consumer durables, mortgage debt, instalment debt, cash balances, and insurance to many socioeconomic-demographic characteristics of the household including disposable income and housing level, the latter providing a

[30] In a subsequent time series analysis using a small-scale complete model, Paul E. Smith derived a value of one for the marginal propensity to invest transitory income in automobiles, which is of course very much higher than the corresponding propensity for normal income (*The Journal of Political Economy*, October 1962). This unusually high value of the transitory propensity to invest in automobiles may reflect the incorporation in the model of an "investment equation," in which government expenditures as well as private investment are determined by gross national product in the current and preceding years.

[31] He concludes "somewhat less conclusively that the income elasticity is between 1.0 and 2.0" (*The Demand for Durable Goods*, p. 99).

[32] Though somewhat outside our main focus of interest in this paper, Chow, Muth, and Burstein all derive substantial and highly significant price elasticities, while Muth also obtains a substantial and significant interest rate elasticity. Any overstatement of the income elasticities in these studies, as suggested by cross-section data, would of course normally be associated with an error in the same direction in the estimates of price and interest rate effects.

basis for distinguishing between normal and transitory income effects. Flow regressions were also derived relating changes in assets or saving in each of the forms indicated to the same socioeconomic-demographic variables plus initial assets in that form and in each of the other forms. The authors' main conclusion is that "There is evidence that households tend to maintain some sort of balance in their capital accounts both between assets yielding direct services and financial assets, and between liquid assets and liabilities. . . . adjustments in capital account items tend to eliminate rather than perpetuate deviations from a basic or preferred portfolio pattern." They further conclude that "The differences between short- and long-run coefficients for saving are definitely in the direction, if not in the amount, predicted by the permanent income hypothesis."[33]

As noted earlier, the Watts-Tobin estimate of the marginal propensity to save out of normal income in 1950 seems reasonably consistent with other cross-section results, but their implicit estimate of the income elasticity of automobile investment seems substantially lower than other cross-section results and lower still than time series estimates. While the transitory income coefficient is higher than the normal coefficient for saving as a whole (which is defined to exclude consumer durables) and for changes in cash and debt, the reverse is true for investment in automobiles, in other consumer durables, and apparently in insurance. As would be expected, normal income generally has a much larger impact than transitory income on the stocks of assets. The greater influence of normal than of transitory income on automobile investment, which seems inconsistent with the results obtained in other studies, may reflect the deficiencies previously referred to in separating normal from transitory effects and in estimating the stock of automobiles.

It is possible to make an interesting comparison of the results from the Watts-Tobin stock and flow regressions which the authors do not discuss. It can be argued that dividing the normal income coefficients in a saving or flow regressions (p. 46) by the corresponding asset or adjustment coefficients in the same regression (pp. 41–44) should give an approximation to the long-run income coefficients in the stock or asset regressions (p. 34), except for automobiles and other durable goods where an adjustment should be made for depreciation. To the extent that the derived normal income coefficients from the flow regressions deviate from the corresponding coefficients in the stock regressions, the

[33] Watts and Tobin in *Consumption and Saving*, Vol. II, pp. 45, 48.

former would be expected to be lower.[34] Instead, the indicated divisions in the flow regressions, except for debt, give results substantially higher than the long-run income coefficients in the stock regressions. While this may be partly attributable to the fact that the relation of actual assets to normal income would be expected to give a somewhat lower income effect than the relation of desired assets to normal income, to which the former is an approximation, it probably reflects to a greater extent the bias in the asset or adjustment coefficients in the flow regressions because of the absence of a tastes variable.[35] Since tastes are not held constant in these regressions, the initial stock or asset variables in the flow regressions act as proxies for tastes and this reduces the magnitude of the stock coefficients.

One further limitation of the Watts-Tobin analysis is the absence of a net worth variable. Thus net worth does not appear in the over-all saving regression, though several individual items of assets and liabilities are included.

A more recent analysis of the structure of consumer assets based on single cross-section data appears in Henry J. Claycamp's *The Composition of Consumer Savings Portfolios*.[36] The two most interesting findings are that households "give far more consideration to the specific needs each asset fulfills than to the effect the asset has on the total portfolio" and that total assets but not income was a major determinant of the composition of the total portfolio as measured by the proportion of variable-dollar assets. The first of these conclusions is open to question

[34] If $A_i^* = j + kA^*$ where A_i represents a particular asset and A net worth, and as noted earlier we assume for simplicity $A^* = a + bY_N$, so that $A_i^* = j + ak + bkY_N$, then $S_i = r[A_i^* - A_{i(t-1)}] = (rj + rak) + rbkY_N - rA_{i(t-1)}$, where r is the speed of adjustment. Then bk, the long-run marginal propensity to hold A_i, may be estimated (not necessarily without bias) by dividing the coefficient of Y_N from the savings regression by the coefficient of $A_{i(t-1)}$.

However, with a somewhat more sophisticated model which allows for disequilibrium in assets generally, the interpretation of the savings regression coefficients must be changed. If $S_i = r_1(A_i^* - A_{i(t-1)}) - r_0[(A^* - A_i^*) - (A_{(t-1)} - A_{i(t-1)})] = (r_1 + r_0)(j + ka) - r_0a + [(r_1 + r_0)bk - r_0b]Y_N - (r_1 + r_0)A_{i(t-1)} + r_0A_{(t-1)}$, then the ratio of the two coefficients gives an estimate of $bk - r_0b/(r_1 + r_0)$, which is less than bk since all factors are positive.

In comparing this ratio with the normal income coefficient obtained using A_i as the dependent variable and omitting lagged stock variables, it should be noted that the latter is also presumably an underestimate of the desired long-run marginal propensity, if adjustment periods exceed one year and if households with rising income (for which A_i is expected to be less than A_i^*) are more frequent at the upper end than at the lower end of the income scale.

[35] As mentioned earlier, the adjustment coefficient in the automobile investment equation also seems affected by an understatement in the estimated stock.

[36] Urbana, Ill., 1963, p. 90.

since it is based largely on the findings of simple correlations, which are generally small and positive, between dollar amounts held of various assets, and may reflect common scale factors rather than any absence of substitutability among different asset items. This conclusion, moreover, is inconsistent with the findings of an earlier analysis which does hold income (both one year and a three-year average) constant and finds a fairly high degree of substitutability among most components of saving.[37] On the other hand, the Watts-Tobin analysis indicates less substitutability for asset items than for saving items. However, both the recent and earlier analyses (as well as others not considered here) are subject to the serious deficiency that substitutability among portfolio items cannot be adequately tested from a single cross section but requires panel data in view of the influence of tastes.[38]

It would be useful to check also against panel data the second major conclusion drawn by Claycamp, based on the relationship between the percentage of the portfolio invested in variable assets and a number of other household characteristics including total assets and current income, so that tastes which are so highly correlated with assets can again be held constant. Moreover, it would be desirable to test the effect of substituting for the year's income a normal or longer-run income variable.[39]

An attempt to correct the more significant deficiencies in cross-section analysis of consumer saving and investment behavior on the basis of panel data was made by Paul Taubman in *A Synthesis of Saving Theory,* using continuous cross-section information for a very small sample of families in the Philadelphia area (ranging from 157 to 78 families depending on the time span). We have considerably extended that earlier analysis and applied it to different and significantly larger samples, covering a somewhat longer time span for selected saving items and for income. However, the basic information in the smaller sample (saving

[37] Substitutability among saving items is used here in the sense that, for given income and other variables determining household saving, a lower value for a component of saving (S_i) among different households is more likely to be associated with a higher value of other items of saving ($S - S_i$) than with higher consumption. It is not a measure of the response of saving to changes in relative yields. For a more precise discussion of this concept, see Friend and Jones, "The Concept of Saving," in *Consumption and Saving,* Vol. II, pp. 336–359 and pp. 381–389.

[38] See *Consumption and Saving,* Vol. II, p. 388.

[39] Of the other socioeconomic-demographic characteristics Claycamp tested, he finds that homeownership in particular but also self-employment and age of head have a significant impact on the variable dollar asset share in household portfolios. Neither education nor psychological views (the latter as measured by the SCF indexes) seems to have a comparable impact.

in all forms for each of the two years covered, 1961 and 1962) did make it possible to test certain relationships not duplicated here. Moreover, Taubman's interesting experiments with the introduction of a rachet variable have no counterpart in our analysis. Taubman's main substantive conclusions are that the marginal propensity to save out of normal income (in forms other than consumer durables) was in the neighborhood of .17, while the corresponding marginal propensity to save out of transitory income was .23. Including gross investment in consumer durables, the propensities were .31 and .42, respectively. The only items of saving significantly affected by transitory income were consumer durables and indebtedness. Transitory income in this analysis was defined as the difference between current income and an average of three years' income. All of the results were derived from saving regressions in which several initial asset (and liability) variables were incorporated.

Another paper by Taubman, analyzing the 472 employees in the Survey Research Center Ford Panel Study for the years 1954 and 1955, points to somewhat higher marginal propensities to save including gross investment in consumer durables, amounting to from .37 to .40 for normal income and from .50 to .63 for transitory income.[40] While the fits are unusually good for cross-section data, these estimates may err on the high side, compared with other cross-section studies, since Taubman indicates the disposable income figures used are probably too small. Normal income is defined here both as two-year averages of income (which might tend to introduce a significant transitory component in the measurement of normal income) and by a Koyck transformation.

A relatively unique feature of this last paper is the presentation of the propensity to save out of normal (and transitory) income by the age of the head of the household. Though Taubman introduces these data for other purposes, they can be used to test, in an admittedly crude fashion, whether his normal income measures can be interpreted as implying too short a planning span. If a longer planning span than that implied in these measures is relevant to saving behavior, then the marginal propensity to save for the youngest age group (18–34), who are below their long-run incomes, would be expected to be strongly biased downward if the understatement of normal income is roughly proportional to the level of such income; and the constant term would be biased downward if the understatement is the same for different households in the group. For the oldest age group (55 and over excluding the retired),

[40] Paul Taubman, "Permanent and Transitory Income Effects," *Review of Economics and Statistics,* February 1965.

the bias might be expected to be in the same direction but (if it exists) should not be nearly as large. The results, interestingly enough, conform reasonably well to these expectations for normal income defined as an average for two years, which suggests that such a time span is too short for this purpose. The results derived through the Koyck transformation are more mixed. However, this test as a whole is quite inconclusive in view of the broad age groups used (so that, for example, household heads at the upper end of the 18–34 age range may have high incomes which are closer to their true normal incomes than are the lower incomes of younger heads) and because of the possibility of a strong saving tastes effect associated with age. To the extent that the data permit, we plan to analyze further the relevant planning span for explaining consumer saving and investment behavior.

Finally, some mention might be made of the numerous recent studies of the demand for money. The most intensive studies in this area have been based on time series analyses of data going back to the turn of the century and have combined corporate with household accounts. Milton Friedman, defining money to include time deposits in commercial banks, concluded several years ago that the demand for money (apart perhaps from very short time periods) is determined by permanent or normal rather than by transitory income, that interest rates do not affect the demand very significantly, and that either permanent income or wealth (net worth) can be regarded as the primary determinant of demand.[41] If the income interpretation is adopted, the permanent income elasticity for money including time deposits is estimated at 1.8. Friedman states that his findings cast doubt on the transactions and speculative motives for holding money.

More recently, Allan H. Meltzer concluded that interest rates do play an important role in the demand for money (which he prefers to define in the more traditional manner as currency plus demand deposits but which he also considers for comparative purposes to include time deposits) and that wealth is more important than income in determining

[41] Milton Friedman, "The Demand for Money: Some Theoretical and Empirical Results," *The Journal of Political Economy,* August 1959. For a criticism of Friedman's conclusions on the comparative unimportance of the interest rate and of transitory income on the demand for money, see James S. Duesenberry, "Discussion," *American Economic Review,* May 1959. It may be recalled that Watts-Tobin found, as might be expected, a lower transitory than normal income effect in the demand equation for the stock of cash (effectively defined as all types of deposits) but found a reverse effect for cash saving or changes in the stock of cash.

such demand.[42] His analysis does not seem to us to indicate any clear basis for a preference between permanent income and wealth as the major determinant of the demand for money defined to include time deposits; it does not provide any data to distinguish between the two effects for the narrower definition of money; and it does not measure the influence of transitory income in view of the long-run orientation of the analysis.[43] Both permanent income and asset effects on money (including time deposits) seem quite unstable from one decade to the next and point to much smaller elasticities in the last decade, with negative values indicated in two of the three regressions (one utilizing wealth and the other permanent income) for which he presents data, though not in the wealth regression he likes best.[44] Indeed there is some suggestion that current income alone has a more stable effect than wealth on money (excluding time deposits) as between the two periods for which such data are shown, 1900–29 and 1930–58.[45] The permanent income elasticity of money is estimated at about one excluding time deposits, but higher including time deposits. Wealth elasticities are of the same general order of magnitude. Meltzer's results suggesting a relatively strong interest rate effect are for the period as a whole since the beginning of the century. For the

[42] Allan H. Meltzer, "The Demand for Money: The Evidence from the Time Series," *The Journal of Political Economy,* June 1963. For a criticism of an earlier paper along similar lines coauthored by Meltzer (Karl Brunner and Allan H. Meltzer), "Predicting Velocity: Implications for Theory and Policy," *Journal of Finance,* May 1963), see "Discussion," by Albert Ando and Martin J. Bailey. Ando in particular questions the conclusion on the comparative unimportance of income both on theoretical and statistical grounds. It might be noted, however, that the empirical work Ando cites relates to the postwar period only. For further discussion of the June 1963 paper, see comments by T. J. Courchene and H. T. Shapiro and rejoinder by Meltzer in *The Journal of Political Economy,* October 1964.

[43] However, Meltzer does measure the influence of the ratio of transitory to permanent income on the demand for money in his rejoinder in *The Journal of Political Economy,* October 1964, and finds that for the period as a whole (1900–58) the effect was insignificant, with a negative impact in the first half of the period and a positive impact in the second half, regardless of which of the two definitions of money was used.

[44] *The Journal of Political Economy,* June 1963, p. 236.

[45] See equations (3) and (8) in *ibid.,* pp. 225, 229, and 232.

Since the stock regressions used by Meltzer assume complete adjustment of the stock of money within a year, the correlation results may be biased in favor of total assets (or permanent income) which can, unlike current income, take into account a slow approach of the stock of money to a new equilibrium level. It might be useful therefore, especially in time series analysis where the tastes problem is less serious, to experiment with flow as well as stock regressions. It can also be argued that the correlation of the stock of money with income may more properly be compared to the correlation of money with nonmonetary assets than to the correlation with total assets.

broader definition of money where he presents decade estimates, the interest rate effect is less evident in the postwar period and does not exist in one of the two wealth relationships for which he presents relevant data.[46] The interest rate effect would, of course, be expected to be more marked for the narrower definition of money.

Feige, using a combination of state income and deposit data for a number of postwar years, derived a permanent income elasticity of demand deposits not significantly different from one.[47] His permanent income elasticities of time deposits and of deposits in savings and loan associations were on the average significantly lower, though the value for time deposits varied substantially over time from a figure somewhat over that for demand deposits in 1949–53 to substantially lower in 1954–59.

While there do not appear to be any comparable estimates readily available from household cross-section data, the Watts-Tobin analysis for 1950 indicated a normal income coefficient of .20 in the demand for cash (including time and savings accounts and deposits in savings and loan associations) by homeowners and .12 for renters, which would seem to indicate an over-all mean elasticity well under one.[48] Such a value would appear to be much closer to that estimated by Feige, who essentially also used a cross-section analysis, though not of household data, than to the values estimated by Friedman and Meltzer.[49] While the household data are known to underestimate cash holdings, this would not be true of the state data used by Feige. Moreover, it is not clear that an understatement of the level of cash holdings should result in any understatement of the estimated income elasticity.

III. Plan of the Present Analysis

The new results presented in this paper are based on cross-section data. Our first analysis utilizes a Federal Reserve Board Survey for a single

[46] *Ibid.*, p. 236.

[47] *Demand for Liquid Assets.*

[48] The corresponding normal income coefficients implicit in the Watts-Tobin flow regressions are only moderately higher for homeowners, but impossibly high for renters.

[49] This presumably cannot be explained even in part by the inclusion of currency in the Friedman and Meltzer money demand functions since the available evidence indicates that the income elasticity of currency is less than that of demand deposits. See Philip Cagan, "The Demand for Money Relative to the Total Money Supply," *Quarterly Journal of Economics,* August 1958. It might be explained in part by Feige's results for the early 1950's compared with the late 1950's and perhaps also by Meltzer's results for the postwar period compared with the prewar period if we depart from his assumption of a stable demand for money function for the 1900–58 period as a whole.

year (1962) to investigate relationships between asset holdings and income, and between various types of assets and total net worth. This is presented in the first section of Part IV.

For the remaining analyses the data used are those collected from a continuous panel of families in the 1960, 1961, and 1962 Surveys of Consumer Finances. They cover the incomes, asset holdings, expenditures on consumer durables, total savings, and savings components of 567 families for the years 1959–61, with some information on incomes for additional years.

The dependent variables studied are net worth, net outlays on autos (i.e., purchases less sales) and on other durables, additions and repairs to owned homes, total saving (excluding durables expenditures), contractual saving, saving in the form of liquid assets, saving in the form of insurance, business saving, saving in corporate stock and other investments, changes in mortgage debt, and changes in instalment debt. The mortgage debt item overlaps contractual saving to the extent of debt repayment, but also includes new debt incurred. Contractual saving also includes life insurance premiums. No analysis of home purchase was possible, since families who moved during the three-year period were dropped from the sample. However, stock regressions, based on value of owned homes, will be fitted in future work. Two-year averages of durables expenditures and savings components for the years 1960–61 are available for all items. In addition, single-year figures are available in all three years for each of the three durable items, for insurance premiums in 1959 and 1961, and for liquid saving in 1959. Regressions are fitted for more than one time period where data permit, and several transformations of the dependent variables are tested. Regressions with asset stocks as the dependent variables are discussed in the second section of Part IV and flow regressions in Part V.

As indicated previously, one of the primary purposes of this paper is to test a number of devices for separating the effects of normal and transitory income. Accordingly, some estimate of normal income is used in each regression, and current income is ordinarily included as a second explanatory variable in linear forms. In such forms, the coefficient of current income measures the transitory income effect, while the sum of the two income coefficients measures the normal income effect.[50]

[50] An analogous result holds in logarithmic relationships, except that transitory income is defined there as the ratio of current income to normal income rather than the difference of the two, so that $\log Y_T = \log Y - \log Y_N$. When the logarithms of both current and normal income are included, the coefficient of the former provides an estimate of the elasticity with respect to transitory income thus defined.

In one group of regressions normal income is estimated by averaging the actual income of an individual household over several years. For regressions involving two-year savings items a five-year income average is used (covering 1958 through anticipated 1962 income), while for single-year items a three-year average is used, centered on the year to which the savings figure refers. In all cases the current income variable refers to the same time period as the savings variable. A third income measure, based on scattered information for still earlier years, is included in some regressions to test the hypothesis that incomes in the relatively distant past may contribute to the explanation of current consumer saving and portfolio decisions.

A second group of regressions takes normal income to be the mean income for the occupational group to which the household head belongs. If normal income is believed to be average lifetime income, a reasonable first approximation to this might be obtained from the average income of the appropriate occupational group. However, if the relevant time span for defining normal income is substantially shorter than the head's working life, a more appropriate estimate would be average income for the occupation-age group to which the head belongs, and we plan to make use of this measure in future work. In a further variant, we plan to estimate normal income for each household as a linear function of the income means for the occupational, educational, racial, regional, sex, and age groups to which the household head belongs, but these results are not yet available. Number of earners, another characteristic correlated with household income, is not utilized because it is not clear to what extent variation in number of earners may reflect differences in transitory income rather than in normal income.

We have noted earlier that some device for holding group tastes constant should be used, when normal income is approximated in this way, to prevent the effects of the grouping variables from being absorbed into the estimate of the normal income effect. If this is done and if mean transitory income is constant over all groups, an unbiased estimate of the normal income effect is obtained, regardless of the grouping variables used, even when transitory income, computed as the difference between actual household income and estimated normal income, is included as a second independent variable.[51] The accuracy with which the transitory

[51] Let us assume that, holding tastes and lagged assets constant, saving for the j^{th} household in the k^{th} group is given by

$$S_{kj} = bY_{Nkj} + cY_{Tkj} + u_{kj},$$

where saving and income are measured from their over-all means, Y_T is transitory income, and u is a random residual uncorrelated with Y_N or Y_T. If we approximate

Y_{Nkj} by Y_{Gk}, the mean income for the group to which the household belongs, and if mean transitory income is zero for all groups, then an unbiased estimate of b may be obtained by regressing S_{kj} against Y_{Gk}.

The least-squares estimate of b is then

$$\hat{b} = \frac{\sum_{k,j} S_{kj}Y_{Gk}}{\sum_{k,j} Y_{Gk}^2} = \frac{\sum_{k} N_kY_{Gk}S_{Gk}}{\sum_{k} N_kY_{Gk}^2},$$

where S_{Gk} is mean group saving, N_k is the number of households in the k^{th} group and the summations in the last fraction are over groups. Since Y_{Tk} is assumed to be zero,

$$S_{Gk} = bY_{Gk} + u_{Gk},$$

and the expected value of $\sum_k N_kY_{Gk}S_{Gk}$ is $b\sum_k N_kY_{Gk}^2$ since Y_{Nkj} and u_{kj} are uncorrelated and Y_{Gk} and u_{Gk} are linear functions of the Y_{Nkj} and the u_{kj}, respectively. The expected value of $\hat{b}$ is therefore b. The estimate of b is not changed by including a second independent variable, $Y_{kj} - Y_{Gk}$, in the regression as an approximation to transitory income. While any error in Y_{Gk} as an approximation to Y_{Nkj} leads to an equal and opposite error in the approximation to transitory income, the two approximations are nevertheless uncorrelated. For their covariance

$$\frac{1}{N}\sum_{k,j} Y_{Gk}(Y_{kj} - Y_{Gk}) = \frac{1}{N}\sum_{k} Y_{Gk}\sum_{j}(Y_{kj} - Y_{Gk}) = 0,$$

since within each group the sum of the deviations from the mean must be zero. Thus, the addition of the second independent variable does not change the least-squares estimate of the coefficient of the first.

income effect is estimated will depend, however, on the closeness with which the household's normal income is approximated. With an imperfect approximation to normal income, the estimated transitory income effect will be biased downward for total savings and those components where this effect is larger than the normal income effect.

In fact, it seems highly unlikely that in any given year mean transitory income is constant for all the groups used, though it may be approximately so for longer time periods. We have, therefore, utilized a five-year average of group income and hope in this way to obtain estimates of the normal income effect which are relatively free of bias due to transitory income. However, some bias due to our imperfect ability to control tastes undoubtedly remains.[52] Furthermore, the understatement of savings, and particularly certain components of savings, which occurs in cross-section data is probably greater, in absolute if not relative terms,

[52] The omission of a variable reflecting the household's tastes for holding assets in general, or particular types of assets, probably leads to a downward bias in the coefficient of normal income because of the positive correlation between initial asset holdings and tastes and between asset holdings and income as well as the negative correlation between asset holdings and saving. This tendency may be reinforced (offset) by negative (positive) correlation of normal income with savings tastes.

at high income levels than at low ones; this leads to a downward bias in the income coefficients, at least for linear regressions.

A second major purpose of the paper is to obtain improved estimates of the effects of initial asset holdings, or net worth, on consumer saving and investment decisions by holding tastes constant in some fashion. Since some households (and groups) have stronger preferences than others for the services produced by real or financial assets, compared with alternative uses of their resources, we expect certain households to wish, and eventually acquire, more assets than others with the same normal income. In other words, in the cross section, there is a substantial correlation between asset holdings and savings tastes, which makes it difficult to estimate the inhibiting effect that assets already acquired exert on further asset acquisition, when tastes are given. In addition, there may be a correlation between normal income and saving tastes, both in the cross section, as already indicated, and in the aggregate over time. For example, as new consumer products become available, the effect is to introduce a negative time trend into the aggregate savings function, while aggregate normal income is characterized by a rising time trend, so that the normal income effect is biased downward. Failure to hold tastes constant may, therefore, bias estimates of income as well as asset parameters.[53]

Two devices are used for holding tastes constant in the cross-section analysis. One is to introduce a variable into the regression which serves to distinguish "high" savers from "low" savers. The variable used is the percentage of normal income saved, either by the individual household or the group to which it is assigned, in some time period other than that to which the dependent variable refers, or alternatively the ratio of net worth to normal income in some earlier or later period. Both taste proxies are subject to certain limitations: the first because savings in any relatively short period may be strongly influenced by transitory components of income or consumption, and the second because net worth may represent an incomplete adjustment to normal income or may fluctuate erratically because of capital gains. For 1959 savings and expenditure items, we use the ratio of total savings in 1960–61 to estimated normal income. For the two-year savings items, the situation is much less satisfactory, since a limited number of savings components are available for 1959. Two alternatives based on savings items were tried—the ratio of insurance premiums to estimated normal income in 1959 and the ratio of insurance premiums plus liquid saving to normal

[53] The bias in estimated income effects is not expected to be very large for ungrouped cross-section data.

income. Since liquid saving is highly erratic in view of its sensitivity to transitory elements of income and consumption, the former gave slightly more promising results. A third alternative, the ratio of 1959 net worth to a three-year average of income centered on 1959, seems somewhat preferable because of its more inclusive coverage and, while not appropriate for total saving, is used in a number of regressions involving savings components and related investment items.

The second device for holding tastes constant is to utilize regressions that relate changes in savings to changes in income and initial assets for the same families or the same groups of families in different time periods. This is more satisfactory in theory, but less so in practice with the limited data available. Changes in initial assets can be computed only for a couple of savings components, since full asset information is available only at the beginning of 1960 and at the end of 1961.

Change regressions are also used as a device for isolating the influence of normal income from that of the grouping variables, when income means for the groups to which the household belongs are used in estimating its normal income. A disadvantage of such regressions for estimating normal income effects, particularly when two adjacent and relatively brief time periods are used, is that the variance of change in normal income among groups is likely to be much smaller than the variance in level of normal income. Thus, if some transitory elements remain in the mean incomes for groups, the variance of these elements probably gains in importance relative to the variance of the normal components when we shift to regressions involving first differences.[54]

As indicated earlier, our savings model presupposes a desired asset level which is based on normal income, tastes, and possibly other considerations and which is perhaps achieved only gradually over time. As long as actual income is equal to normal income, the optimum time path for asset growth is assumed to depend only on the size of the gap between actual and desired assets and the preferred speed of adjustment. Thus, in a linear model, we have as one component of saving

$$S'_t = r(A_t^* - A_{t-1}).$$

When actual income deviates from normal income, adjustments are made both in consumption and in the time path of asset growth, with the latter presumably more flexible than the former. Thus we have a second savings component which in a linear model takes the form

$$S''_t = cY_{Tt},$$

[54] This problem is discussed in some detail by Jean Crockett in *Consumer Expenditures and Incomes in Greece,* Center of Economic Research, Athens (in press).

where Y_T is transitory income. This will very likely be considerably more important for certain forms of saving than for others. If deviations from normal income are for the most part unanticipated, we may think of the first component as the planned and the second as the unplanned component of saving. Total saving is the sum of the two components:

$$S_t = r(A_t^* - A_{t-1}) + cY_{Tt}.^{55}$$

For a specific form of saving, S_{it}, we must consider the gap between desired and actual assets not only for the i^{th} asset but for other assets as well.

$$S_{it} = (r_0 + r_i)(A_{it}^* - A_{i(t-1)}) - r_0(A_t^* - A_{t-1})\,Y + c_{iT}t.$$

A number of regressions of this type are fitted under various assumptions about the determinants of A^* or A_i^*. Under the assumptions

$$A_t^* = a + bY_{Nt} + d\mu,$$

$$A_{it}^* = j_i + k_iY_{Nt} + m_i\mu,$$

where μ is a measure of tastes and assumed constant over time, we obtain

$$S_t = ra + (rb - c)Y_{Nt} + cY_t + rd\mu - rA_{t-1}, \tag{1}$$

replacing Y_T by Y, as we may do since Y_N is already present in the regression. While it is far from clear that the tastes variable should enter additively, rather than influencing the coefficient of normal income, the regressions for saving actually fitted avoid nonadditive tastes effects. For components of saving we have

$$S_{it} = a_i + b_iY_{Nt} + c_iY_t + d_i\mu + r_0A_{t-1} - (r_0 + r_i)A_{i(t-1)}, \tag{1a}$$

[55] This implies the following formulation for the consumption function

$$C = Y_N - r(A^* - A_{t-1}) + (1 - c)Y_T,$$

which can also be derived by a somewhat different line of reasoning. Suppose that the fraction of normal income devoted to consumption is variable and depends on the gap between actual and desired assets. Then, for $Y_T = 0$, $c = fY_N$, where f is a function of $(A^* - A_{t-1})$. A simple function of $(A^* - A_{t-1})$, which has the desirable properties that it takes on the value one when $(A^* - A_{t-1})$ is zero and that it has a lower limit greater than zero, is

$$f = \frac{1}{g}\left(g - m\frac{A^* - A_{t-1}}{A^*}\right), g > m.$$

If $A^* = bY_N$, we obtain by substitution

$$C = \frac{1}{g}\left(g - m\frac{A^* - A_{t-1}}{bYn}\right)Y_N = Y_N - \frac{m}{gb}(A^* - A_{t-1}).$$

where $a_i = (r_0 + r_i)j_i - r_0 a$; $b_i = (r_0 + r_i)k_i - r_0 b - c_i$; and $d_i = (r_0 + r_i)m_i - r_0 d$.

If we assume the household, or more plausibly socioeconomic groups of households, to be in asset equilibrium at the beginning of the period —i.e., $A_i^*{}_{(t-1)} = A_{i(t-1)}$—then $(A_t^* - A_{t-1})$ becomes simply $b\Delta Y_N$, while $A_{it}^* - A_{i(t-1)}$ becomes $k_i \Delta Y_N$, and we have

$$S_t = rb\Delta Y_N + cY_{Tt} \text{ or} \tag{2}$$

$$S_{it} = [(r_0 + r_i)k_i - r_0 b]\ \Delta Y_N + c_i Y_{Tt}. \tag{2a}$$

Alternatively, we may assume that A_t^* and A_{it}^* are quadratic functions of Y_N,

$$A_t^* = aY_{Nt} + bY_{Nt}^2 + f \text{ and } A_{it}^* = j_i Y_{Nt} + k_i Y^2{}_{Nt} + f_i.$$

Assuming a zero constant term for mathematical convenience, this leads to

$$\frac{S_t}{Y_{Nt}} = ra + rbY_{Nt} + c\frac{Y_{Tt}}{Y_{Nt}} - r\frac{A_{t-1}}{Y_{Nt}}, \tag{3}$$

or adding $\dfrac{A_{t-1}}{Y_{Nt}}$ to both sides and ignoring capital gains

$$\frac{A_t}{Y_{Nt}} = ra + rbY_{Nt} + c\frac{Y_{Tt}}{Y_{Nt}} + (1 - r)\frac{A_{t-1}}{Y_{Nt}}.$$

For components of saving,

$$\frac{S_{it}}{Y_{Nt}} = a_i + b_i Y_{Nt} + c_i \frac{Y_{Tt}}{Y_{Nt}} + r_0 \frac{A_{t-1}}{Y_{Nt}} - (r_0 + r_i)\frac{A_{i(t-1)}}{Y_{Nt}}, \tag{3a}$$

where a_i and b_i are defined as above. Regressions of this type have been fitted both for savings and for asset items.

As normal income rises, we may divide the resulting changes in the desired stock of a particular type of asset into two components, one reflecting the increased size of the total portfolio and the other reflecting shifts in the preferred composition of the portfolio. For example, we expect corporate stock to be relatively more important in large portfolios than in small, so that desired holdings of stock will grow more rapidly than total net worth. To isolate the effects on asset acquisition of such shifts in portfolio composition as income rises, we plan in future work to fit a number of regressions of the general types discussed above, but with S_i/S or A_i/A as the dependent variable. Portfolio shifts may also occur, of course, as the result of changes in the relative rates of return on assets which are close substitutes in the services they perform, but cross-section data are not convenient for analyzing these shifts.

The logarithmic formulations

$$\log A_t = \rho \log \alpha + \rho\beta \log Y_{Nt} + \rho\theta \log \mu + (1 - \rho) \log A_{t-1}, \quad (4)$$

based on the assumptions

$$\frac{A_t}{A_{t-1}} = \left(\frac{A_t^*}{A_{t-1}}\right)^{\rho} \text{ and } A_t^* = \alpha Y^{\beta}_{Nt}\mu^{\theta},$$

and

$$\log A_{it} = \rho_i \log \alpha_i + \rho_i\beta_i \log Y_{Nt} + \rho_i\theta_i \log \mu + (1 - \rho_i) \log A_{i(t-1)},^{56} \quad (4a)$$

based on the assumptions

$$\frac{A_{it}}{A_{i(t-1)}} = \left(\frac{A_{it}^*}{A_{i(t-1)}}\right)^{P_i} \text{and } A_{it}^* = \alpha_i Y_{Nt}{}^{\beta_i}\mu^{\theta_i},$$

have considerable appeal, but suffer from two disadvantages. First, it is not convenient to introduce a term in transitory income and, second, zero values are likely to occur in the cross section for specific types of assets.[57] For these reasons, regressions of the form (4) are shown for net worth only. In later work we plan to fit similar regressions for individual assets to grouped data, for which transitory income is expected to be close to zero and zero asset values are unlikely to occur.

IV. Empirical Results for Stock Regressions

1. FRB NET WORTH DATA

Data compiled by the Federal Reserve Board (FRB) from a stratified sample of 2,600 "families and unrelated individuals" for the year 1962, with an oversampling of upper income classes,[58] permit the derivation of the relations between the volume and composition of household net worth and household income. For this paper, we have had to work with grouped data for a single year published in the *Federal Reserve Bulletin* (March 1964), whereas our subsequent analysis of the Survey of Consumer Finances (SCF) panel data, collected by the University of Michigan Survey Research Center (SRC), permits the use of ungrouped data

[56] Note that this ignores the effect on the i^{th} asset of disequilibrium in other asset holdings.

[57] A further disadvantage arises from the failure of the expressions for individual assets to aggregate to that for total assets.

[58] The over-all response rate was 86 per cent, but the rate was very much smaller in the upper income classes.

as well as data covering a much longer time span. However, the FRB survey focuses on net worth, covers a larger sample (particularly in the upper income brackets), gives some additional asset detail, and apparently has certain types of checks (notably against income tax data) not carried out in the SCF data. The FRB data have been appropriately weighted so as to be representative of all families (and unrelated individuals).

A comparison of the volume and composition of household net worth implied by the weighted FRB data with external time series aggregates can be made by multiplying the mean value of asset holdings by the number of families and unrelated individuals in the universe, both reported by the FRB for the end of 1962. The results can then be roughly compared with the time series estimates by Raymond W. Goldsmith, Robert E. Lipsey, and Morris Mendelson for nonfarm households, nonfarm unincorporated business, and agriculture as of the end of 1958;[59] we increase their figures for net worth and stock holdings by an estimated $50 billion to allow for the 15 per cent rise in the market value of equities from the end of 1958 to the end of 1962 and deduct an estimated $135 billion for consumer durables (other than automobiles) and currency not included in the FRB survey. With these crude adjustments, the FRB net worth of $1400 billion is modestly lower than the adjusted Goldsmith *et al.* figure of $1600 billion; part of this remaining difference is still conceptual since the coverage of FRB insurance is much narrower. For homes, the largest single item in net worth,[60] the estimates seem quite close. The most serious understatements in the FRB survey are for liquid assets, where the FRB figure is only about two-thirds of the external aggregate, and for insurance, where the proportion is even lower, but the latter difference appears to be more conceptual than statistical. There also appears to be a significant understatement in the FRB estimate for stock holdings, but it is not possible to tell precisely how much since stock in closely held corporations is grouped with other investments rather than with marketable stock in the FRB data. Though the time series aggregates are also subject to error, they are likely to be more reliable for financial assets. The deficiencies in the universe estimate of financial assets—especially liquid assets—from the FRB survey reflect in part underrepresentation of upper income groups (as discussed subsequently in another context), but also appear to reflect

[59] *Studies in the National Balance Sheet of the United States,* Vol. II, Princeton for NBER, 1963, pp. 68–69.

[60] Stock is a close second.

underreporting of holdings by respondents in the survey.[61] The understatement of liquid assets in consumer surveys has generally been assumed to be proportional to income, but there is no conclusive evidence that this is so. Indeed, there appears to be some reason to believe that proportionately more of the understatement is attributable to the upper than to the lower income groups.[62]

The relation of assets to income for families classified by income, which is essentially the only FRB data available for the purposes of our analysis, might be expected to give a fully satisfactory approximation of the relation of desired assets to normal income only under certain assumptions. First, the average time to adjust actual assets to desired assets for a given level of normal income should be not much over a year. In other words, actual assets should, on the average, be close to desired assets without any substantial disequilibrium component, an assumption which may be more valid for assets than saving but is questionable even for assets. As noted in Part II, if this assumption is incorrect, the relation of assets to normal income would be expected to give a somewhat lower income effect than the relation of desired assets to normal income in which we are interested. Second, it is assumed that available income is, on the average, close to normal income, a condition which is certainly not true at the low end of the income scale for a particular year and probably not at the upper end. The low end is likely to be particularly biased because of the inclusion of the retired group in the FRB sample. The only device available to us to get around these difficulties at least in part is to exclude the lowest and highest income classes in attempting to approximate the relation of desired assets to normal income and to examine the implications of omitting different income classes at the extremes. Third, it is assumed that the correlation of saving tastes with income is not very strong (e.g., the correlation between income for the i^{th} group Y_i and tastes F_i in the relation for net worth $A_i = a + bY_i + F_i + u_i$). This seems to be a reasonable hypothesis.

Two additional technical problems involved in the use of the FRB data should also be mentioned. While data on the dollar value of assets by income class are provided, this is not true of the dollar value of income. This presents a major problem only for the open-end over-$100,000 income class where there is no satisfactory basis for estimating the average income. There is strong evidence that the external data pub-

[61] The FRB survey is less subject to the first type of deficiency than other available surveys, but it is not possible to tell without further analysis about the second type.

[62] See footnote 13.

lished by the Internal Revenue Service, which we used for estimating average income within an income class, would greatly overestimate the average income of the sample reporting to the FRB for incomes over $100,000. This, of course, is not surprising in view of the well-known difficulties of obtaining survey responses from the top income class, and simply provides another reason for omitting this group from our regression analysis. The other problem is that the income data are on a before-tax base so that it was necessary to convert them to a disposable income base, using the income and tax statistics for before-tax income groups published by the Internal Revenue Service for 1962. However, since these adjustments are fairly crude, a few key before-tax results will also be presented.

Plotting the average net worth (including the market value of automobiles) against average disposable income for households classified by 1962 before-tax income indicated that the relation was closer to logarithmic than to linear. Omitting the under-$3,000 and over-$100,000 income classes which are subject to special problems previously mentioned, the coefficient of determination adjusted for degrees of freedom ($\bar{R}^2$) is .91 for the logarithmic relation and .72 for the linear relation, both universe weighted results.[63] An examination of the logarithmic scatter still shows significant curvilinearity, with an apparent income elasticity of net worth in the neighborhood of one for disposable income between $3,000 and $7,500 and well above one thereafter, rising to 2.0 or so in the $10,000 to $100,000 range. In the latter range there is no consistent trend, but there is an indication of some decline in the $50,000–$100,000 bracket.

The distribution of net worth by income class indicates that 65 per cent of net worth is held by the households with an income elasticity of well over one. Actually the percentage falling into this category is likely to be higher than the raw figures suggest. Families with low current incomes will, on the average, have negative transitory incomes, which would be expected to affect income more than assets, so that the observed asset-to-income ratio will be well above normal. On the other hand, families with high current incomes and positive transitory income would be expected to have an observed asset-to-income ratio well below normal. As a result, the presence of extreme current income groups is likely to introduce a downward bias in the estimated income elasticities.

The income elasticities derived from the weighted log relations between the volume and composition of net worth and disposable income are presented in Table 1 for all households excluding the two extreme

[63] These results are somewhat lower than those obtained on a before-tax base.

income classes (under $3,000 and over $100,000), and in Table 2 for all households excluding four extreme income groups (under $5,000 and over $50,000). The income elasticity of net worth is estimated at 1.27 in the first table and at 1.51 in the second (with $\bar{R}^2$ of .91 and .93, respectively).[64] One qualification of these estimates—the tendency of transitory income to introduce a downward bias in these estimates, particularly in Table 1—has already been pointed out. Another limitation which should be mentioned is the possibility that, in the absence of precise information on income for the sample, we have overstated income significantly in the $50,000–$99,999 class, which would again lead to understatement of the elasticities in Table 1 and suggest that the correct values are closer to those in Table 2.[65]

An income elasticity of net worth significantly over one appears to be inconsistent with the "permanent income" hypothesis, which assumes proportionality between normal saving and normal income. In the absence of disequilibrium asset holdings, transitory income, and capital gains, the unitary income elasticity of saving in the permanent income hypothesis implies the same income elasticity for net worth, holding age constant. As suggested earlier, the existence of disequilibrium holdings and transitory income would not be expected to raise the estimated income elasticity of net worth. Nor is it clear why capital gains (which, of course, are largely unrealized) should have such an effect. If desired assets are determined only by normal income, the relation of normal income to assets should not be affected by whether assets are accumulated by saving or by capital gains. If desired assets are a function not only of normal income but also of average capital gains, then as a first approximation it might be assumed that capital gains are proportional to accumulated saving and hence to normal income. If this is true, then under the permanent income hypothesis the income elasticity of assets would be equivalent to the normal income elasticity of saving. Other assumptions would seem to be required—such as a higher propensity of upper income groups for variable price assets in conjunction with the treatment of capital gains as part of normal income—if these findings

[64] The corresponding elasticities are 1.19 and 1.38 on a before-tax base. It might also be noted that, when the four extreme groups are omitted, $\bar{R}^2$ in the linear relation of net worth to after-tax income is raised from .72 to .80.

[65] The average after-tax incomes used were $3,640 for the $3,000–$4,999 before-tax class, $5,480 for the $5,000–$7,499 class, $7,670 for the $7,500–$9,999 class, $10,120 for the $10,000–$14,999 class, $15,250 for the $15,000–$24,999 class, $25,350 for the $25,000–$49,999 class, and $43,800 for the $50,000–$99,999 class. The last figure was estimated to be $65,400 on a before-tax basis. We hope to check our estimates of average income as well as to improve on this analysis generally through access to the ungrouped data.

TABLE 1

Weighted Log Regressions of Assets on Disposable Income as of December 31, 1962, for Families and Unrelated Individuals with Before-Tax Incomes from $3,000 to $99,999, FRB Survey of Financial Characteristics of Consumers

Asset Items (equity in)	Income Slope (and standard error)	Constant Term (and standard error)	Coefficient of Determination (adjusted for degrees of freedom)
Total net worth	1.269 (.047)	.611 (.088)	.911
All tangible assets	1.037 (.010)	.0004 (.019)	.993
Own home	1.034 (.012)	− .110 (.022)	.991
Automobile	1.043 (.017)	−2.227 (.031)	.982
Business, profession	1.213 (.082)	−1.200 (.154)	.754
Life insurance, annuities, retirement plans	1.471 (.007)	−2.358 (.013)	.999
All liquid and investment assets	1.248 (.070)	− .308 (.132)	.815
Liquid assets	1.072 (.056)	−1.064 (.105)	.837
All investment assets	1.309 (.078)	− .844 (.147)	.796
Stocks	1.668 (.113)	−2.354 (.212)	.753
Marketable bonds	2.749 (.168)	−8.077 (.315)	.790
Other	.967 (.107)	− .905 (.200)	.533
Miscellaneous assets	2.127 (.189)	−4.150 (.355)	.638
Less: personal debt (excludes autos)	.635 (.062)	−1.824 (.116)	.592

Note: See Table 3 for definitions of asset items.

TABLE 2

Weighted Log Regressions of Assets on Disposable Income as of December 31, 1962, for Families and Unrelated Individuals with Before-Tax Incomes from $5,000 to $49,999, FRB Survey of Financial Characteristics of Consumers

Asset Items	Income Slope (and standard error)	Constant Term (and standard error)	Coefficient of Determination (adjusted for degrees of freedom)
Total net worth	1.508 (.056)	.068 (.114)	.935
All tangible assets	1.118 (.010)	− .175 (.021)	.996
Own home	1.122 (.014)	− .303 (.028)	.993
Automobile	1.064 (.023)	−2.262 (.047)	.977
Business, profession	1.705 (.083)	−2.306 (.169)	.892
Life insurance, annuities, retirement plans	1.513 (.008)	−2.447 (.016)	.999
All liquid and investment assets	1.688 (.075)	−1.293 (.152)	.909
Liquid assets	1.565 (.016)	−2.151 (.033)	.995
All investment assets	1.713 (.100)	−1.753 (.205)	.851
Stocks	1.572 (.202)	−2.168 (.414)	.538
Marketable bonds	4.053 (.150)	−10.952 (.307)	.935
Other	1.786 (.093)	−2.714 (.190)	.878
Miscellaneous assets	.758 (.231)	−1.174 (.473)	.160
Less: personal debt (excludes autos)	.652 (.110)	−1.878 (.224)	.402

Note: See Table 3 for definitions of asset items.

are to be reconciled with the permanent income hypothesis.[66] It is possible to examine the income elasticities of the major categories of assets classified by their capital gains potential, i.e., by fixed and variable value asset groupings, to provide some information on the relative propensities of upper income groups to hold variable value assets and thus provide insights into the relation between the normal income elasticities of assets and savings. Such information is, of course, of great interest in its own right.

The data in Tables 1 and 2 suggest that income elasticities of assets are about one or significantly above for all major categories of net worth, with the single exception of personal indebtedness (exclusive of mortgage and automobile debt).[67] The latter constitutes only about 2 per cent of net worth (Table 3). The elasticities indicated in Table 2, with minor exceptions, are higher than those in Table 1 and are associated with significantly higher correlations. Perhaps the most interesting difference between the two sets of results are those for liquid assets (including U.S. savings bonds but excluding currency), where the second set points to an elasticity of 1.57 (with $\bar{R}^2$ over .99) vs. 1.07 for the first set (with an $\bar{R}^2$ of .84). There is also a substantial difference for equity in business, but in both cases the elasticity is significantly above one. The elasticities for other investment assets (including stock in closely held corporations) and miscellaneous assets (including those in trust) also differ greatly between the two sets.

Tangible assets seem to have an income elasticity not very different from one; life insurance, business investment, and stocks in the neigh-

[66] The possibility exists that, in the analysis of the FRB data, our inability to hold other factors constant, notably age, seriously affects the results. This possibility as well as the implications of explicitly adjusting for transitory income and asset disequilibrium will be investigated in the next section in the analysis of the SRC data. Empirical evidence on the comparative size of income elasticities for assets and for savings will be presented in a subsequent section.

[67] Our estimates of both the income elasticity of net worth and of individual components of assets may reflect in part interest rate or rate of return effects as a result of differential taxation in upper and lower income groups. The upper income groups receive less returns after taxes from an identical investment and have more tax incentive to invest in certain types of assets, notably tax-exempt bonds and variable price assets such as stock. Thus it could be argued that our income elasticities of net worth are biased downward and our income elasticities of tax-exempt bonds and stocks biased upward. Such biases do not arise from the cross-sectional nature of our data but might be expected in time series as well.

TABLE 3

Percentage Distribution of Assets as of December 31, 1962, for All Families and Unrelated Individuals, FRB Survey of Financial Characteristics of Consumers

Asset Items (equity in)	Per Cent of Total Net Worth
Total net worth	100.0
All tangible assets	29.3
Own home	26.5
Automobile	2.8
Business, profession	17.3
Life insurance, annuities, retirement plans	6.1
All liquid and investment assets	42.7
Liquid assets	11.4
All investment assets	31.3
Stocks	18.0
Marketable bonds	2.0
Other	11.2
Miscellaneous assets	6.8
Less: personal debt (excludes autos)	−2.1

Notes

Net worth in own home represents the respondent's estimate of market value of his principal residence as well as any vacation homes owned, less debt secured by such properties. Owner-occupied farm residences are included under business interests.

Net worth in automobiles represents the respondent's estimate of market value in the majority of cases. In the remaining cases, values from the Red Book of the National Market Reports, Inc., were used. Debts secured by automobiles were deducted.

Business interest consists of equity in farm and nonfarm sole proprietorships, partnerships, and closely held corporations in which the respondent considered himself to be active in management. Investment in business by self-employed professionals is also included here. Respondents were asked to value their businesses on two bases – book and market. The net worth concept used in this report incorporates businesses valued at book in most cases.

Equity in life insurance, annuities, and retirement plans consists of cash surrender value of life insurance (less loans secured by policies), the amounts that families could have withdrawn from retirement plans had they left their jobs on December 31, 1962, and amounts which had been paid for individual annuities as of December 31, 1962. The present value of annuities that were paying income in 1962 is not included in the estimate.

Notes to Table 3 (concluded)

Liquid assets consist of checking accounts at banks, savings accounts at banks, shares in savings and loan associations and credit unions, and U.S. savings bonds valued at face.

Stock consists of all publicly traded common and preferred stocks, shares in mutual funds and other investment companies, and shares in investment clubs, less net debit balances and loans secured by stocks. Shares were valued at market prices prevailing on December 31, 1962.

Marketable bonds consist of bonds, notes, bills, certificates, and debentures issued by the U.S. government, by state and local governments, by foreign and domestic corporations, and by foreign governments, less loans secured by such bonds. These securities were valued at par.

Other investment assets consist of mortgage assets (amount outstanding as of December 31, 1962), real estate valued at market less debt outstanding, and closely held or family businesses in which a family member was not active in management. Respondents were asked to value their interest in such businesses at market.

Miscellaneous assets consist of assets held in trust, amounts that family members could have withdrawn from profit-sharing and other deferred income plans had they left their jobs on December 31, 1962, and such assets as oil royalties, patents, and commodity contracts.

Personal debt consists of nonbusiness debt not secured by any of the asset types covered in the Survey. Examples are instalment debt on consumer durable goods other than automobiles, home repair and modernization loans, and debts to hospitals, doctors, and the like.

Total net worth consists of the various asset components of net worth described above less personal debt.

Income is defined as the total money income received in 1962 by all family members before any payroll deductions. The following components are included: salaries; commissions; net income from unincorporated businesses or professions, partnerships, and farms; dividends; interest; net income from rents; pension and social security payments; and any other periodic payments received by family members.

borhood of 1.5; and marketable bonds in the neighborhood of 3 to 4.[68] The most important assets by size of holdings were value of home, stocks, business, and liquid assets in that order (Table 3). The extremely high elasticity for marketable bonds presumably reflects the advantage

[68] The income elasticity for stocks estimated at 1.67 in Table 1 and 1.57 in Table 2 is less than the 1.98 figure for all income classes obtained from the relatively reliable distribution of stock ownership built up from dividend receipts reported to the U.S. Internal Revenue Service. See Jean Crockett and Irwin Friend, "Characteristics of Stock Ownership," *Proceedings of the Business and Economic Statistics Section,* American Statistical Association, 1963, p. 156. The income elasticity from the latter body of data excluding the retired is 1.95 (*ibid.,* p. 152).

to upper income groups of tax exemption on state and local government issues since, according to external data, tax-exempt bonds represent about 40 per cent of the marketable bonds held by individuals. In general, there is less relation between income elasticity and capital gains (or loss) potential or risk (anticipated variance in capital value or in return) than might have been expected on a priori grounds.

Because of differences in coverage, it is difficult at this time to make precise comparisons of these income elasticities with those derived in earlier studies.[69] However, the slightly larger than unitary elasticity for automobiles (less related debt) seems reasonably close to the results obtained in prior cross-section and in the Houthakker-Haldi panel studies but lower than the results in most time series studies, including the careful analysis carried out by Chow. The slightly larger than unitary elasticity for homes (less mortgage) appears close to the time series result derived by Muth, though higher than in a number of other analyses. On the other hand, the netting out of mortgage debt may significantly affect the estimated elasticities. The income elasticity for liquid assets (excluding currency) seems more consistent with the Friedman and Meltzer time series than with the Feige and Watts-Tobin cross-section results, though this cannot be stated with any certainty because of the inclusion of U.S. savings bonds in the FRB data as well as other noncomparable items.

In order to test, albeit crudely, the relative usefulness of total assets or net worth compared with income in explaining the composition of assets, the weighted logarithmic relations between component items of assets and net worth less that component are presented in Tables 4 and 5, which may be compared with the corresponding income relations in Tables 1 and 2.[70] The income relations provide better fits for tangible assets and insurance. The asset relations are better for business and investment assets. Pooling results from the regressions covering the $3,000–$99,999 and the $5,000–$49,999 income groups, there is not much basis for choosing between income and assets as an explanation of variation in holdings of liquid assets, stocks, and marketable bonds.

[69] We hope to be able to do this subsequently by making, at least in crude fashion, some of the necessary conceptual adjustments from the SCF data and by eventual access to the details of the FRB data.

[70] The absence of a total savings tastes variable might be expected to bias the results in favor of the asset relations; on the other hand, there may be fully offsetting negative correlations between tastes for different asset items.

TABLE 4

Weighted Log Regressions of Assets on Net Worth Less Indicated Asset Items as of December 31, 1962, for Families and Unrelated Individuals with Before-Tax Incomes from $3,000 to $99,999, FRB Survey of Financial Characteristics of Consumers

Asset Items (equity in)	Adjusted Net Worth Slope (and standard error)	Constant Term (and standard error)	Coefficient of Determination (adjusted for degrees of freedom)
All tangible assets	0.689 (.027)	0.186 (.069)	.900
Own home	0.699 (.025)	0.002 (.067)	.913
Automobile	0.728 (.036)	−2.424 (.106)	.851
Business, profession	1.003 (.040)	−1.755 (.113)	.897
Life insurance, annuities, retirement plans	1.052 (.044)	−2.669 (.128)	.888
All liquid and investment assets	1.011 (.037)	−0.491 (.093)	.913
Liquid assets	0.828 (.029)	−1.411 (.084)	.917
All investment assets	1.106 (.038)	−1.367 (.102)	.923
Stocks	1.333 (.087)	−3.043 (.249)	.765
Marketable bonds	2.188 (.101)	−9.454 (.301)	.868
Other	0.771 (.068)	−1.285 (.194)	.641
Miscellaneous assets	1.453 (.171)	−4.436 (.499)	.501
Less: personal debt (excludes autos)	0.489 (.044)	−2.083 (.129)	.635

Note: See notes to Table 3 for definitions of asset items.

TABLE 5

Weighted Log Regressions of Assets on Net Worth Less Indicated Asset Items as of December 31, 1962, for Families and Unrelated Individuals with Before-Tax Incomes from $5,000 to $49,999, FRB Survey of Financial Characteristics of Consumers

Asset Items (equity in)	Adjusted Net Worth Slope (and standard error)	Constant Term (and standard error)	Coefficient of Determination (adjusted for degrees of freedom)
All tangible assets	0.619 (.027)	0.435 (.072)	.914
Own home	0.634 (.026)	0.235 (.072)	.921
Automobile	0.642 (.033)	−2.086 (.104)	.879
Business, profession	1.152 (.042)	−2.275 (.127)	.935
Life insurance, annuities, retirement plans	0.923 (.042)	−2.185 (.128)	.906
All liquid and investment assets	1.217 (.039)	−1.105 (.106)	.949
Liquid assets	0.981 (.033)	−1.915 (.099)	.946
All investment assets	1.238 (.050)	−1.794 (.142)	.924
Stocks	1.119 (.121)	−2.319 (.366)	.622
Marketable bonds	2.536 (.136)	−10.652 (.429)	.871
Other	1.128 (.073)	−2.485 (.221)	.825
Miscellaneous assets	0.639 (.135)	−1.586 (.415)	.296
Less: personal debt (excludes autos)	0.434 (.067)	−1.899 (.210)	.443

Note: See notes to Table 3 for definitions of asset items.

Multivariate regressions of asset items on income and net worth and on income and net worth less that component pointed to similar results on the relative importance of income and assets as the simple regressions for all families in the $3,000–$99,999 income range included in Tables 1 and 4.[71] However, in view of the small number of observations, no attempt was made to compute similar multivariate regressions for the $5,000–$49,999 income range, which, as noted earlier, probably give better results. The data do not permit us to relate the composition of assets to the year's income and to initial or beginning-of-year net worth, which jointly represent the available resources for allocation over the year.

While these data are far from convincing, they suggest that income cannot be disregarded in analyzing the demand for liquid assets as well as for most other components of net worth. Of course, to the extent that net worth is determined by normal income, the use of either net worth or normal income as an explanatory variable in the demand functions for assets should give equivalent results. The difference in results may reflect various factors, notably, the fact that net worth is only imperfectly determined by normal income and that the income variable used includes transitory components which differ from normal income in their effect on desired and actual assets.

One further point should be considered in connection with the interpretation of the results presented in this section, viz., the implications of combining households with retired heads of households and other families. Most of such households, of course, are in the lower income brackets and are excluded when the extreme income classes are omitted. To the extent that such households are included, they could be regarded as having negative transitory income, which would introduce a downward bias in the estimated income elasticities as measures of the elasticities for other (i.e., nonretired) families.[72] The normal income elasticity of

[71] Both income and asset coefficients were generally (though not always) significant, but sometimes the statistically less important of the two had a negative sign, probably reflecting the differential effect of transitory elements on current income and assets.

[72] As noted earlier, however, it is probably preferable to consider our basic desired asset and asset-adjustment relations to apply to households in their working span, while the assets of retired persons are determined by their end-of-work-life assets (which, in turn, is a function of their normal income at that time), their retirement span, and the proportion of such assets that will be passed on as inheritances.

net worth for households with working heads in turn should be equivalent to or less than the elasticity relevant to time series analysis.[73]

2. SRC NET WORTH DATA

Data on assets, saving, and income were compiled by the Survey Research Center (SRC) from a panel of 1059 spending units for the years 1959, 1960, and 1961. Not all asset or saving items were collected for each year, but total savings were collected for the two-year period 1960-61, assets for the beginning and end of the two-year period, income and selected items of assets and saving for each of the three years covered by the panel, and income also for a preceding year (1958), expected income for a subsequent year (1962), and rough estimates of income for the years 1920, 1928, 1940, 1947, and 1955. Although the initial sample was randomly selected, the final panel sample of respondents for all three years is not a random sample of the population as a whole. "Younger consumer units were not introduced into the panel in succeeding years and respondents who moved were not followed. As a result, the members of our panel tend (1) to have higher

[73] If A_w represents assets during the work life, A_r assets of the retired, A total assets, A'_w assets of the retired at the end of their work life, i half the retirement span, Y_N normal income for the working population, and g the growth rate of income, and if we assume for simplicity that the relation of desired assets to normal income is linear in logs (i.e., $A_w{}^* = aY_N{}^b$), that the asset adjustment period is instantaneous, that a fraction f of A'_w is left as inheritances, and that no income is earned on assets, we can write as an approximation

$$A = \left[a + \frac{a(1+f)}{2(1+g)^{ib}} \right] Y_N{}^b$$

so that the income elasticity of A, which is of course b, would be the same as that of A_w. If we drop the most troublesome assumption for our purposes, that of immediate adjustment and write $A_w = raY_N{}^b + (1-r)(A_w) - 1$ where r is the speed of adjustment, the normal income elasticity for working households

$$E_w = \frac{braY_N{}^b}{raY_N{}^b + (1-r)(A_w)_{-1}}$$

is less than the corresponding elasticity for all households

$$E = \frac{b\left[ra + \dfrac{a(1+f)}{2(1+g)^{ib}} \right] Y_N{}^b}{\left[ra + \dfrac{a(1+f)}{2(1+g)^{ib}} \right] Y_N{}^b + (1-r)(A_w)_{-1}},$$

and both are less than b.

incomes, (2) to contain a higher proportion of home owners, and (3) to be older than the noninstitutional population of the United States as a whole."[74]

The saving data in this panel have been subjected to an interesting preliminary analysis by the Survey Research Center in *Consumer Behavior of Individual Families Over Two and Three Years,* largely by relating two-year total saving (in ratio form) to two-year per capita income (before taxes) and other selected family characteristics, along lines similar to earlier analysis of one-year saving by the Center. The analysis in this paper attempts, among other things, to make much greater use of the panel features of the data. However, in view of difficulties with the data, not all of which have yet been resolved, we are able to present at this time only part of the results we had hoped to have completed. Our analysis is confined to those families who reported information on all variables we were interested in, so that, instead of the 1059 panel members reporting some information for all three years, or the 921 panel members included in the SRC's more limited analysis of two-year total saving, our entire potential sample consisted of only 596 spending units. An examination suggested that data for a handful of households—largely those with extremely large saving-to-income ratios and, to a lesser extent, those with very large incomes—were highly questionable, so that it was decided to eliminate the twenty-five units with a ratio of annual savings (a two-year average) to normal disposable income (a five-year average) of over 75 per cent and the four other units with five-year disposable income of over $20,000 per annum. The fairly numerous cases of extremely high saving-to-income ratios generally seemed to be associated with the inclusion of capital gains in saving or with other distortions. The small number of high-income families in our potential sample is presumably largely a reflection of the original random sampling scheme, but may also reflect the difficulty of enlisting full cooperation from such households. The remaining 567 cases were divided into three groups which were analyzed separately: viz., 413 units headed by employees; 61 by self-employed persons including farmers; and 93 by retired persons.

In addition to the characteristics of each spending unit supplied by the Survey Research Center, we constructed a number of other variables on the basis of the data made available to us. Perhaps the most important of these include average disposable income for five years, which serves as a basic set of estimates of normal income; rough estimates of average disposable income for even longer periods based on data for 1928,

[74] *Consumer Behavior of Individual Families Over Two and Three Years,* p. 75.

1940, 1947, 1955, and 1958;[75] net worth at the end of 1961 and at the end of 1959; group averages of income, which serve as another set of estimates of normal income; and several different savings tastes variables. Since disposable income for each household was estimated by the Survey Research Center only for 1959, 1960, and 1961, it was necessary to convert the before-tax figure available for 1958 and 1962 to an after-tax base in order to obtain average disposable income for the five-year period 1958–62. This was done by multiplying the 1958 before-tax income for each household by the ratio of 1959 after-tax to 1959 before-tax income for the same unit, and multiplying the 1962 before-tax income by the ratio of 1961 after-tax to 1961 before-tax income.

Simply as a matter of convenience, net worth was not defined to include the stock of automobiles or other consumer durables (the latter not being available), but reflects all other items of assets and liabilities covered in the survey.[76] The net worth estimates for 1961 are probably much more reliable than those for 1959 since several components for 1959 were obtained in the later survey and presumably reflect a more significant memory bias. Moreover, both the value of stocks (i.e., equity securities) and the value of business for 1959 were available only in class interval form, introducing further errors of measurement.

The SRC data on net worth or stock of assets for 1961 are analyzed in this section. The more detailed analysis of saving or flow of assets appears in the following section. In both sections the data are unweighted, partly to save time at this stage of the analysis and partly to maintain comparability with the published SRC results.

Summary data on the end of 1961 net worth regressions derived from the SRC panel are presented in Table 6, both in logarithmic form to allow for the nonlinearities in the net worth relations noted earlier and for comparability with the FRB data, and in linear form for comparability with the later savings regressions. If we confine our attention

[75] In this long-run perspective, one estimate of normal income for the group with heads of households over 55 was obtained by taking the simple average of 1928, 1940, and 1947 incomes; for the 35–54 age groups as the average of 1940, 1947, and 1955 incomes; and for the under 35 age group as the average of 1947, 1955, and 1958 incomes. Still another estimate used an average of 1947 and 1955 incomes for all age groups. It was necessary to convert before-tax income to disposable income by applying average prevailing tax rates in an income class to all units in that class. All before-tax income data were available only by class intervals.

[76] An important omission in the SRC data on net worth consists of financial investment other than corporate stock and U.S. savings bonds. Such investment would tend to be concentrated more heavily among the upper income groups than other items of net worth, leading to a relative understatement of net worth for these groups.

TABLE 6

Regressions of 1961 Net Worth on Disposable Income and Other Variables, SCF Panel Data for Households with 1958-62 Disposable Income of Less Than $20,000

PART A: EMPLOYEES

Coefficient of	Logarithmic Regressions						
	1	2	3	4	5	6	7
Household income, 1958-62	1.64 (13.65)	1.07 (3.05)	.19 (.82)	.13 (.56)	1.51 (10.57)	.55 (5.17)	–
Group income, 1958-62	–	–	–	–	–	–	.11 (.59)
Historical household income[a]	–	–	–	–	.16 (1.66)	−.03 (−.43)	–
Household income, 1961	–	.56 (1.76)	.32 (1.50)	.35 (1.66)	–	–	.46 (5.40)
Household net worth, 1959	–	–	.70 (22.65)	.69 (21.84)	–	.70 (22.68)	.70 (22.52)
Normal capital gains[b]	–	–	–	.01 (1.26)	–	–	–
Age of head[c]	–	.64 (6.96)	.19 (2.99)	.19 (3.00)	–	.20 (2.90)	.19 (3.00)
Constant term	−5.49 (−5.28)	−7.26 (−7.04)	2.58 (3.16)	2.77 (3.35)	−5.67 (−5.43)	2.48 (3.05)	2.09 (1.39)
Normal income elasticity	1.64	1.63	1.72[d]	1.59[d]	1.68	1.75[d,e]	1.90
Speed of adjustment[h]	1	1	.16	.17	1	.16	.16
$\bar{R}^2$	.31	.38	.73	.73	.31	.72	.73

(continued)

TABLE 6 *(continued)*

PART A: EMPLOYEES (concluded)

Linear Regressions					
8	9	10	11	12	13
3.25 (13.54)	–	2.24 (2.48)	.69 (1.07)	–	–
–	–	–	–	.92 (1.70)	-.12 (-.31)
–	–	–	–	–	–
–	2.87 (13.34)	1.02 (1.27)	.30 (.53)	2.68 (11.13)	.90 (4.80)
–	–	–	1.07 (20.18)	–	1.08 (20.22)
–	–	–	–	–	–
–	–	354.94 (5.78)	56.68 (1.23)	–	52.44 (1.14)
-6,226.65 (-4.99)	-6,535.04 (-4.20)	-16,373.79 (-7.55)	-6,149.89 (-3.80)	-11,146.66 (-3.56)	-5,001.01 (-1.98)
1.68	1.54[f]	1.68	g	1.89	g
i	i	i	g	i	g
.31	.30	.36	.68	.30	.68

(continued)

TABLE 6 *(continued)*

PART B: SELF-EMPLOYED INCLUDING FARMERS

Coefficient of	Logarithmic Regressions					
	1	2	3	4	5	6
Household income, 1958-1962	1.51 (6.43)	1.76 (3.34)	.55 (1.17)	.44 (.92)	1.39 (5.39)	.76 (3.06)
Historical household income[a]	–	–	–	–	.03 (.15)	-.11 (-.67)
Household income, 1961	–	-.18 (-.36)	.23 (.55)	.27 (.66)	–	–
Household net worth, 1959	–	–	.64 (5.72)	.64 (5.72)	–	.66 (6.03)
Normal capital gains[b]	–	–	–	.14 (1.63)	–	–
Age[c]	–	.41 (1.39)	.09 (.36)	.10 (.40)	–	.12 (.47)
Constant term	-3.07 (-1.52)	-4.95 (-1.99)	1.21 (.54)	1.70 (.74)	-2.27 (-1.07)	2.10 (.95)
Normal income elasticity	1.51	1.58	2.19[d]	1.99[d]	1.42	1.91
Speed of adjustment[h]	1	1	.20	.20	1	.19
$\bar{R}^2$	.41	.41	.62	.63	.36	.62

(continued)

TABLE 6 *(continued)*

PART B: SELF-EMPLOYED INCLUDING FARMERS (concluded)

Linear Regressions			
7	8	9	10
8.47	–	7.55	3.18
(6.52)		(2.63)	(1.32)
–	–	–	–
–	7.55	1.42	1.95
	(5.73)	(.51)	(.89)
–	–	–	1.13
			(5.84)
–	–	–	–
–	–	601.02	1.59
		(1.36)	(.00)
-12,195.01	-5,589.77	-29,897.95	-20,839.98
(-1.26)	(-.57)	(-1.80)	(-1.56)
1.29	1.14[f]	1.36	g
i	i	i	g
.41	.35	.41	.63

(continued)

TABLE 6 *(continued)*

PART C: RETIRED

Coefficient of	Logarithmic Regressions					
	1	2	3	4	5	6
Household income, 1958-62	1.03 (5.04)	1.85 (4.31)	.24 (.98)	.18 (.74)	.88 (3.68)	-.04 (-.31)
Historical household income[a]	–	–	–	–	.25 (1.21)	.07 (.66)
Household income, 1961	–	-.58 (-1.93)	-.19 (-1.21)	-.17 (-1.13)	–	–
Household net worth, 1959	–	–	.98 (15.89)	.96 (15.35)	–	.98 (16.23)
Normal capital gains[b]	–	–	–	.03 (1.23)	–	–
Age[c]	–	1.74 (2.46)	.01 (.03)	.04 (.10)	–	-.06 (-.17)
Constant term	.68 (.45)	-7.95 (-2.24)	6.40 (3.18)	6.61 (3.28)	.04 (.02)	6.92 (3.65)
Normal income elasticity	1.03	1.27	2.27[d]	.20[d]	1.13	1.26
Speed of adjustment[h]	1	1	.01	.02	1	.01
$\bar{R}^2$	.21	.26	.81	.81	.22	.81

(continued)

TABLE 6 *(continued)*

PART C: RETIRED (concluded)

Linear Regressions			
7	8	9	10
6.48 (6.31)	–	8.15 (2.68)	6.06 (3.04)
–	–	–	–
–	5.98 (5.74)	-1.22 (-.41)	-4.96 (-2.53)
–	–	–	.98 (11.76)
–	–	–	–
–	–	297.23 (1.53)	-23.51 (-.19)
-2,349.31 (-.81)	-1,064.21 (-.36)	-17,819.96 (-1.70)	-562.37 (-.08)
1.19	1.08[f]	1.27	[g]
[i]	[i]	[i]	[g]
.30	.26	.31	.73

(continued)

TABLE 6 *(continued)*

PART D: EMPLOYEES BY AGE OF HEAD

Coefficient of	Logarithmic Regressions					
	Under 35			35 to 44		
	1	2	3	4	5	6
Household income, 1958-62	2.09	1.20	1.15	2.37	.11	.08
	(8.20)	(1.77)	(1.67)	(9.97)	(.23)	(.16)
Household income, 1961	–	-.41	-.38	–	.67	.68
		(-.71)	(-.65)		(1.60)	(1.62)
Household net worth, 1959	–	.76	.75	–	.64	.63
		(8.87)	(8.31)		(11.68)	(11.41)
Normal capital gains[b]	–	–	.01	–	–	.01
			(.45)			(.53)
Age[c]	–	-.06	-.05	–	.23	.22
		(-.30)	(-.28)		(.51)	(.49)
Constant term	-9.80	.78	.90	-12.03	.12	.28
	(-4.44)	(.38)	(.43)	(-5.79)	(.06)	(.13)
Normal income elasticity	2.09	3.22[d]	3.01[d]	2.37	2.15[d]	2.08[d]
Speed of adjustment[h]	1	.13	.14	1	.20	.20
$\bar{R}^2$	.37	.63	.63	.44	.74	.73

(continued)

TABLE 6 *(concluded)*

PART D: EMPLOYEES BY AGE OF HEAD (concluded)

Logarithmic Regressions					
45 to 54			55 and over		
7	8	9	10	11	12
1.20	-.12	-.39	1.55	.88	.87
(6.19)	(-.38)	(-1.16)	(5.35)	(1.57)	(1.54)
–	.37	.56	–	-.24	-.24
	(1.31)	(1.92)		(-.47)	(-.46)
–	.69	.65	–	.77	.76
	(14.06)	(12.99)		(10.67)	(10.48)
–	–	.04	–	–	.01
		(2.36)			(.24)
–	-1.02	-1.10	–	1.32	1.28
	(-1.69)	(-1.87)		(1.34)	(1.28)
-1.21	8.99	10.02	-4.22	-2.63	-2.43
(-.72)	(3.60)	(4.04)	(-1.75)	(-.63)	(-.56)
1.20	.81[d]	.48[d]	1.55	2.72[d]	2.67[d]
[i]	.17	.19	[i]	.12	.13
.25	.73	.75	.32	.77	.76

Note: Numbers in parentheses are *T*-tests for the coefficients immediately above.

[a]Average of 1947 and 1955 income before taxes.

[b]Ratio of household net worth (1959) plus estimated normal capital gains to 1959 net worth. Normal capital gains for the two years 1960-61 were estimated as 10 per cent of holdings of corporate stock in 1959, assuming a normal rate of capital gains of 5 per cent per year.

[c]Age of head minus 20 to approximate number of working years.

[d]Assuming same normal income in 1960 and 1961.

[e]Elasticity with respect to a weighted average of mean 1958-62 income and mean long-term income, the weights being determined by the regression coefficients.

[f]Elasticity with respect to current income.

[g]Meaningful estimates of the speed of adjustment and normal income elasticity cannot be computed from this regression.

[h]Fraction of the gap between desired and actual assets (or their logarithms) eliminated in a single year.

[i]Assumed to be one.

initially to those regressions which assume a short-term adjustment (within one year) to the level of desired assets, for the employee group (Part A of the table) the normal income elasticity of net worth indicated by the log regression—where normal income is defined as average disposable income for the five years 1958–62—is 1.64,[77] while for the self-employed (Part B) it is 1.51, and for the retired (Part C), where this concept of normal income is most questionable, it is 1.03. A weighted average of the first two elasticities which might be expected to approximate the corresponding FRB elasticities that eliminate the lowest and highest income groups would appear to be reasonably close to the FRB results. As might be expected from the fact that five-year average income is used, rather than single-year income as in the analysis of the FRB data, the SRC elasticities are slightly higher.[78] Some difference may also be expected, because of the more complete coverage of assets in the FRB data and because the FRB data are weighted to approximate the universe income distribution while the SRC data are not.[78a]

The logarithmic regressions based on ungrouped (SRC) data are quite sensitive to the treatment of the relatively few households for which net worth, as we have measured it, is zero or negative. For the most part these are cases in which instalment debt is reported but no assets other than automobiles and other durables, which have been omitted in our computation of net worth. This omission, of course, leads to a persistent understatement of net worth throughout the sample, but the omission becomes critical only when little or no other assets are reported, for then the percentage understatement is very large, introducing substantial distortion into the logarithmic, though not the linear, regressions. For employees, we experimented with several alternatives in handling these households, arbitrarily assigning to them net worths of $1, $100, and $1,000 and finally omitting them entirely, which is roughly equivalent to assigning them a net worth equal to the average value for other households in the sample with the same income (implying in most cases a net worth well above $1,000). The correlations were substantially higher for the last three alternatives than for the first. The estimated

[77] Under an alternative method of handling households with zero or negative computed values for net worth, this rises to 1.82, as discussed subsequently.

[78] Using single-year income, the elasticity for employees based on SRC data drops to 1.45.

[78a] The less than $18,000 average net worth implied by the S.R.C. data prior to elimination of any of the extreme cases (an average of $12,700 for employees, $52,300 for the self-employed, and $15,000 for the retired) is somewhat lower than the over-all F.R.B. total of $22,600. The elimination of the extreme cases reduces the S.R.C. estimates, but only for the self-employed is the reduction substantial.

income elasticity based on a simple logarithmic regression against five-year average income fell from 2.17 (setting net worth at one dollar) to 1.82 (setting net worth at $100) to 1.64 (setting net worth at $1,000) to 1.54 (omitting the cases of zero or negative net worth entirely).[79] Since with rare exceptions households may be expected to hold automoblies and durables with a value at least equivalent to their outstanding instalment debt and probably somewhat larger, and since all households may be expected to hold some liquid assets, in the form of currency if not bank deposits, the assumption of a minimum net worth of either $100 or $1,000 appears more reasonable than either of the other two alternatives; and the highest correlations are obtained under these assumptions, particularly when other relevant variables are included in the regressions. The logarithmic regressions in Table 6 are based on the assignment of net worths of $1,000 to the households with zero or negative computed values. While this is not clearly preferable to the $100 figure, and some intermediate value might well be superior to either, we prefer to err in the direction of understating rather than overstating the income elasticity of net worth. Further, we obtain better agreement both with the income elasticity obtained from the FRB data and that obtained from the SRC data using linear regressions.

The linear regressions relating net worth to the five-year average of household income provide about as good a fit as the log regressions for those relations which assume a short-term adjustment (somewhat better in the case of the retired). The income slopes in the SRC linear regressions are substantially lower than the corresponding FRB results, but this may reflect at least in part the difference in the income groups covered. The mean income elasticities of assets implied by the linear relationships are very close to those in the log regressions for employees (and for the retired when age and transitory income are held constant), but are a little lower than in the log regressions for the self-employed.

While the SRC sample is very much smaller than the FRB sample, the additional information available for each household permits us to rectify three shortcomings of the FRB analysis. First, we can control the age of household head to investigate whether, given the correlation of age with income, the increase in the asset-to-income ratio as income rises may simply reflect the effect of age on net worth. In other words, the higher income families may have higher asset-to-income ratios only because they tend to be older families who have had more earning years

[79] For the linear regressions, the elimination of the households in question changed the estimated income elasticity only to 1.60 from 1.68 (obtained with no adjustment at all in the value of net worth).

over which to accumulate assets. Second, we can make some rough allowance for capital gains based on initial holdings of corporate stock. Since net worth grows through capital gains as well as through saving and since, further, some part of capital gains may in fact be anticipated and counted as part of normal income by the holders of variable value assets, the asset-to-income ratios of households experiencing capital gains may be pushed up relative to other households, either by the addition of unanticipated capital gains to the numerator (assuming savings is not curtailed to offset them) or through understatement of the denominator by the amount of anticipated capital gains. If upper income families are more inclined to hold variable value assets than lower income families, this may account to some extent for their higher asset-to-income ratios. Third, we can avoid or reduce biases in the income elasticity of assets due to temporary aberrations of the asset-to-income ratios, arising either from the presence of transitory income or from time lags in the adjustment of net worth to recent changes in normal income. As indicated in Part III we try to minimize the effect of transitory income by utilizing either a five-year average of household income or income for the occupational group to which the household head belongs, instead of single-year income. To allow for incomplete adjustment to the desired asset level at a given point of time, we introduce asset holdings at an earlier time.

The age effect is controlled for both by adding age as a continuous variable[80] to the regressions fitted and for employees by fitting separate regressions within four age groups—under 35 years, 35–44, 45–54, and 55 and over—to investigate nonlinear age effects as well as possible interactions between age and income effects. The introduction of age and current income into the instantaneous adjustment model has a negligible effect on the normal income elasticity (computed from the sum of the coefficients of current and normal income) for employees, even though the effect of age is highly significant. The elasticity is raised very slightly for the self-employed and somewhat more in the logarithmic model for the retired. The transitory income effect (measured by the coefficient of current income) is much smaller than the normal income effect for employees (though close to significant in the logarithmic regression), insignificant for the self-employed, and actually negative (though not significantly so) for the retired. When age is controlled by

[80] We have subtracted 20 from the age of head to approximate the number of working years, since, apart from inheritances, we expect wealth to be zero at the beginning of the working life. This is significant only for the logarithmic model which implies that the dependent variable approaches zero when any independent variable does so.

fitting separate regressions within each age group, the normal income elasticities for the instantaneous adjustment model are greater than unity in all cases and quite significantly so for the two younger age groups, for which elasticities greater than two are obtained.

If we turn from the assumption of an immediate or a short-term adjustment to the level of desired assets to allow for a delayed or prolonged adjustment, the correlations are increased, particularly for employees and the retired. The log regressions for employees and the self-employed imply that the adjustment time is neither very fast (say, close to one year) nor very slow (close to the entire earning span), with one-sixth of the gap between the logs of desired and actual net worth eliminated in a year for employees and one-fifth of the gap for the self-employed group.[81] Thus, according to these relationships, two-thirds of the gap would be eliminated within six years for employees and a higher fraction for the self-employed. The estimated normal income elasticity is slightly increased over the instantaneous adjustment model for employees and substantially increased for the self-employed.[82] The effect of age remains significant for employees, though not for the other two groups. The normal income effect is still somewhat larger than the transitory for employees and substantially so for the other two groups. For the four age groups of employees, income elasticities are above two for all except the 45–54 age group (where the elasticity falls below one). In two of the four cases, the elasticity rises compared with the immediate adjustment model. In all cases except the 45–54 group, the normal income effect remains greater than the transitory effect, and in two cases substantially so. Adjustment speeds are higher for the two age groups in the middle than for the youngest or oldest group.

When a proxy variable for normal two-year capital gains is introduced into the delayed adjustment logarithmic regressions, the normal income elasticity drops a little for employees (from 1.72 to 1.59) and for the self-employed (from 2.19 to 1.99). Some decline occurs for each of the age groups of employees, but it is large only for the 45–54 group, where the elasticity is already low. The coefficient of initial net worth, and therefore the estimated speed of adjustment, remains virtually

[81] The estimated speed of adjustment may be biased downward by reason of the crude handling of capital gains and the use of an imperfect approximation to savings tastes, but random errors in the measurement of lagged assets work in the opposite direction, so that no a priori statement can be made as to the probable direction of bias.

[82] For the retired, erratic results are obtained, which are quite sensitive to the inclusion of a capital gains proxy discussed below. It appears that for the retired, current net worth is almost entirely explained by initial net worth.

unchanged for all groups. The proxy variable which is used for normal capital gains in the logarithmic regressions is the ratio to initial net worth of initial net worth plus capital gains on 1959 holdings of corporate stock at a rate of 5 per cent annually, which of course falls far short of the actual, highly abnormal gains for the 1960–61 period.

The linear regressions, which do not provide as good a fit for employees, point to a speed of adjustment close to zero for all three employment status groups. The resulting estimates of income elasticities are unrealistically high, throwing considerable doubt on the validity of the linear model under the assumption of time lags in adjusting net worth to changes in normal income. The introduction of 1959 holdings of corporate stock as a proxy for capital gains in the 1960–61 period reduces the coefficient of net worth for the self-employed, retired, and three of the four age groups of employees. However, only in the case of the retired and one age group of employees do reasonable speeds of adjustment result. The effect of the lagged stock variable is positive and highly significant for the two older age groups of employees and for the retired. When linear regressions are fitted for net worth excluding corporate stock as a function of normal income and other variables, somewhat more reasonable speeds of adjustment are obtained for employees (.045) and for the retired (.11) but not for the self-employed. Estimated income elasticities of net worth excluding corporate stock run about 1.25 for both employees and the self-employed in the instantaneous adjustment linear model and rise to 5.11 in the lagged adjustment model for employees.

A quadratic relationship of net worth to normal income was also fitted for employees, yielding an income elasticity of 1.29, somewhat lower than the logarithmic and linear models, and a correlation which is also lower. In the lagged adjustment quadratic model, the correlation is a little higher than for the logarithmic or linear models. However, the implied speed of adjustment, while larger than in the linear model, is still very small, leading to an unreasonably high estimate of the income elasticity. In both cases the upward concavity of the asset-income function is attested by the positive and highly significant coefficients of the quadratic term.[83]

[83] The regressions actually fitted are:

$$NW61/Y_N = -.26 + .00011\ Y_N + .063\ W \qquad \bar{R}^2 = .12$$

$$NW61/Y_N = -.93 + .00006\ Y_N + .009\ W + .63\ Y/Y_N + .97\ NW59/Y_N \qquad \bar{R}^2 = .76,$$

where $NW61$ and $NW59$ are household net worth at the end of 1961 and 1959, respectively; Y_N is average household income, 1958–62; Y is 1961 income; and W is age of head minus 20. T-tests for the coefficient of Y_N are 3.30 and 3.41, respectively.

When normal income is defined as the mean of five-year income (1958–62) for the occupational group to which the spending unit belongs, a somewhat higher income elasticity (about 1.90) is obtained for employees in the instantaneous adjustment linear model and in the lagged adjustment logarithmic model and a still higher estimate (2.14) in the instantaneous adjustment logarithmic model. As noted earlier, such group income might be expected to give an unbiased estimate of the normal income effect, if transitory income averages close to zero for each group. For employees, mean income was available for seven subgroups with a range in income from $3,937 to $8,600.

A historical income variable which is an average of 1947 and 1955 disposable incomes does not add significantly to 1958–62 income in explaining variations in net worth for either employees or the self-employed, whether logarithmic or linear or short-run or long-run adjustment models are used. The adjusted normal income elasticities of net worth, where normal income is now defined as an average of the five-year (1958–62) and two-year (1947 and 1955) income averages weighted by the relative size of their coefficients, is not appreciably different from the elasticities based on the five-year income variable above. The historical income variable has a coefficient close to significant in the logarithmic instantaneous adjustment model, but loses all effect when 1959 net worth is added to the regression. This suggests that the relevant planning span for asset accumulation is relatively short-run or a period much shorter than the earning span, and seems to point to an even more rapid speed of adjustment to the desired asset level than is indicated in the delayed adjustment log regressions. It is possible, of course, that the virtually complete unimportance of the longer-term income variable reflects the households' difficulties in recalling such information.[84] The improvement in the correlations and the change (upward) in the income elasticities is quite small as the time span for incomes is lengthened successively from one year to two years to five years to sixteen years (1947–62),[85] with each year added making progressively less difference and with very little difference between the five year and longer-term results. Transitory income, as might be

[84] The fact that the longer-term income variable has not yet been converted from the old current (1947 and 1955) dollars to the more relevant recent (1958–62) prices tends to overstate the corresponding income slope in linear regressions (by a factor which is the average of income-weighted price increases from 1947 and 1955 to 1958–62), though not necessarily the associated income elasticity.

[85] The increase in income elasticity is from 1.45 to 1.68 for the instantaneous adjustment logarithmic model while the improvement in correlation is negligible.

expected, is much less important than normal income in the determination of net worth and, what may be more surprising, generally falls short of significance (except when normal income is measured by the average income for occupational groups).

Two different measures of historical income were used for the four age groups of employees. In addition to the mean of 1947 and 1955 incomes, another long-term income variable which varies with the age group was used. Neither alternative has much net effect on net worth, and even the direction of the effect is not consistent over the different age groups. There is some indication that for the youngest (under 35) age group there is a significant, if small, positive net effect on net worth over and above the 1958–62 average income in the instantaneous adjustment model, but this becomes insignificant when lagged net worth is introduced.

The major conclusion of this section is that the normal income elasticity of household net worth is significantly greater than one and in the neighborhood of 1.5 or above when the income extremes are excluded. This result is not altered when we hold constant both age of head and a crude approximation to recent capital gains. Close agreement as to the magnitude of the income elasticity is obtained between analyses based on the SRC and the FRB data and between immediate and delayed adjustment logarithmic and immediate adjustment linear models for employees, using the SRC data. A somewhat lower elasticity is obtained from an immediate adjustment quadratic model for employees, but this is still well above one. The linear and quadratic delayed adjustment models are less satisfactory than the logarithmic in that they imply extremely low speeds of adjustment to the desired asset level and extremely high income elasticities.

The income elasticity of net worth is much more erratic for the self-employed and retired, as might be expected in view of the much smaller samples. However, it appears not to differ much for the self-employed and employees, and is somewhat lower for the retired.

V. Empirical Results for Flow Regressions[86]

Part A of Table 7 presents, for employees, linear relationships for average annual total saving (excluding currency and consumer durables but including additions to houses), contractual saving (life insurance premiums plus payments on mortgage principal), changes in liquid assets (excluding currency but including U.S. savings bonds), net change in

[86] These are all based on the SCF data.

TABLE 7

Linear Regressions of Total Saving, Saving Components, and Consumer Investment Items (1960-61 Averages) on Disposable Household Income and Other Variables, SCF Panel Data for Households with 1958-62 Disposable Income of Less Than $20,000

Dependent Variable	Coefficient of: Normal Household Income[a]	Current Household Income	Net Worth, 1959	Holdings of Individual Asset, 1959	Age[b]	Saving Tastes	Constant Term	Normal Income Elasticity	$\bar{R}^2$
				Part A: Employees					
Total saving	.210 (8.72)						−560.90 (−3.41)	1.75	.154
	−.081 (−.64)	.278 (2.34)					−511.60 (−3.10)	1.64	.163
	−.077 (−.61)	.280 (2.35)	−.004 (−.49)			1.31[c] (.53)	−522.88 (−3.11)	1.69[d]	.160
Contractual saving	.060 (5.99)						−1.57 (−.02)	1.00	.078
	.103 (1.93)	−.041 (−.81)					−8.77 (−.13)	1.04	.077
	.107 (2.00)	−.046 (−.92)			−2.68 (−.94)	16.73[e] (.97)	31.26 (.33)	1.02	.076

(continued)

TABLE 7 *(continued)*

Dependent Variable	Coefficient of: Normal Household Income[a]	Current Household Income	Net Worth, 1959	Holdings of Individual Asset, 1959	Age[b]	Saving Tastes	Constant Term	Normal Income Elasticity	$\bar{R}^2$
				Part A: Employees (continued)					
Changes in liquid assets	.112 (5.17)						−596.08 (−3.84)	5.41	.059
	−.053 (−.46)	.157 (1.47)					−541.20 (−3.63)	5.06	.061
	−.031 (−.27)	.149 (1.38)		−.050[f] (−3.23)	13.76 (2.31)	16.88[e] (.49)	−862.71 (−4.30)	5.70[d]	.090
Other investment	.034 (1.55)						−187.39 (−1.23)	[g]	.003
	−.158 (−1.35)	.184 (1.67)					−154.73 (−1.01)	[g]	.008
	−.150 (−1.28)	.184 (1.66)	−.004 (−.54)		−4.10 (−.66)		−69.37 (−.32)	[g]	.006

(continued)

TABLE 7 *(continued)*

Dependent Variable	Coefficient of: Normal Household Income[a]	Current Household Income	Net Worth, 1959	Holdings of Individual Asset, 1959	Age[b]	Saving Tastes	Constant Term	Normal Income Elasticity	$\bar{R}^2$
				Part A: Employees (continued)					
Reduction in mortgage debt	.006 (.36)						87.65 (.76)	[g]	−.002
	.036 (.40)	−.028 (−.34)					82.59 (.71)	[g]	−.004
	−.047 (−.54)	.001 (.01)		−.072[h] (−6.47)	8.50 (1.92)		−46.18 (−.31)	−2.30[d]	.085
Reduction in instalment debt	.004 (.52)						−21.45 (−.40)	[g]	−.002
	.076 (1.82)	−.069 (−1.76)					−33.66 (−.62)	[g]	.003
	.039 (1.07)	−.045 (−1.32)		−.286[i] (−11.60)	2.43 (1.31)		−162.39 (−2.47)	−9.22[d]	.248

(continued)

TABLE 7 *(continued)*

Dependent Variable	Coefficient of: Normal Household Income[a]	Current Household Income	Net Worth, 1959	Holdings of Individual Asset, 1959	Age[b]	Saving Tastes	Constant Term	Normal Income Elasticity	$\bar{R}^2$
				Part A: Employees (continued)					
Net outlay on automobiles	.050 (6.31)						9.16 (.17)	.97	.086
	−.070 (−1.70)	.115 (2.95)					29.57 (.55)	.87	.103
	−.068 (−1.64)	.112 (2.87)			−1.15 (−.52)	8.94[e] (.66)	44.32 (.60)	.86	.100
Net outlay on other durables	.015 (5.09)						29.03 (1.46)	.76	.057
	.001 (.07)	.013 (.91)					31.36 (1.56)	.72	.057
	.002 (.11)	.010 (.70)	.001 (1.05)		−2.11 (−2.60)		84.12 (2.96)	.60	.068

(continued)

TABLE 7 *(continued)*

Dependent Variable	Coefficient of: Normal Household Income[a]	Current Household Income	Net Worth, 1959	Holdings of Individual Asset, 1959	Age[b]	Saving Tastes	Constant Term	Normal Income Elasticity	$\bar{R}^2$
				Part A: Employees (concluded)					
Home additions and repairs	.047 (5.15)						−51.29 (−.82)	1.21	.058
	−.016 (−.33)	.060 (1.33)					−40.64 (−.65)	1.14	.060
	−.020 (−.43)	.053 (1.17)	.005 (1.83)		−1.99 (−.78)		22.18 (.25)	.84	.063
				Part B: Self-Employed and Farmers					
Total saving	.357 (4.02)						−1083.79 (−1.64)	1.92	.205
	−.036 (−.15)	.412 (1.71)					−1189.38 (−1.83)	2.03	.230
	−.054 (−.20)	.424 (1.68)	.000 (.02)		−15.08 (−.47)	−7.16 (−.74)	−501.85 (−.41)	2.00[d]	.198

(continued)

TABLE 7 *(concluded)*

Dependent Variable	Coefficient of: Normal Household Income[a]	Current Household Income	Net Worth, 1959	Holdings of Individual Asset, 1959	Age[b]	Saving Tastes	Constant Term	Normal Income Elasticity	$\bar{R}^2$
				Part C: Retired					
Total saving	.043						−156.72	[g]	−.005
	(.73)						(−.94)		
	.565	−.548					−98.22	[g]	.084
	(3.18)	(−3.10)					(−.61)		
	.557	−.535	−.002		−4.52		134.16	[g]	.066
	(3.06)	(−2.95)	(−.27)		(−.40)		(.22)		

Note: Numbers in parentheses are *T*-tests for the coefficient immediately above.

[a] Five-year average of household income, 1958-62.

[b] Age of head minus 20 to approximate number of working years to date.

[c] Ratio of household insurance premiums in 1959 to average household income 1958-60, multiplied by 1000.

[d] This is a short-run income elasticity of savings. Under the assumptions of the lagged adjustment model, the long-run elasticity for savings is zero.

[e] Ratio of household net worth in 1959 to average household income, 1958-60.

[f] Liquid assets, end of 1959.

[g] Meaningful estimates of the normal income elasticity cannot be computed from this regression.

[h] Mortgage debt, end of 1959, treated as a negative asset.

[i] Instalment debt, end of 1959, treated as a negative asset.

other investments, reduction in mortgage debt, reduction in instalment debt, and net outlays on automobiles (purchases less sales), on other durables, and on additions and repairs to owned homes for the two-year period 1960–61. Corresponding single-year relations for each of the three durable items in 1959, 1960, and 1961, for insurance premiums in 1959 and 1961, and for liquid saving in 1959 were also computed but are not shown. The choice of variables to be analyzed was dictated in part by availability of data. Each of the flow or saving variables for the two-year 1960–61 analysis was related to the five-year average disposable income, to a two-year average (the transitory income effect being obtained from the coefficient of this variable and the normal income effect being the sum of the five-year and two-year coefficients), to initial net worth, to the initial level of specific assets where available, to age, to family size dummy variables, and to two general savings tastes variables—the ratio of insurance premiums in 1959 to annual average disposable income for the three-year period 1958–60 and (for savings components) the ratio of net worth at the end of 1959 to the three-year average of disposable income.[87] Each of the saving variables for the single-year analysis was related to a three-year average of disposable income centered on that year, to disposable income for the same year, to initial net worth where available, to the initial level of specific assets where available, and to a general savings tastes variable which was the ratio of insurance premiums in 1959 to average 1958–60 disposable income for the 1960 and 1961 savings items and the more theoretically attractive ratio of two-year 1960–61 saving to five-year average income for the 1959 saving items. The table shows only selected regressions for the two-year savings items. The family size dummies were generally insignificant and are not shown. The savings tastes and age variables are for the most part shown only when they raise the correlation or show *T*-tests in the neighborhood of one or more.

For employees, the average annual marginal propensity to save out of normal disposable income during the 1960–61 period amounted to .20 or .21, representing a mean income elasticity of about 1.7, if neither initial assets nor saving tastes are introduced into the analysis. A comparison can be made between this estimate of about .20 and an estimate made by Kosobud based on a larger sample, including nonemployee

[87] Note that for individual savings components, with income given, initial net worth itself may serve as a savings tastes variable in addition to its role in reflecting the extent to which the household's desire for alternative types of assets is satisfied. However, when initial stock of the specific asset corresponding to the savings component is omitted from the regression, net worth plays still a third role, serving as a proxy for the missing asset item.

groups as well as employees (921 panel members), reporting all the required information for both 1960 and 1961, but using a somewhat different saving regression relating the two-year saving-to-income ratio to two-year per capita income, change in liquid assets in the preceding year, number of people in the spending unit, and age of head.[88] No asset or tastes variable appears in the Kosobud regression and only income is significant. Kosobud derives a marginal propensity to save of .09 but he appears to be relating an annual saving rate to two-year income, and our rough estimate of the more customary annual propensity to save based on his regression is over .14. Since this is a propensity to save out of before-tax income, the Kosobud result appears to be fairly close to ours, though in view of the inclusion of self-employed and retired groups in the former it is difficult to be precise.

In our model, the absence of an initial assets variable is highly questionable from a theoretical point of view unless the speed of adjustment to the desired level of assets is relatively slow, while the absence of some device for holding tastes constant also raises statistical difficulties. The elasticity discussed above may be interpreted as an approximation to a short-run elasticity of savings under our model, if the speed of adjustment is very slow, or as both a long- and a short-run elasticity under an alternative model which takes initial assets to be irrelevant to savings behavior.[89] We note that this elasticity of savings is quite similar in value to the income elasticity of net worth obtained in Table 6 when initial assets are omitted. It is also very close to the short-run elasticity of saving obtained when initial assets are introduced into the savings regression, since this does not change the normal income coefficient of employees appreciably. Nor does the introduction of age or of a saving tastes variable make any appreciable difference. The low initial assets coefficient implies a very slow—indeed close to zero—speed of adjustment, which is the same dubious result obtained from the linear regression in the preceding section relating assets to normal income and initial assets, and which implies an income elasticity for assets completely inconsistent with the instantaneous adjustment linear regressions and both the instantaneous and delayed adjustment logarithmic regressions for assets.

As noted earlier, the dubious result provided by the linear delayed adjustment model may reflect the basic nonlinearity of the relationship, with the result that the initial assets variable reflects much of the normal income effect so that the absolute value of the initial assets coefficient

[88] *Consumer Behavior of Individual Families Over Two and Three Years*, p. 87.

[89] The long-run (full-adjustment) elasticity of net saving under our model is, of course, zero.

is substantially biased downward. Alternatively if the true relationship is approximately linear, it could be argued that normal income, which is measured more accurately than assets, acts as a proxy for initial assets so that again the absolute value of the initial assets coefficient may be biased downward (and the income coefficient similarly biased downward). The use of an imperfect approximation to saving tastes should further tend to bias the estimated speed of adjustment downward, but random errors in the measurement of lagged assets work in the opposite direction. Thus errors in the estimate of certain initial assets would tend to be associated with an opposite error in the estimate of saving, which would introduce an upward bias in the estimated speed of adjustment in the saving regression. On the other hand, the general understatement of saving and assets characterizing survey data would not be expected to have any effect on the estimated speed of adjustment, though it would tend to understate the estimated income elasticity of saving. There is reason to believe, both on the basis of a priori considerations and a comparison of survey data with external aggregates, that both random and systematic errors are more serious for the savings than for the asset data.

Because of the unrealistically low estimate of the speed of adjustment obtained, any attempt to compute an income elasticity of net worth from the savings regression would lead to an unrealistically high figure. The results obtained appear to throw doubt on the adequacy of a linear savings function as well as to suggest that the biases introduced by measurement errors and other factors may be quite large. Savings functions which are quadratic in normal income will be discussed subsequently.

When the annual average of income during the two years is used as an explanatory variable in addition to the five-year average, the transitory income effect for employees (with transitory income, it will be recalled, measured here as the difference between the two-year and five-year average) is .28, compared with a normal income effect of .20 or .21, but the difference between the two effects is not significant.[90] As a result, the two-year average of saving is explained about as well by two-year average income alone as by a combination of the five-year and two-year averages. The two-year average income alone gives about the same income coefficient and correlation as the five-year or either of the relevant three-year averages.

The historical income variable, which is an average of 1947 and 1955 disposable incomes, does not add significantly to 1958–62 incomes in explaining variations in saving (Table 8). The adjusted normal income

[90] The significance of this difference is measured by the significance of the five-year income coefficient.

TABLE 8

Linear Regressions of Total Saving, Contractual Saving, and Liquid Saving (1960-61 Averages) on Historical Household Income and Other Variables, SCF Panel Data for Households with 1958-62 Disposable Income of Less Than $20,000

Coefficient of	Employees		Self-Employed and Farmers		Retired	
	1	2	3	4	5	6
			Total Saving			
Household income, 1958-62	.199 (7.05)	.199 (6.06)	.400 (3.67)	.392 (3.01)	.022 (.31)	.032 (.36)
Historical household income (mean of 1947 and 1955)	.029 (.70)	.036 (.82)	−.131 (−.78)	−.105 (−.59)	.073 (1.13)	.075 (1.15)
Household net worth, 1959	–	−.002 (−.29)	–	−.003 (−.16)	–	−.004 (−.51)
Age of head[a]	–	−3.78 (−.54)	–	−13.25 (−.40)	–	−7.10 (−.59)
Savings tastes[b]	–	1.16 (.46)	–	−4.69 (−.48)	–	–
Constant term	−593.27 (−3.47)	−544.33 (−2.20)	−844.06 (−1.24)	−300.55 (−.24)	−192.48 (−1.09)	173.71 (.27)
Normal income elasticity	1.91	1.96	1.45	1.55[c]	d	d
$\bar{R}^2$	.153	.148	.196	.158	.004	−.010

(continued)

TABLE 8 *(continued)*

Coefficient of	Employees		Self-Employed and Farmers		Retired	
	1	2	3	4	5	6
			Contractual Saving			
Household income, 1958-62	.051	.044	.129	.191	.043	.048
	(4.32)	(3.23)	(2.61)	(3.37)	(3.13)	(2.87)
Historical household income (mean of 1947 and 1955)	.026	.030	.027	.019	−.008	−.008
	(1.50)	(1.66)	(.35)	(.25)	(−.65)	(−.61)
Household net worth, 1959	–	.002	–	−.013	–	−.001
		(.64)		(−1.72)		(−.85)
Age of head[a]	–	−3.45	–	23.05	–	−1.03
		(−1.19)		(1.61)		(−.44)
Constant term	−30.35	53.72	−678.41	−1283.45	−16.57	35.92
	(−.42)	(.54)	(−2.20)	(−2.54)	(−.49)	(.29)
Normal income elasticity	1.28	1.24	4.30	5.80	1.21	1.40
$\bar{R}^2$	.081	.080	.148	.184	.089	.080

(continued)

TABLE 8 *(concluded)*

Coefficient of	Employees		Self-Employed and Farmers		Retired	
	1	2	3	4	5	6
			Change in Liquid Assets			
Household income, 1958-62	.109	.124	.049	.063	.006	−.007
	(4.27)	(4.85)	(.83)	(.98)	(.08)	(−.09)
Historical household income (mean of 1947 and 1955)	.009	.000	−.050	−.057	−.006	−.006
	(.23)	(.00)	(−.56)	(−.66)	(−.09)	(−.10)
Household net worth, 1959		−		.016		−
				(1.80)		
Liquid assets, 1959		−.047		−.132		.005
		(−3.52)		(−3.47)		(.46)
Age of head[a]		14.01		1.86		−3.53
		(2.34)		(.11)		(−.30)
Constant term	−578.71	−872.41	−357.94	−437.32	−38.01	141.75
	(−3.76)	(−4.36)	(−.98)	(−.76)	(−.22)	(.23)
Normal income elasticity	5.68	6.03	d	d	d	d
$\bar{R}^2$	.056	.086	−.022	.126	−.022	−.042

Note: Numbers in parentheses are *T*-tests for the coefficients immediately above.

[a]Age of head minus 20 to approximate number of working years.

[b]Ratio of household insurance premiums in 1959 to average household income 1958-60, multiplied by 1000.

[c]This is a short-run elasticity of savings with respect to normal income, defined as a weighted average of five-year (1958-62) and two-year (1947 and 1955) income with weights determined by the regression coefficients.

[d]A meaningful estimate of the normal income elasticity cannot be computed from this regression.

elasticities of saving are a little higher for employees than the elasticities based on the five-year income variable alone.

For total saving, the family size dummies and the age variable all have negligible effects. The savings tastes variable (ratio of insurance premiums to normal income in the preceding year) is not at all significant, but its inclusion increases very slightly the income elasticity and the effect of lagged net worth. To allow for nonlinear age effects and to investigate possible interactions between income and age effects, the employee saving and related regressions were computed separately for each of four age groups—under 35, 35–44, 45–54, and 55 and over. The household saving regressions for individual age groups (Table 9) gave about the same marginal propensity to save out of normal income as the .20 figure for all age groups combined for the under 35 and the 45–54 groups, but a higher value for the 35–44 group and a lower value for the 55 and over group which is characterized by extremely low correlations. Correlations for the two youngest age groups, on the other hand, are substantially higher than for all ages combined. Only the 45–54 group showed a higher propensity to save out of transitory than out of normal income, but here the difference was close to significance. Thus both the age groups in the middle show relatively high propensities to save, the 35–44 group with respect to normal income and the 45–54 group with respect to transitory income. The family size effect was substantial (though still not significant) only for the youngest age group and the indication was that three or four person families saved more than either larger or smaller families. Age effects within age groups are still insignificant but larger than for employees as a whole, with a nonlinear pattern. Saving appears to fall with age for the youngest group, rise with age for the middle groups, and then fall again for the oldest group. The saving tastes variable has the expected positive effect only for the 45–54 age group, where it comes close to being significant. For the relatively small group aged 55 and over, the effect is negative and significant. This seems to be associated with the apparent large liquidation of other investment (corporate stock, etc.) by this group and the negative relationship between other investment and savings in the form of insurance (which dominates the saving tastes variable used).

Turning next to the components of saving and related items, we were able to utilize our lagged adjustment model only for changes in liquid

TABLE 9

Regressions of Total Savings, Saving Components, and Consumer Investment Items (1960-61 Averages) on Disposable Household Income and Other Variables, for Employees by Age of Household Head, SCF Panel Data for Households with 1958-62 Disposable Income of Less Than $20,000

PART A: TOTAL SAVING

Age of Head	Coefficient of: Household Income, 1958-62	Household Income, 1960-61	Net Worth, 1959	Age[a]	Saving Tastes[b]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
Under 35	.219					−500.44	1.63	.255
	(6.36)					(−2.29)		
	.220	−.000				−500.52	1.63	.249
	(1.10)	(−.00)				(−2.20)		
	.203	−.011	.020	−10.37	−2.020	−285.77	1.43[c]	.240
	(.94)	(−.06)	(1.23)	(−.39)	(−.57)	(−.90)		
35-44	.295					−1187.89	2.46	.229
	(6.17)					(−3.43)		
	.071	.209				−1105.60	2.34	.230
	(.34)	(1.10)				(−3.13)		
	.051	.202	.011	14.46	−1.40	−1263.96	2.11[c]	.215
	(.24)	(1.05)	(.66)	(.33)	(−.28)	(−1.38)		

(continued)

TABLE 9 *(continued)*

PART A: TOTAL SAVING (concluded)

Age of Head	Coefficient of Household Income, 1958-62	Household Income, 1960-61	Net Worth, 1959	Age[a]	Saving Tastes[b]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
45-54	.192					−562.41	1.75	.111
	(3.83)					(−1.46)		
	−.549	.723				−517.01	1.58	.145
	(−1.69)	(2.31)				(−1.37)		
	−.503	.663	.005	20.45	9.15	−1371.23	1.45[c]	.149
	(−1.55)	(2.10)	(.31)	(.34)	(1.71)	(−.74)		
55 and over	.118					−37.68	1.07	.029
	(1.66)					(−.10)		
	.242	−.123				−40.82	1.09	.016
	(.88)	(−.47)				(−.11)		
	.073	.116	−.035	−42.64	−12.53	2000.71	1.72[c]	.206
	(.29)	(.47)	(−2.84)	(−1.21)	(−2.33)	(1.34)		

(continued)

TABLE 9 *(continued)*

PART B: CONTRACTUAL SAVING

Age of Head	Coefficient of: Household Income, 1958-62	Household Income, 1960-61	Net Worth, 1959	Age[a]	Saving Tastes[e]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
Under 35	.119					−274.92	1.64	.276
	(6.69)					(−2.44)		
	.328	−.192				−338.96	1.87	.297
	(3.26)	(−2.11)				(−2.95)		
	.299	−.175		2.65	67.92	−357.28	1.71	.297
	(2.88)	(−1.89)		(.19)	(1.32)	(−2.46)		
35-44	.054					35.73	.91	.064
	(3.10)					(.28)		
	.054	−.000				35.63	.91	.057
	(.71)	(−.00)				(.27)		
	.056	−.009		−2.89	63.66	44.30	.80	.066
	(.74)	(−.13)		(−.18)	(1.78)	(.14)		

(continued)

TABLE 9 *(continued)*

PART B: CONTRACTUAL SAVING (concluded)

Age of Head	Coefficient of Household Income, 1958-62	Household Income, 1960-61	Net Worth, 1959	Age[a]	Saving Tastes[e]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
45-54	.044					8.97	.97	.025
	(1.95)					(.05)		
	.145	−.098				2.78	1.03	.020
	(.98)	(−.70)				(.02)		
	.144	−.094		21.15	9.24	−659.92	d	.008
	(.97)	(−.66)		(.77)	(.22)	(−.79)		
55 and over	.087					−65.52	1.19	.206
	(4.04)					(−.59)		
	.100	−.013				−65.86	1.19	.193
	(1.21)	(−.16)				(−.58)		
	.099	−.014		−5.76	.26	173.01	1.16	.167
	(1.14)	(−.17)		(−.48)	(.01)	(.34)		

(continued)

TABLE 9 *(continued)*

PART C: CHANGE IN LIQUID ASSETS

Age of Head	Coefficient of Household Income, 1958-62	Household Income, 1960-61	Liquid Assets, 1959	Age[a]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
Under 35	−.003				92.38	[d]	−.009
	(−.11)				(.58)		
	−.201	.183			153.25	[d]	.000
	(−1.41)	(1.41)			(.94)		
	−.178	.171	−.039	−1.13	123.88	[d]	−.014
	(−1.18)	(1.28)	(−.67)	(−.06)	(.58)		
35-44	.157				−1039.51	[d]	.131
	(4.46)				(−4.06)		
	−.112	.251			−940.58	[d]	.147
	(−.73)	(1.81)			(−3.62)		
	−.090	.254	−.109	27.95	−1443.99	[d]	.201
	(−.61)	(1.88)	(−3.19)	(.90)	(−2.36)		

(continued)

TABLE 9 *(continued)*

PART C: CHANGE IN LIQUID ASSETS (concluded)

Age of Head	Coefficient of: Household Income, 1958-62	Household Income, 1960-61	Liquid Assets, 1959	Age[a]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
45-54	.158				−847.28	4.68	.073
	(3.11)				(−2.18)		
	.177	−.019			−848.49	4.70	.064
	(.53)	(−.06)			(−2.17)		
	.257	−.079	−.054	56.40	−2490.43	5.29[c]	.060
	(.74)	(−.24)	(−.94)	(.90)	(−1.29)		
55 and over	.135				−374.09	2.46	.059
	(2.16)				(−1.16)		
	−.198	.330			−365.70	2.40	.077
	(−.84)	(1.46)			(−1.14)		
	−.219	.369	−.041	13.12	−837.34	2.73[c]	.198
	(−.99)	(1.75)	(−3.26)	(.42)	(−.62)		

(continued)

TABLE 9 *(continued)*

PART D: OTHER INVESTMENT

Age of Head	Coefficient of: Household Income, 1958-62	Household Income, 1960-61	Net Worth, 1959	Age[a]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
Under 35	.037 (3.08)				−194.07 (−2.56)	9.24	.069
	−.108 (−1.60)	.133 (2.18)			−149.72 (−1.94)	6.32	.098
	−.124 (−1.74)	.137 (2.20)	.008 (1.39)	−5.69 (−.63)	−66.48 (−.63)	3.44	.099
35-44	.028 (1.03)				−116.89 (−.60)	d	.000
	−.123 (−1.05)	.140 (1.32)			−61.60 (−.31)	d	.006
	−.146 (−1.24)	.139 (1.30)	.013 (1.37)	−21.17 (−.87)	379.84 (.78)	−.69	.010

(continued)

TABLE 9 *(continued)*

PART D: OTHER INVESTMENT (concluded)

Age of Head	Coefficient of: Household Income, 1958-62	Household Income, 1960-61	Net Worth, 1959	Age[a]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
45-54	.066				−328.90	d	.008
	(1.37)				(−.88)		
	−.833	.877			−273.79	2.40	.073
	(−2.69)	(2.94)			(−.76)		
	−.833	.885	−.004	−3.95	−153.60	2.82	.056
	(−2.67)	(2.91)	(−.25)	(−.07)	(−.09)		
55 and over	−.178				595.18	d	.025
	(−1.59)				(1.03)		
	.531	−.702			577.34	d	.058
	(1.26)	(−1.74)			(1.01)		
	.442	−.601	−.026	−67.57	3437.94	d	.076
	(1.05)	(−1.47)	(−1.26)	(−1.13)	(1.35)		

(continued)

TABLE 9 *(continued)*

PART E: REDUCTION IN MORTGAGE DEBT

Age of Head	Coefficient of: Household Income, 1958-62	Household Income, 1960-61	Mortgage Debt, 1959	Age[a]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
Under 35	.033				−115.70	d	−.004
	(.76)				(−.42)		
	.104	−.066			−137.59	d	−.012
	(.41)	(−.29)			(−.48)		
	−.143	.079	−.055	9.29	75.98	−4.75[c]	.012
	(−.51)	(.33)	(−2.18)	(.28)	(.20)		
35-44	.023				49.67	d	−.002
	(.84)				(.25)		
	−.002	.023			58.83	d	−.010
	(−.02)	(.21)			(.29)		
	−.064	.046	−.063	−13.89	302.57	−.59[c]	.107
	(−.56)	(.45)	(−4.18)	(−.59	(.65)		

(continued)

TABLE 9 *(continued)*

PART E: REDUCTION IN MORTGAGE DEBT (concluded)

Age of Head	Coefficient of: Household Income, 1958-62	Household Income, 1960-61	Mortgage Debt, 1959	Age[a]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
45-54	−.018				162.13	[d]	−.007
	(−.52)				(.63)		
	.081	−.096			156.10	[d]	−.014
	(.36)	(−.45)			(.60)		
	.041	−.113	−.119	49.04	−1227.10	−11.89[c]	.108
	(.20)	(−.56)	(−3.98)	(1.27)	(−1.03)		
55 and over	.036				35.85	.83	.026
	(1.61)				(.31)		
	.081	−.044			34.73	.84	.014
	(.93)	(−.54)			(.30)		
	−.049	.034	−.091	−1.25	177.06	−.34[c]	.440
	(−.72)	(.54)	(−6.65)	(−.13)	(.44)		

(continued)

TABLE 9 *(continued)*

PART F: REDUCTION IN INSTALMENT DEBT

Age of Head	Coefficient of: Household Income, 1958-62	Household Income, 1960-61	Instalment Debt, 1959	Age[a]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
Under 35	.031				−134.24	3.61	.013
	(1.58)				(−1.07)		
	.053	−.020			−140.76	d	.004
	(.46)	(−.19)			(−1.08)		
	.059	−.037	−.358	−18.45	−144.14	2.51[c]	.435
	(.67)	(−.47)	(−9.00)	(−1.63)	(−1.15)		
35-44	−.003				−8.81	d	−.008
	(−.15)				(−.07)		
	.170	−.162			−72.35	d	.024
	(2.15)	(−2.25)			(−.54)		
	.088	−.096	−.269	1.29	−163.53	d	.212
	(1.22)	(−1.47)	(−5.58)	(.09)	(−.56)		

(continued)

TABLE 9 *(continued)*

PART F: REDUCTION IN INSTALMENT DEBT (concluded)

Age of Head	Coefficient of Household Income, 1958-62	Coefficient of Household Income, 1960-61	Coefficient of Instalment Debt, 1959	Coefficient of Age[a]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
45-54	−.000				−13.08	d	−.009
	(−.04)				(−.14)		
	.072	−.071			−17.53	d	−.010
	(.92)	(−.94)			(−.19)		
	.055	−.061	−.210	−14.17	354.79	d	.106
	(.74)	(−.86)	(−3.97)	(−1.04)	(.84)		
55 and over	.015				−49.72	3.61	.015
	(1.37)				(−.89)		
	−.018	.032			−48.90	d	.009
	(−.43)	(.82)			(−.88)		
	−.002	.005	−.258	6.00	−283.29	.71[c]	.297
	(−.07)	(.16)	(−4.97)	(1.20)	(−1.34)		

(continued)

TABLE 9 *(continued)*

PART G: NET OUTLAY ON AUTOMOBILES

Age of Head	Coefficient of: Household Income, 1958-62	Household Income, 1960-61	Net Worth, 1959	Age[a]	Saving Tastes[e]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
Under 35	.027					112.27	.59	.014
	(1.61)					(1.06)		
	−.233	.239				191.94	.14	.071
	(−2.51)	(2.84)				(1.81)		
	−.268	.261		6.38	65.24	149.30	−.13	.077
	(−2.79)	(3.05)		(.51)	(1.38)	(1.11)		
35-44	.056					−3.26	1.01	.067
	(3.16)					(−.03)		
	−.129	.173				64.95	.79	.105
	(−1.69)	(2.50)				(.50)		
	−.132	−.181		−26.50	−4.65	541.06	.88	.111
	(−1.74)	(−2.61)		(−1.67)	(−.13)	(1.74)		

(continued)

TABLE 9 *(continued)*

PART G: NET OUTLAY ON AUTOMOBILES (concluded)

Age of Head	Coefficient of Household Income, 1958-62	Household Income, 1960-61	Net Worth, 1959	Age[a]	Saving Tastes[e]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
45-54	.050					62.61	.85	.106
	(3.74)					(.61)		
	.058	−.007				62.17	.85	.098
	(.65)	(−.08)				(.60)		
	.056	−.003		16.81	5.18	−459.12	.90	.091
	(.63)	(−.03)		(1.01)	(.20)	(−.91)		
55 and over	.022					38.83	[d]	.008
	(1.21)					(.42)		
	−.067	.088				41.06	.69	.022
	(−.99)	(1.36)				(.45)		
	−.071	.086		−11.84	−.57	534.55	.52	.013
	(−1.02)	(1.30)		(−1.21)	(−.04)	(1.29)		

(continued)

TABLE 9 *(continued)*

PART H: NET OUTLAY ON OTHER DURABLES

Age of Head	Coefficient of: Household Income, 1958-62	Household Income, 1960-61	Net Worth, 1959	Age[a]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
Under 35	.027 (4.08)				−13.45 (−.32)	1.09	.120
	.043 (1.14)	−.015 (−.44)			−18.44 (−.43)	1.15	.114
	.065 (1.65)	−.025 (−.73)	−.005 (−1.76)	−2.21 (−.44)	−36.29 (−.61)	1.63	.127
35-44	.011 (1.51)				69.83 (1.30)	.52	.010
	.005 (.15)	.006 (.20)			72.12 (1.31)	d	.002
	.001 (.03)	.002 (.08)	.003 (1.09)	6.58 (.97)	−31.24 (−.23)	d	.005

(continued)

TABLE 9 *(continued)*

PART H: NET OUTLAY ON OTHER DURABLES (concluded)

Age of Head	Coefficient of: Household Income, 1958-62	Household Income, 1960-61	Net Worth, 1959	Age[a]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
45-54	.012				10.75	.89	.082
	(3.30)				(.38)		
	.017	−.004			10.48	.89	.074
	(.68)	(−.18)			(.37)		
	.017	−.009	.002	−.19	15.77	.56	.082
	(.69)	(−.38)	(1.72)	(−.04)	(.11)		
55 and over	.013				16.18	.79	.067
	(2.29)				(.56)		
	−.046	.058			17.67	.75	.183
	(−2.29)	(3.04)			(.65)		
	−.044	.056	.001	2.03	−67.92	.74	.169
	(−2.14)	(2.81)	(.67)	(.70)	(−.55)		

(continued)

TABLE 9 *(continued)*

PART I: HOME ADDITIONS AND REPAIRS

Age of Head	Coefficient of Household Income, 1958-62	Coefficient of Household Income, 1960-61	Coefficient of Net Worth, 1959	Coefficient of Age[a]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
Under 35	.021				100.95	d	.000
	(1.02)				(.76)		
	.055	−.031			90.51	d	−.008
	(.46)	(−.29)			(.66)		
	−.015	.007	.011	17.52	45.11	d	.003
	(−.12)	(.06)	(1.18)	(1.10)	(.24)		
35-44	.042				20.11	.93	.029
	(2.19)				(.15)		
	.024	.017			26.64	.91	.022
	(.29)	(.22)			(.19)		
	.028	.016	−.002	6.04	−89.83	d	.007
	(.32)	(.21)	(−.26)	(.34)	(−.26)		

(continued)

TABLE 9 *(concluded)*

PART I: HOME ADDITIONS AND REPAIRS (concluded)

Age of Head	Coefficient of: Household Income, 1958-62	Household Income, 1960-61	Net Worth, 1959	Age[a]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
45-54	.058				−167.03	1.72	.105
	(3.74)				(−1.40)		
	−.065	.120			−159.46	1.63	.109
	(−.64)	(1.22)			(−1.33)		
	−.064	.110	.004	−8.41	94.22	1.36	.098
	(−.61)	(1.09)	(.70)	(−.44)	(.16)		
55 and over	.056				−107.00	1.69	.083
	(2.52)				(−.92)		
	−.169	.223			−101.33	1.62	.186
	(−2.09)	(2.89)			(−.93)		
	−.138	.183	.010	14.95	−742.73	1.34	.280
	(−1.80)	(2.46)	(2.62)	(1.37)	(−1.60)		

Note: Numbers in parentheses are T-tests for the coefficients immediately above.

[a]Age of head minus 20 to approximate number of working years to date.

[b]The ratio of household insurance premiums in 1959 to average household income 1958-60 (multiplied by 1000).

[c]This is a short-run income elasticity of saving. Under the assumptions of the lagged adjustment model the long-run elasticity of net saving is zero.

[d]A meaningful estimate of the normal income elasticity cannot be computed from this regression.

[e]The ratio of household net worth at the end of 1959 to average household income, 1958-60.

assets and the two debt components.[91] For employees as a whole and for each age group, the marginal propensity to save in contractual form is substantial for normal income and is generally negligible for transitory income, which is reasonable.[92] The difference in the two income effects is significant for employees as a whole. The roles of normal and transitory income seem to be quite different for liquid saving where transitory income seems somewhat more important than normal income. This result is consistent over all age groups except for the 45–54 group, but the differences are not at all statistically significant. For other financial investment, which is something of a hodge-podge, the correlations are extremely low. The mean normal income elasticities are close to one for contractual saving but very much higher for liquid assets. Even for contractual saving, the normal income elasticity is considerably higher than one for the under 35 age group, and it is increased to somewhat above one for all age groups combined when the long-run average of 1949 and 1955 incomes is included as an additional explanatory variable. The data suggest that long-run income may be somewhat more important in explaining contractual saving than in explaining saving generally, at least for employees, but has little influence on saving in the form of liquid assets.

For reduction in debt, both income variables are almost irrelevant and only the initial levels of debt and age contribute to the explanation of these savings components. For each age group of employees and for all combined, the normal income elasticity of reduction in mortgage debt was found to be negative when the initial level of debt was held constant. This was due entirely to the greater propensity of the higher than the lower income groups to increase mortgage debt either to finance home additions and repairs or for other reasons. (No purchases of new homes were involved.) If cases of increasing mortgage debt are eliminated,[93] the income elasticity becomes positive. For reduction in

[91] In future work we plan to extend this model to net outlays on automobiles, when data on initial auto stocks have been developed, and possibly for homeowners to home additions, using value of house as the relevant asset stock. For insurance premiums on existing policies—a large component of contractual saving—the model is not particularly useful, while for other investment and outlays on other durables the relevant asset data are not available.

[92] The strongly negative effect of transitory income for the lowest age group suggests a time lag in adjusting contractual saving to rapidly rising income trends. Thus, for a given five-year average of income, the household with rapidly rising income has less contractual saving than the household with more gradual income growth.

[93] For employees, there were 37 such cases, of which two-thirds had incomes above average and one-third had incomes substantially above average.

instalment debt also, the income elasticities were negative for all employees and for the two age groups in the middle, holding the initial level of debt constant. This indicates a somewhat stronger tendency for the upper than the lower income brackets to increase instalment debt in this period.

For the three classes of consumer physical investment—including automobiles, other consumer durables, and additions and repairs to homes[94]—the marginal propensity with respect to transitory income seems substantially higher for automobile expenditures and somewhat higher for home additions and repairs than the normal income propensity, while for other consumer durables little difference exists between normal and transitory income effects. However, considerable variation appears among age groups. The transitory income effect on automobile expenditures is significantly higher than the normal income effect for the youngest age group and almost so for the 35–44 group, while the differences are much smaller for the two older groups. For additions and repairs, on the other hand, the normal income effect is slightly stronger than that of transitory income for the two younger groups (with correlations very low), while the transitory income effect is the stronger for the two older groups, with the difference significant for those 55 and over. For durables expenditures, the normal income effect is the stronger for all except the oldest group, where the transitory effect is significantly stronger. For the over 55 age group, which as noted earlier is based on a rather small sample, there is evidence that for all classes of consumer physical investment the propensity to invest out of transitory income is substantially higher than out of normal income, suggesting that, for these families, investment in durables does not have as urgent a claim on normal income as for the younger households. For employees as a whole, the normal income elasticities at the mean are about one for automobiles, somewhat lower for other durables, and somewhat higher for additions and repairs. In the last two cases, the inclusion of lagged net worth substantially reduces the estimated normal income elasticity.

The effect of family size is significant only for additions and repairs, with families of five persons or more spending more than smaller families. Liquid saving appears to decline steadily with family size, while the smallest households are most inclined to reduce mortgage debt and the largest are least inclined to reduce instalment debt. The effect of age is significant and positive for changes in liquid assets and reduction in

[94] Only additions are considered as part of investment and included in total saving, but we were not able to separate additions from repairs as a saving component at this stage of our analysis.

mortgage debt,[95] significant and negative for durables expenditures, and positive but not significant for reduction in instalment debt. Small negative effects occur for contractual saving,[96] other investment, automobile expenditures, and additions and repairs. The savings tastes variables shown for savings components (i.e., net worth at the end of 1959 either deflated by a three-year average of income centered on 1959 or not deflated) have positive, though not significant, effects for contractual saving, outlays on other durables, and home additions and repairs. The alternative savings tastes variable—the ratio of insurance premiums in 1959 to three-year average income—was significantly positive for contractual savings, reflecting the high correlation between insurance premiums in 1959 and in 1960–61, significantly negative for other investments,[97] and negative though not significant for reduction in mortgage debt.

When attention is directed to consumer investment in insurance premiums, changes in liquid assets, other consumer durables, and additions and repairs for individual years for the period 1959–61 (with insurance available for 1959 and 1961, liquid assets for 1959, and other variables for all three years), the marginal propensity to save out of normal income is significantly higher than that out of transitory income for insurance and additions and repairs in 1959, higher for other consumer durables (significantly so) and additions and repairs (not quite significant) in 1960, and somewhat higher for insurance in 1961. Transitory income seems more important for other consumer durables in 1959 and somewhat more important for additions and repairs in 1961. For automobiles, the transitory propensity is significantly higher than the normal propensity in 1960, but there is no significant or even consistent difference between the two in 1959 and 1961. Thus, the evidence is reasonably strong that the normal propensity is higher than the transitory for insurance, but the evidence is not consistent from year to year for auto-

[95] The positive effect of age on reduction in mortgage debt, holding initial level of debt constant, probably reflects not only the reluctance of older families to incur new debt, but also the mechanical fact that the same debt level is likely to be associated with a relatively expensive house, largely paid for, in the case of a middle-aged family, and a relatively inexpensive house, recently purchased, in the case of a young family. Monthly payments (debt reduction) are expected to be larger in the first case than in the second.

[96] The negative effect for contractual savings, in conjunction with a strong positive effect for reduction in mortgage debt, implies a substantial negative effect of age on savings in the form of insurance, the other major component of contractual saving.

[97] Possibly this suggests a pattern of savings tastes in which those households that are strongly insurance-minded are disinclined toward such investments as corporate stock, bonds other than U.S. savings bonds, and real estate.

mobiles, other consumer durables, and additions and repairs. Change in liquid assets in 1959 seems completely uncorrelated with either income component.

Of the three saving or related items for which corresponding initial asset holdings are already available—i.e., changes in liquid assets, reduction in mortgage debt, and reduction in instalment debt—the apparent speed of adjustment was relatively high for instalment debt (.35) and much lower for mortgage debt (.08) and liquid assets (.05). When regressions are derived for each age group separately, the speed of adjustment tends to rise with age for mortgage debt but to fall for instalment debt.[98] For these three items, long-run income elasticities for the associated asset stocks may be estimated from the saving regressions, if we ignore the effects of disequilibrium in holdings of other types of assets. Dividing the sum of the two income coefficients by an appropriate function of the speed of adjustment as estimated from the lagged asset coefficient, we obtain a normal income elasticity of 7.34 for liquid assets, 1.09 for mortgage debt, and .25 for instalment debt. The figure for liquid assets is considerably higher than that obtained from the FRB data, while no direct comparison is available for the debt items.

For entrepreneurs or the self-employed and farmers (Part B of Table 7), the marginal propensity to save seems higher than for employees, amounting to .40 or .41 for transitory income and from .36 to .38 for normal income. However, again the difference between the two coefficients is not significant. Once more also the coefficients of the net worth and saving tastes variables are insignificant. The mean normal income elasticities of saving for the self-employed are not very different from those for employees, running around 2.0. Historical income is even less important for the self-employed than for employees, but the inclusion of this variable lowers the estimated normal income elasticity, bringing it into closer agreement with that obtained for net worth.

Because of the smallness and the nonhomogeneity of the sample (combining farm and nonfarm entrepreneurs), rather erratic results were obtained for saving components and these are not shown. The major difference between entrepreneurs and employees lies, of course, in the much greater role played by business saving for the entrepreneurs. The marginal propensity of entrepreneurs to channel income into business saving was about half of their over-all normal saving propensity,

[98] The annual speed of adjustment (r) in the 1960–61 equations is measured as $r = 1 - \sqrt{1 + 2c}$, where c is the algebraic value of the coefficient of the initial specific assets variable. This computation ignores the effect on particular savings components of disequilibrium in holdings of other assets.

while it was entirely negligible for employees. Though the propensity to save in this form was higher for normal than for transitory income, the difference is not statistically significant. The marginal propensity of entrepreneurs to save in contractual form was also substantial and somewhat higher than for employees; again only normal income was of any importance in the determination of saving in this form.

The income elasticity obtained for business savings was surprisingly low, in the neighborhood of unity, while that for contractual saving (which may include some elements of business saving) was much higher than for employees. For liquid saving in 1960–61, the marginal propensity to save out of transitory income was very large and significantly greater than out of normal income, which is in the same direction as the result for employees. The speed of adjustment to the desired level of liquid assets is faster than for employees (.12). Mortgage debt was increased rather than decreased, on the average, by entrepreneurs but the marginal propensity to reduce debt is positive, unlike the result for employees. The income elasticity for reduction of instalment debt is again negative. The speed of adjustment is somewhat lower than in the case of employees for mortgage debt (.04) and somewhat higher for instalment debt (.82), and in the last case the difference between the two occupational groups is statistically significant. The implicit income elasticities for asset stocks are higher than for employees in the case of mortgage debt, much lower in the case of liquid assets, and negative in the case of instalment debt. As for employees, the relative size of the entrepreneurial marginal propensities to save out of normal and transitory income is not consistent from year to year for automobiles, other consumer durables and additions and repairs. Elasticities for these items are lower than for employees. The effect of age is negative and significant for durables outlays, and positive and close to significance for reduction in mortgage debt; these results are consistent with the findings for employees.

For the retired (Part C of Table 7), current income is completely unrelated to saving (or dissaving), while normal or five-year average income is not much better in this respect, with a positive but statistically insignificant coefficient. The comparative unimportance of current or short-run income for this group of consumer units is not surprising. However, when both five-year average and current income are included as explanatory variables, the current income coefficient is significantly negative while the five-year average income coefficient is positive, but not significantly so. This is a strange result and may reflect the fact that our measure of initial net worth is inadequate and that current income for the retired acts as a proxy for initial net worth (which may be the primary

determinant of saving or dissaving for the retired) to a greater extent than does five-year average income. Thus the major components of saving which account for the negative current income coefficient and positive five-year coefficient are liquid assets and to a much lesser extent other investments, both of which might be expected to be liquidated by the retired. Initial assets, when included in the regression with normal and current income, has a negative but again insignificant coefficient. The unimportance of initial assets for the retired is difficult to explain and may again reflect the fact that income acts as a proxy for initial assets. Historical income seems somewhat more important than five-year average income for this group but neither is significant. The only major component of saving that is significantly related to either income variable is contractual saving, which is positively and significantly correlated with five-year average income. Contractual saving, which is positive (and averages $68 per household), helps to account for the surprisingly small dissaving of retired households (averaging $14), with liquid assets and other investments representing the major dissaving items. Net outlays on automobiles, other durables, and additions and repairs are positively and significantly correlated with five-year average income, while the effects of transitory income are negligible in all three cases. The income elasticities for automobiles and other durables are higher than for employees. The elasticity for reduction of instalment debt is negative as for the other two groups.

Table 10 presents selected saving-to-income ratios separately for employee homeowners and employee renters. Renters represented only about one-fourth of our sample and had lower mean incomes than homeowners ($4,842 vs. $6,811) and total saving amounting to only about one-fourth of homeowner saving, with liquid saving about the same for the two groups and contractual saving accounting for most of the difference. Outlays for automobiles and other durables were also lower for renters.

The independent variables we have used appear much more adequate to explain the saving behavior of renters than of homeowners, accounting for one-third of the variance of total and contractual saving and 40 per cent of the variance of liquid saving for renters. In the lagged adjustment model, the income elasticity of total saving is considerably higher for each group taken separately than for both groups combined and is quite similar for the two groups. In the immediate adjustment model, the elasticity for homeowners is lower and that for renters very much higher than for both combined, with the weighted average again higher. The elasticity for liquid saving, in particular, is much larger for renters than

TABLE 10

Linear Regressions of Total Saving, Saving Components, and Consumer Investment Items (1960-61 Averages) on Disposable Household Income and Other Variables, for Employees by Tenure of Dwelling Unit, SCF Panel Data for Households with 1958-62 Disposable Income of Less Than $20,000

Coefficient of	Renters			Homeowners		
	1	2	3	1	2	3
			Total Saving			
Household income, 1958-62	.225	−.200	−.345	.183	−.062	−.064
	(5.67)	(−1.32)	(−2.23)	(5.90)	(−.38)	(−.39)
Household income, 1960-61		.403	.473		.235	.252
		(2.91)	(3.43)		(1.52)	(1.62)
Net worth, 1959			.044			−.009
			(2.30)			(−.97)
Age of head[a]			8.60			−5.03
			(1.31)			(−.51)
Constant term	−870.24	−792.33	−722.47	−305.97	−263.41	−131.76
	(−4.14)	(−3.88)	(−2.66)	(−1.34)	(−1.14)	(−.40)
Normal income elasticity	4.99	4.52	2.83[b]	1.32	1.25	2.68[b]
$\bar{R}^2$	.241	.295	.337	.101	.105	.105

(continued)

TABLE 10 *(continued)*

Coefficient of	Renters			Homeowners		
	1	2	3	1	2	3
			Contractual Saving			
Household income, 1958-62	.025	.023	.002	.050	.098	.088
	(5.25)	(1.20)	(.13)	(3.75)	(1.38)	(1.20)
Household income, 1960-61		.002	.015		−.046	−.037
		(.12)	(.88)		(−.68)	(−.54)
Age of head[a]			−1.57			−1.40
			(−1.99)			(−.33)
Saving tastes[c]			70.08			−10.47
			(4.54)			(−.58)
Constant term	−1.72	−1.32	43.64	131.65	123.38	189.06
	(−.07)	(−.05)	(1.50)	(1.33)	(1.23)	(1.36)
Normal income elasticity	1.01	1.01	.69	.72	.75	.72
$\bar{R}^2$	.213	.205	.340	.042	.040	.036

(continued)

TABLE 10 *(concluded)*

Coefficient of	Renters			Homeowners		
	1	2	3	1	2	3
			Change in Liquid Assets			
Household income, 1958-62	.232	−.201	−.183	.101	.050	.063
	(6.62)	(−1.53)	(−1.32)	(3.63)	(.34)	(.43)
Household income, 1960-61		.411	.416		.049	.047
		(3.41)	(3.37)		(.36)	(.34)
Liquid assets, 1959			−.053			−.048
			(−1.71)			(−3.18)
Age of head[a]			14.72			16.91
			(2.52)			(2.08)
Constant term	−1011.28	−931.83	−1295.28	−562.32	−533.37	−904.56
	(−5.44)	(−5.24)	(−5.93)	(−2.73)	(−2.67)	(−3.20)
Normal income elasticity	10.07	9.12	10.14[b]	5.40	5.28	5.88[b]
$\bar{R}^2$	.304	.372	.407	.039	.036	.068

Note: A small number of employees who were not either renters or homeowners are omitted from this table. Numbers in parentheses are *T*-tests for the coefficients immediately above.

[a]Age of head minus 20 to approximate number of working years.

[b]This is a short-run elasticity. The long-run income elasticity of savings is zero under the assumptions of the lagged adjustment model.

[c]Household net worth, 1959, divided by average income 1958-60.

for homeowners. The effect of transitory income on total saving is significantly greater than that of normal income for renters, while for homeowners there is rather little difference in the two effects. For renters, both contractual saving and other investment seem to be much more strongly related to initial net worth or the ratio of initial net worth to normal income than to either of the income variables. The effect of age on total saving is positive and quite large for renters, though not significant, while it is negative and relatively small for homeowners.

We have indicated earlier our reservations about the linearity of the saving function, in terms of both the apparent nonlinearity of the asset-to-income relationship and the insignificance of lagged net worth in the linear saving regressions and the unrealistically low speeds of adjustment implied. When the ratio of saving to normal income is related to normal income and other variables (Table 11)—a formulation consistent with a quadratic relationship between saving and income—lagged net worth becomes significant or nearly so for all three employment status groups. However, the speeds of adjustment, though somewhat increased, still seem unrealistically low. Correlations are lower for total saving (though as high or higher for some components).[99] However, correlation coefficients are not directly comparable between the two models since in the present case only the relatively small variance of the saving-to-income ratio is to be explained. In the neighborhood of mean income, the deviations of actual from computed saving appear to be somewhat smaller using the quadratic model, while an examination of the households with incomes over $10,000 suggests that there is little to choose between the two models in this range.

For employees, there is strong evidence of nonlinearity for total saving and for liquid saving in the highly significant coefficient of the quadratic term, and some indication of nonlinearity for reduction in instalment debt, reduction in mortgage debt, and outlays on other durables. In the last two cases, the relationship with income appears to be concave downward. For the self-employed also, there is an indication that the relationships are concave upward for total saving and change in liquid assets, and concave downward for outlays on other durables, though the coefficients are not significant. In addition, there is significant nonlinearity for contractual saving and for reduction in mortgage debt, with the relationships concave upward. For the retired, the effect of income on all three durables items is concave upward, significantly so for automobiles and other durables.

[99] Correlations are higher for liquid saving and about the same for the two debt items.

TABLE 11

Regressions of Saving-to-Income and Investment-to-Income Ratios on Disposable Household Income and Other Variables (1960-61 Averages) SCF Panel Data for Households with 1958-62 Disposable Income Less Than $20,000

	Coefficient of							
	Normal Income[a]	Current Income[b]	Net Worth, 1959[c]	Holdings of Individual Asset, 1959[c]	Age of Head[d]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
				Total Saving				
Employees	.013	.255			−.000	−.229	1.50	.046
	(3.61)	(2.76)			(−.37)	(−2.33)		
	.013	.274	−.012		.000	−.248	1.67[e]	.053
	(3.75)	(2.95)	(−1.95)		(.31)	(−2.51)		
Self-employed including farmers	.040	.892			−.004	−.944	1.81	.102
	(1.78)	(2.28)			(−.61)	(−1.93)		
	.038	.786	−.029		−.001	−.780	2.48	.120
	(1.74)	(1.99)	(−1.46)		(−.16)	(−1.57)		
Retired	.003	−.321			−.003	.432	[f]	.053
	(.13)	(−2.56)			(−.86)	(1.85)		
	.006	−.213	−.012		−.002	.321	[f]	.092
	(.29)	(−1.60)	(−2.19)		(−.53)	(1.37)		

(continued)

TABLE 11 *(continued)*

	Coefficient of							
	Normal Income[a]	Current Income[b]	Net Worth, 1959[c]	Holdings of Individual Asset, 1959[c]	Age of Head[d]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
Saving Components for Employees								
Contractual saving	.002	−.000			−.000	.049	[f]	−.004
	(1.10)	(−.00)			(−.16)	(1.18)		
	.002	−.006	.004		−.000	.055	[f]	−.001
	(.99)	(−.15)	(1.47)		(−.65)	(1.32)		
Change in liquid assets	.010	.250			.001	−.328	3.13	.052
	(3.41)	(3.37)			(1.22)	(−4.15)		
	.010	.219		−.059[g]	.002	−.302	4.01[e]	.165
	(3.60)	(3.13)		(−7.50)	(2.79)	(−4.07)		
Reduction in mortgage debt	−.001	.017			.001	−.010	[f]	−.004
	(−.24)	(.26)			(1.17)	(−.14)		
	−.004	.042		−.072[h]	.002	−.074	−2.19[e]	.092
	(−1.68)	(.67)		(−6.63)	(2.76)	(−1.11)		

(continued)

TABLE 11 *(continued)*

	Coefficient of							
	Normal Income[a]	Current Income[b]	Net Worth, 1959[c]	Holdings of Individual Asset, 1959[c]	Age of Head[d]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
Saving Components for Employees (continued)								
Reduction in instalment debt	.001	−.030			−.000	.029	[f]	−.003
	(.73)	(−.90)			(−.68)	(.82)		
	.002	−.023		−.285[i]	.001	−.026	−2.15[e]	.245
	(1.52)	(−.80)		(−11.63)	(1.81)	(−.82)		
Net outlay on automobiles	.001	.093			−.000	−.043	.96	.016
	(.70)	(2.77)			(−.90)	(−1.21)		
	.001	.089	.002		−.000	−.040	.89	.016
	(.62)	(2.64)	(1.03)		(−1.19)	(−1.10)		
Net outlay on other durables	−.001	.008			−.000	.023	.57	.009
	(−1.33)	(.60)			(−2.27)	(1.71)		
	−.001	.007	.000		−.000	.024	.56	.008
	(−1.37)	(.53)	(.59)		(−2.33)	(1.76)		

(continued)

TABLE 11 *(concluded)*

	Coefficient of							
	Normal Income[a]	Current Income[b]	Net Worth, 1959[c]	Holdings of Individual Asset, 1959[c]	Age of Head[d]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
Saving Components for Employees (concluded)								
Home additions and repairs	.001	.041			−.000	−.004	[f]	−.001
	(.70)	(1.10)			(−.85)	(−.09)		
	.001	.034	.005		−.001	.003	[f]	.005
	(.57)	(.90)	(1.87)		(−1.43)	(.09)		

Note: Denominator for ratios is five-year average of household income, 1958-62. Numbers in parentheses are *T*-tests for the coefficients immediately above.

[a]Five-year average of household income, 1958-62, divided by 1000.

[b]Average income, 1960-61, divided by normal income.

[c]Divided by normal income.

[d]Age minus 20 to approximate number of working years.

[e]This is a short-run elasticity. The long-run elasticity of saving is zero under the assumptions of the lagged adjustment model.

[f]A meaningful estimate of the normal income elasticity cannot be computed from this regression.

[g]Liquid assets.

[h]Mortgage debt.

[i]Instalment debt.

For employees, the income elasticity of total saving is the same as in the linear model when lagged net worth is included in the regression, but otherwise a little lower (1.5). However, for change in liquid assets, the elasticity is considerably lower than in the linear form (3 or 4 compared with 5 or 6). For reduction in mortgage debt and outlays on automobiles and other durables, the elasticities are much the same as in the linear model. The effects of age and of net worth considered as a saving tastes variable are somewhat enhanced in the quadratic model.

For the self-employed, the elasticity for total saving is a little higher (2.5) than in the linear form when initial net worth is included in the regression. For the retired, the marginal propensity to save out of normal income is .04 at the mean, compared with .02 for the linear model when current income is also included in the regression. The effect of transitory income is still large and negative but no longer significant when lagged net worth appears in the regression. The transitory income effect is no longer negative for liquid assets, though it remains significantly so for other investment. Business saving for the self-employed again has an income elasticity around unity, while contractual saving again has a very high elasticity. The marginal propensity to reduce mortgage debt is again positive at mean income and that for liquid saving is the same as for the linear model when initial liquid assets are included in the regressions. The income elasticity for reduction of instalment debt is negative for all three employment status groups, as in the linear model.

Table 12 presents for employees the relationships between total saving and related items for each consumer unit in 1960–61 and both group income (the 1958–62 mean income of the occupational group to which the unit belongs) and the unit's income for the two-year period covered, as well as other variables. The measure of the normal income effect obtained from these regressions as the sum of the group income and household income coefficients conforms essentially to a long-run concept of normal income. However, the implicit measure of transitory income must be assumed to contain substantial components of permanent income as well. Therefore, it is not surprising that the estimates of the two income effects are generally quite similar. However, substantial (though not quite significant) differences still appear for contractual saving and liquid saving. For change in liquid assets the transitory income effect is higher than the normal income effect, with marginal propensities of .13 and .05, respectively. For contractual saving, the situation is reversed with marginal propensities of .08 for normal income and .05 for transitory income. Furthermore, the income elasticities differ somewhat from those obtained from the regressions using

TABLE 12

Linear Regressions of Total Saving, Saving Components, and Consumer Investment Items (1960-61 Averages) on Group Disposable Income and Other Variables for Employees, SCF Panel Data for Households with 1958-62 Disposable Income of Less Than $20,000

	Mean Income for Occupational Group, 1958-62	Household Income, 1960-61	Asset Stock, 1959	Age[a]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
Total saving	.178				−383.27	1.51	.026
	(3.46)				(−1.14)		
	−.027	.209			−407.65	1.54	.163
	(−.51)	(8.27)			(−1.31)		
	−.025	.214	−.003[b]		−428.36	1.61[c]	.161
	(−.45)	(7.52)	(−.39)		(−1.36)		
Contractual saving	.080				−131.01	1.35	.033
	(3.87)				(−.98)		
	.034	.047			−136.48	1.36	.074
	(1.48)	(4.38)			(−1.04)		
Change in liquid assets	.030				−63.81	[d]	−.001
	(.68)				(−.22)		
	−.097	.130			−78.93	1.59	.070
	(−2.00)	(5.70)			(−.28)		
	−.080	.132	−.037[e]		−135.49	2.56[c]	.086
	(−1.65)	(5.86)	(−2.82)		(−.49)		

(continued)

TABLE 12 *(continued)*

	Mean Income for Occupational Group, 1958-62	Household Income, 1960-61	Asset Stock, 1959	Age[a]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
Other investment	.048				−285.91	d	.001
	(1.14)				(−1.02)		
	.018	.034			−302.60	d	.004
	(.35)	(1.47)			(−1.05)		
Reduction in mortgage debt	.026				−39.77	1.31	−.001
	(.77)				(−.18)		
	.027	−.001			−39.62	1.31	−.003
	(.72)	(−.07)			(−.18)		
	−.001	−.042	−.071[f]	8.31	−54.31	−2.16[c]	.084
	(−.03)	(−2.29)	(−6.41)	(1.88)	(−.23)		
Reduction in instalment debt	.018				−108.79	d	.001
	(1.13)				(−1.06)		
	.021	−.003			−108.42	d	−.001
	(1.18)	(−.39)			(−1.05)		
	.019	−.013	−.289[g]	2.64	−245.83	.83[c]	.249
	(1.21)	(−1.81)	(−11.74)	(1.42)	(−2.41)		

(continued)

TABLE 12 *(concluded)*

	Mean Income for Occupational Group, 1958-62	Household Income, 1960-61	Asset Stock, 1959	Age[a]	Constant Term	Normal Income Elasticity	$\bar{R}^2$
Net outlays on automobiles	.044 (2.65)				45.26 (.42)	.86	.014
	−.007 (−.42)	.052 (6.22)			39.22 (.38)	.88	.097
Net outlays on other durables	.014 (2.38)				31.58 (.82)	.74	.011
	.000 (.06)	.014 (4.56)			29.95 (.79)	.75	.057
	−.001 (−.21)	.012 (3.36)	.001[b] (1.08)		92.01 (2.06)	.54	.068
Home additions and repairs	.048 (2.60)				−65.20 (−.54)	1.27	.014
	.005 (.23)	.044 (4.61)			−70.36 (−.60)	1.29	.060
	.000 (.02)	.036 (3.36)	.005[b] (1.62)		−37.97 (−.32)	.97	.064

Note: Numbers in parentheses are *T*-tests for the coefficients immediately above.

[a]Age of head minus 20 to approximate number of working years.

[b]Net worth.

[c]This is a short-run elasticity. The long-run elasticity of saving is zero under the assumptions of the lagged adjustment model.

[d]Meaningful estimates cannot be computed.

[e]Liquid assets.

[f]Mortgage debt.

[g]Instalment debt.

ungrouped variables only, being a little higher for contractual saving and considerably lower, though still well above one, for liquid saving. Theoretically, these elasticities are unbiased if transitory income within each group is approximately zero (while some bias due to transitory income may still remain in the elasticities of Table 7), and in any case they show considerably closer agreement with the asset elasticities of Table 2.

VI. Summary and Conclusions

In Part I we have presented a simple general model of consumer saving and investment behavior, in which desired total assets or net worth is primarily a function of normal income and tastes; actual net worth, which at any point of time represents a delayed adjustment to desired net worth, is a function of normal income, transitory income, capital gains (which may be treated partly as normal and partly as transitory income), beginning-of-period net worth, and tastes; and saving is, apart from capital gains, simply the difference between end and beginning of period net worth.[100] The optimum asset structure depends, of course, not only on the variables explaining total assets and saving but also on the relative rates of return and risks of individual items of assets and liabilities, while the composition of saving during any period will depend as well on the initial values of these items.

Part II summarizes the results obtained by others in prior analysis of the determinants of consumer demand for total assets and saving and for individual items of saving or investment. It points out the very wide range of results derived in estimating the role played by income and initial assets in the determination of the demand for assets, saving or investment and discusses the difficulties in resolving these differences.

Part III presents the plan of our analysis; we have undertaken to correct some important deficiencies in the earlier work, but have not been able to complete all of our analysis for this paper. The empirical work in this paper is based on cross-section data on total and individual items of both assets (or stocks) and saving (or flows). We attempt to integrate the asset and saving analysis, to experiment with different mathematical forms, and to use several approaches to the measurement of normal (and transitory) income and to holding tastes constant. Unfortunately, the results of some of the more promising approaches

[100] In this paper we have ignored problems of capital transfers since they do not seem to affect significantly any of our conclusions.

are not yet available, and some were not conspicuously successful, but several interesting findings do emerge from the analysis in this paper.

The most noteworthy of the substantive findings in Part IV (on asset stocks) and Part V (on saving or flows) is that the long-run normal income elasticity of total net worth and the short-run normal income elasticity of total saving are substantially higher than one, a result which is inconsistent with the usual version of the "permanent" income hypothesis. With minor exceptions, only for consumer investment in tangible assets such as housing and consumer durables and in associated debt do both the long-run normal income elasticity of assets and the short-run normal income elasticity of saving appear to be in the neighborhood of one, while for most major categories of business, liquid, or financial investment, at least one and generally both of these elasticities appear to be well over one. The influence of transitory income on total saving—particularly on changes in liquid assets—seems to be somewhat greater than that of normal income, but the reverse is true for contractual saving and for total assets. The difference is especially marked for contractual saving.

A puzzling result of our analysis is the conflicting evidence relating to the planning span for total asset accumulation. While we are disposed to believe that the relevant period is relatively short, i.e., a period effectively much shorter than the earning span, there is as much evidence to contradict as to support this supposition. On the other hand, the significance of the initial assets coefficient in the parabolic saving form and the fact that this coefficient is significantly different from one in the logarithmic asset form tend to support our lagged adjustment model as opposed to a model which considers initial assets irrelevant.