1983

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11444

ISSN: 0318-725X
ISBN: 0-7714-0401-8

RESEARCH REPORT 8304

ASSET EFFECTS AND HOUSEHOLD SAVING: ESTIMATES FROM SURVEY DATA BY INCOME CLASS

by

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ABSTRACT

Saving response of various income groups to changes in asset prices is estimated from FRB micro data. Stock market gains increase saving in most cases, but other gains, incorporated into cross-section analysis for the first time, have a positive effect in some categories, negative in others. Earlier research, based on aggregate data, shows a positive association between capital gains and saving. Existing cross-section evidence, derived by pooling data across income classes, is questionable because of aggregation and specification bias. With one exception, all significant asset effects occur in income brackets below $15,000 (in 1963 dollars). Alternative specifications leave the results virtually intact.

January, 1983

I. Introduction

The main concern of this paper is to examine how households in various income classes alter their saving behavior in response to changes in the prices of assets they own. Although aggregate asset effects have been analyzed in a number of studies by this author (1972, 1979), Martin Feldstein (1973), among others, disaggregation by income class and by asset type has not been systematically attempted before. Economists have either dealt with all capital gains or with the effects of changes in stock prices [John Arena (1965), Irving Friend and Charles Lieberman (FL) (1975), Barry Bosworth (1975), and Frederic Mishkin (1977)].[1]

The focus on stock market gains clearly implies that their role is different from that of, say, real estate gains. Housing is the largest component of household wealth and it is more widely owned than corporate stock in the United States. These two asset types also differ in liquidity, in the nature and extent of their markets, and in the variability of their prices. Theoretical support for disaggregation comes from the life-cycle hypothesis which, when extended to incorporate the bequest motive, allows for differences in saving behavior among income classes, and for different marginal propensities to consume (mpc's) out of equities and other wealth.[2] Taxation alone can lead to varying saving responses because gains are not taxed uniformly up and down the income scale (one half of the income tax rate applies to realized gains in Canada and the United States), or across asset categories (e.g., gains on principal residences are tax exempt in Canada). The saving response of different income groups is important for several issues in taxation, capital formation, and economic policy, but it has not been adequately examined in the literature. To anticipate some of the results, the equations estimated here from micro data reveal a wide range of asset effects: In every income class but one, stock market gains increase saving whereas other gains, which are being incorporated into cross-section analysis for the first time, have a positive effect in some cases and negative in others. Analyses with aggregate data have invariably shown that appreciation in asset values adds to saving and reduces consumption.

These results have a direct bearing on the controversy about the magnitude and timing of aggregate asset effects highlighted by FL, and Bosworth. In this context, the principal finding here is that the existing cross-section evidence is faulty because it ignores differences in saving behavior among income classes and indiscriminately pools data across them. The null hypothesis that regression coefficients are the same for all income brackets, which must hold to justify pooling, cannot be sustained. There is also the possibility of specification bias because gains on assets other than corporate stock, which have been quite large in many years, were left out.[3]

The next section sets out the controversy about aggregate asset effects and briefly reviews earlier studies. A saving equation, focussing on factors which are likely to vary from one income class to the next is derived in Section III. The underlying data, compiled by the U.S. Federal Reserve Board and used by FL and others (called the FRB data hereafter) are appraised in Section IV, and statistical results are presented in Section V. Since the results are dramatically different from those in earlier work, a number of sensitivity tests are performed in Section VI. A summary of the key conclusions and their policy implications are contained in the last section.

II. Earlier Work

Do changes in asset prices affect the saving behavior of different income groups differently? This question has not been directly tackled in earlier studies although a popular belief seems to be that upper income and wealth groups, to whom gains mostly accrue, do not alter their consumption in response to fluctuations in asset prices. John Arena (1965), and Clyde Granger and Oskar Morgenstern (1970) use this argument to explain their finding that stock market gains have an insignificant effect on aggregate consumption. Since there is no direct, independent information on accrued gains for any income class, Arena (1965) referred to data about stock holdings compiled by Dorothy Projector and Gertrude Weiss (1966) which are also an integral part of the sample being used here, but there are no numbers on accrued gains in that survey, and realized gains reported by households in the subsequent saving survey were believed to be so unreliable that they were excluded from all tabulations and analysis.

Size of a household's portfolio will be a good proxy for accrued gains if all stock prices move together. Wealth, likewise, will accurately reflect total gains if prices of all asset types are perfectly correlated. That, apparently, did not happen in 1963. Accrued gains computed by FL from details of stock ownership recorded in the FRB sample were distributed rather differently than stock holdings and wealth, as Table 1 shows. The lowest income class, for example, accounted for 11.3 percent of accrued gains but only 6.9 percent of all corporate stock. About 46 percent of all gains accrued to households in the top three brackets who owned more than 50 percent of all stock, and so on. Other gains, similarly, did not follow the distribution of total wealth.

Even if consumption and saving decisions of upper income classes are not affected by movements in asset prices, there is always the possibility that should low and middle income classes get some gains, as they often do and report on their tax returns, their consumption and saving decisions might be influenced.[4] Even wealthier households might not be immune to sharp changes in stock prices such as in 1973-74 when more than 40 percent of the value of stock holdings was wiped out, and there are other assets in household wealth which can offset or reinforce the effects of stock market gains and losses. These hypotheses, however, have not yet been verified in any existing study.

The Controversy About Aggregate Effects

Besides the econometric work on saving and consumption cited above, stock market gains are an important channel for the transmission of monetary policy in the MIT--Pennsylvania--Social Science Research Council (MPS) model of the U.S. economy, while being a significant variable in the consumption function as well. In this model and in other estimates of the MPS consumption function, mpc out of stock market gains is 0.054, and most of this effect takes place in the very first year. The other time series studies mentioned above derived a much lower estimate of mpc, the first year effect of all capital gains being one half of what the MPS model suggests [Bhatia (1972)]. It is natural to turn to cross-section evidence to resolve controversies of this sort. In a careful and thorough analysis of the FRB data, FL found a strong support for the MPS model with an mpc modestly lower than the MPS estimates, and this, according to Bosworth (1975, p. 274), "...is a major step in reducing the uncertainty about the effects of capital gains and losses." This conclusion, however, is called into question because, in addition to the problems of aggregation (pooling) and specification (omitted variables) bias mentioned above, the FL finding is a curious one for at least two other reasons.

Firstly, conditioned as we are by econometric studies of the aggregate consumption function in which cross-section regressions have generally revealed a smaller mpc than in equations based on time series data, it is difficult to accept a larger short-run effect although the variable in question is capital gains and not income. Secondly, in earlier econometric studies, it has been postulated that households respond to expected gains (approximated by a distributed lag extending to five years in Bhatia (1972, 1979), or up to two years with quarterly data (MPS model)). FL could include only current year gains in their equation. Inasmuch as transitory gains will be more important in a single cross-section than over a period of time, one should expect a smaller effect in the former than in the latter. A contrary result will have to be justified.

At any rate, the comparison made by FL (p. 625) between cross-section and time series results is not entirely correct because many of these studies used very different econometric techniques (e.g., constrained maximum likelihood estimates in Bhatia (1972) but straight ordinary least squares in FL), different measures of gains (all gains as against stock market gains in FL), and different specifications (distributed lag functions rather than a contemporaneous relationship in FL). While it is not possible to replicate the time series equations with the FRB data, the FL equation can be improved to include other gains, and possible sources of bias can also be discussed. By far the most serious problem, which alters the results dramatically, is caused by pooling across income classes, and that will be discussed at length. For now, we turn to the derivation of a saving function.

III. Theoretical Considerations

In this section, a general saving function based on the life-cycle hypothesis (LCH) will be derived. It will be shown that the equation used by FL is a special case of the one presented below, and two sources of specification bias in the FL equation will be highlighted.

Note, first, that in keeping with much of the LCH literature, it is postulated that households treat capital gains as a component of wealth.[5] Since conventional measures of income do not include capital gains, saving is affected only if consumption is displaced. Alternatively, if saving is treated as the primary variable, consumption will change by an equal and opposite amount, i.e., for capital gains, marginal propensity to save (mps) equals (-mpc) whereas for conventional income, mps = 1 - mpc. In this framework, households make saving plans to bridge the gap between their actual and desired levels of wealth, the latter depending on their income, initial wealth, position in the life cycle, and a host of other considerations. If all goes as expected, actual saving will equal planned saving, but plans can go awry if some unforeseen events--such as capital gains or losses, or transitory income--happen. These would call for a modification of saving behavior. Some hypotheses along these lines can be formalized by adapting the equations derived by Irving Friend and Paul Taubman (1966) which are summarized below.

If actual net worth is denoted by A, accrued capital gains by G, and t is a time subscript,

$$A_t = A_{t-1} + G_t + \alpha(A_t^* - A_{t-1}) \ . \qquad (1)$$

Here A_t^* is desired net worth, $\alpha(A_t^* - A_{t-1})$ is planned saving, and α is the speed of adjustment or the fraction of the difference between A_t^* and A_{t-1}

which is made up during period t. Actual saving, (S), by definition, can be computed by subtracting capital gains from change in net worth, so $S_t \equiv A_t - A_{t-1} - G_t$, and if it is assumed that A_t^* depends only on normal income (Y^n), say, $A_t^* = k_1 Y_t^n$, we can write:

$$S_t = \alpha k_1 Y_t^n - \alpha A_{t-1} \quad . \tag{2}$$

It is implicit in these equations that there is no transitory income (Y^T), and household saving plans are not affected by capital gains either because none can be foreseen at the beginning of the period, or gains are believed to be transient. Under these assumptions, actual saving will, of course, equal planned saving. If Y^T and G_t are completely foreseen and incorporated into saving plans, we can write:

$$A_t = A_{t-1} + G_t + k_2 Y_t^T + \alpha(A_t^* - G_t - k_2 Y_t^T - A_{t-1}) \tag{3}$$

and

$$S_t = \alpha k_1 Y_t^n - \alpha G_t + k_2(1-\alpha) Y_t^T - \alpha A_{t-1} \quad . \tag{4}$$

These are equations (8) and (9) in Friend and Taubman. Notice that planned saving is reduced by a dollar for every dollar of expected capital gains, and the coefficient of both G_t and A_{t-1} is α, the speed of adjustment. If Y^T does not affect saving plans, its coefficient in (4) will be simply k_2, the mps out of transitory income, and if capital gains are entirely unforeseen, G_t will drop out of equation (4). These cases fall between the two extremes represented by equations (2) and (4). It is worth noting that in (4) actual saving will not equal planned saving as long as there is some transitory income unless k_2 is zero or $\alpha = 1$.

In order to focus on individual income classes and to consider gains on different asset types, equation (4) needs to be modified. At the outset, G_t is decomposed into G_t^c and G_t^o, stock market and other gains, respectively. Secondly, it is assumed that A_t^* depends on normal income, as in (4), and on initial wealth and expected gains. G^c and G^o might be treated very differently by various income classes in formulating their expectations. Accordingly,

$$A_t^* = k_1 Y_t^n + k_3 G_t^c + k_4 G_t^o + k_5 A_{t-1} \tag{5}$$

Thirdly, it is assumed that households apply some discount factors to their expected gains in making saving plans instead of blindly reducing planned saving by the full amount of expected gains as implied by equation (4). These discount factors could depend on type of asset: accrued gains on real estate might be construed as more "real" and permanent than those on corporate stock, or on the size and composition of household wealth: someone with all his eggs in one basket might react to accrued gains on one asset very differently from another household with a more diversified portfolio. Tax considerations by themeslves might elicit disparate discount factors from different income classes, sometimes within the same tax bracket for different asset types.[6] Since gains are taxed only on realization, the need to realize them will vary from group to group according to its liquidity position, income, credit rating, etc. Many of these points can be captured by writing planned saving as $\alpha(A_t^* - d_1 G_t^c - d_2 G_t^o - A_{t-1} - k_2 Y_t^T)$ where $(1-d_1)$ and $(1-d_2)$ are the discount factors applied to G^c and G^o respectively, $0 \leq d_1, d_2 \leq 1$. The final equation now can be written as

$$S_t = \alpha k_1 Y_t^n + \alpha(k_3 - d_1)G_t^c + \alpha(k_4 - d_2)G_t^o + k_2(1-\alpha)Y_t^T + \alpha(k_5 - 1)A_{t-1} \tag{6}$$

which will be estimated for each income class. The FL equation is essentially (4) with additional variables such as age, family size, etc. As such, it can be seen as a special case of (6) when $k_4 = d_2$, or other gains are omitted for some reason, and initial wealth and G^c are not allowed to have any effect on target wealth. So far as the expected signs of various coefficients are concerned, the main difference between (6) and (4) is that coefficients of both capital gains and initial wealth were expected to be negative in (4). Now they can be positive or negative. Presumably, k_1, k_2, d_1, and d_2 are non-negative. If the increase in target net worth caused by expected gains is greater than the reduction in planned saving, actual saving will increase. When $k_3 = d_1$ or $k_4 = d_2$, the corresponding capital gain will have no effect on saving, and negative coefficients for gains will emerge if $k_3 < d_1$ or $k_4 < d_2$.

The effect of initial wealth depends crucially on the magnitude of k_5. It is possible that in some income classes, a dollar increase in initial wealth might add more than a dollar to the target wealth, in which case the coefficient of A_{t-1} will be positive. It is interesting to observe here that in many econometric studies where equations such as (6) have been used, both negative and positive coefficients for A_{t-1} have been estimated although the explanation for them has been somewhat different from the one offered here. For example, Lawrence Klein (1954) points out that assets are an enabling factor as well as an indicator of past saving habits. In the former role, they are negatively associated with saving, but in the latter capacity the association is positive. Since low-income people are not habitually large savers, one should expect a negative coefficient for net worth in their case and a positive one for upper income groups. A non-linear effect is also possible because mps out of income could well increase with increasing net worth.[7]

Specification Bias?

If (6) is the correct equation and (4) is estimated, as FL have done, several potential sources of bias arise. Firstly, as mentioned above, pooling across income classes will create problems. That, however, is a statistical point, to be taken up in the next section. Secondly, omission of G^o can bias the coefficients of variables in the equation unless some variable in (6) is a good proxy for G^o, other gains have no effect on saving, or G^o is not correlated with the independent variables included in (6). The point to note is that even if one is interested in stock market gains, other gains belong in the saving equation, and their omission will affect the coefficient of G^c. Unfortunately, the extent of the bias thus caused cannot be determined on a priori grounds because coefficients of G^c and G^o have indeterminate signs in (6), and these two types of gains were positively correlated for some income classes and negatively for others in the FRB sample although accrued gains were recorded on each asset type in the aggregate in 1963. To illustrate, if both G^c and G^o are expected to have negative coefficients, and only G^c is included in the equation, its estimated coefficient will be biased towards zero in those income brackets where G^c and G^o are negatively correlated.

IV. An Appraisal of the Data

The unique feature of the FRB data is that for the first time a conscious effort was made to secure adequate response from households in the high income categories by oversampling them. A stratified random sample based on income was used to collect detailed information about income, saving, value of various components of net worth, several demographic variables, and size and value of individual holdings of publicly traded stock in each of 9 income strata. In almost every income class, there are more observations than have been used in most time series analyses of this topic, and in five income brackets, the sample size exceeds 200. The sampling design and coverage of the FRB data remain unsurpassed.

FL have enhanced the utility of this body of data by estimating gains that actually accrued on stockholdings during 1963 from prices quoted on the stock market at the beginning and end of the year. That cannot be done for other assets because markets for them are often local and not as active as the stock markets. Also, there is simply not enough information to compute gains actually accruing on, say, a respondent's house. Some indirect procedures, therefore, have to be followed.

We have allocated aggregate accrued gains on non-farm real estate and certain farm assets reported in Bhatia (1970) for 1963 to each household in proportion to the value of the relevant asset type owned by it. This is equivalent to using a price index rather than the actual price of an item. For corporate stock, it is like using the Standard and Poor's 500 instead of the price of, say, IBM stock. Otherwise, these estimates are comparable to those on stock market gains compiled by FL and their coefficients can be similarly interpreted. One can also get an idea of the specification bias caused by omitting them from the regression equations as FL have done.

Shortcomings of the Data

Apart from the well-known problem of underreporting and incorrect information highlighted by Robert Ferber et al (1969), and the unique difficulties of estimating stock market gains discussed by FL, it could be argued that (i) these data are stratified by current income, not "permanent" of "lifetime" income which would be more meaningful from the standpoint of economic theory, and (ii) they are dated since they relate to 1962 and 1963.

It is difficult to argue against either of these points. More recent data will be preferable, and the other bases of stratification suggested above would be more meaningful, but comparable data for more recent years are not available. These limitations are not serious in our judgment, and we believe that the FRB data are well suited to the main concerns of this paper. There is no better way of testing for aggregation bias than by referring to the strata in which data were compiled. Comparable income categories for more recent years can always be determined by adjusting for inflation or by computing population deciles. At any rate, since these data have been extensively used, comparability with the literature leaves little choice in the matter.

Before turning to empirical results it is worth noting that numbers on disposable income, especially for the two highest income classes (1963 money income $50,000 or more), could be wide off the mark because no information was collected on taxes actually paid in the FRB survey, and it is difficult to compute tax liability accurately from the available data. Many pieces of information are missing. Figures on realized gains are of dubious quality, and there is no record of losses carried forward, etc. Although we have followed the Income Tax Act and the procedures described by Projector (1968, p. 50) quite closely, estimates of tax liability and disposable income for upper income classes are probably not very reliable, certainly less so than those for lower income brackets where tax rates are lower and realized gains are not very large.[8]

V. Statistical Results

The results of estimating equation (6) for all 2164 observations pooled together as well as for each of the 9 income classes are presented in Table 2. Weighted regressions are used in all cases to reflect the sampling design of the FRB data as suggested by Klein (1974). We adopt Projector's definition of saving except that depreciation on own homes is subtracted, and expenditure on automobiles is treated as a part of consumption. Accordingly, automobiles are not included in net worth either.[9] Normal income is defined as the average of disposable incomes for 1962 and 1963; transitory income, $Y^T = Y_{63} - Y^n$; G^c is accrued gain on corporate stock for 1963 computed by FL, G^o denotes other capital gains for that year allocated from time series data, and market value of net worth at the end of 1962 is A. Age is the age of head of household, and Size is family size--both continuous variables--whereas Occu is a dummy variable which is set equal to one for self-employed respondents and is zero for everyone else.[10] These variables were similarly defined by FL, so the results in Table 2 can be directly compared to those derived by them.

<u>To Pool Data or Not?</u>

The first question worth considering is whether data should be pooled across income classes. As noted above, the FRB survey used a stratified random sample based on income, and pooling can be justified if regression coefficients are the same in each stratum. That is not so in this sample because the relevant F-statistic to test the null hypothesis that these coefficients are constant is 4.83, which is more than 3 times the 1 percent critical value from the F-distribution. Hence the null hypothesis cannot be sustained. Aggregation across income categories is unwarranted, so we shall examine the overall equation no further than to note that it is very similar to FL's equation (1): all the coefficients reported for pooled data in Table 2 have the same sign as in FL's equation (1); Y^n, Y^T, and A are significant at the 95 percent level; the coefficient of G^o is also significant, negative, and almost three times that of G^c. The exclusion of G^o from the FL equation seems to have led to an underestimate of the absolute value of the true coefficient of G^c (-.018, instead of -.026 in Table 2). Only one of the nine coefficients of G^c is negative (income class $25-50,000), and that seems to be dominating all others in the entire sample.

Results for Individual Income Classes

Before examining these in detail, it should be noted that the income coefficients might not be very accurate. Normal income has been defined as an average of disposable income for 1962 and 1963 mainly because data for other years are not available, whereas a longer lag might be more appropriate. Also, as discussed above, it is unlikely that tax liability has been measured with any degree of precision, especially for the highest three income classes. The very large coefficients of Y^n and Y^T in these instances, which are untenable on theoretical grounds, are probably a direct result of gross underestimation of disposable income.[11]

Coefficients of G^c and G^o

The most remarkable feature of these coefficients is that they vary so much in sign and magnitude across income classes. In fact, their variability is what accounts for the result derived above about pooling. In five out of nine brackets, G^c and G^o have an opposite effect on household saving, i.e., if stock market gains increase saving, other gains tend to reduce it, and vice versa. Analyses of aggregate data would lead one to expect negative coefficients for capital gains. In only one income class, $25-50,000, both G^c and G^o have a negative effect on saving. Their joint effect will be to increase saving below an income of $25,000, and reduce it thereafter.

The only coefficients of G^c which are statistically significant are positive, and their highest values occur in the two income classes between

$5,000 and $10,000. According to this sample, households with an income of $15,000 or more held 58.3 percent of all stock outstanding. In none of these income classes do gains on corporate stock have a significant effect on saving. This supports Arena's contention noted above that those who own most of corporate stock do not alter their set spending (and saving) patterns in response to changes in stock prices, but Arena was using this argument to explain the low mpc he had estimated from aggregate time series data. The large, positive, and highly significant coefficients for G^c in four income classes which accounted for nearly 39 percent of all accrued gains certainly raise doubts about Arena's aggregate result.

Coefficients of G^o show greater variation, both in sign and magnitude, than those of G^c: positive in the lowest income category, negative in the next two, positive and significant in the following two, and then negative in the highest four income brackets. The one coefficient which is significant as well as negative is in the income class $50-100,000.

In terms of equation (6), a positive coefficient for capital gains suggests that $k_3 > d_1$ for G^c, and $k_4 > d_2$ for G^o, assuming d_1 and d_2 to be positive. That is, accrued gains increase target level of wealth more than they reduce planned saving. This argument, combined with high speed of adjustment (α close to unity), can explain the very large coefficients (all greater than 1) observed in the three income classes between $5,000 and $15,000.[12]

Estimates of α, k_3, k_4, d_1, and d_2 for each income class are needed to verify these possible explanations, but the non-linear techniques required for this purpose turn out to be too cumbersome, so it is difficult to test if the relative magnitudes of these parameters postulated here are in fact borne out by the data. All in all, accrued gains mostly have a positive effect on saving, and it is significant in income classes below

\$15,000. The only exception is the negative and highly significant coefficient for G^o in the second highest income bracket \$50,000-100,000.

VI. Some Sensitivity Tests

The significant positive effects of accrued gains on saving suggested by the statistical results reported above are remarkable because all existing evidence, whether based on time series data or pooled cross-section data, points to the contrary. At least for this reason, the coefficients appear to be highly implausible although they are by and large in accord with the theoretical specification. Before reading too much into the results, it is worthwhile to see how sensitive they are to alternative specifications and definitions. In what follows, a number of sensitivity tests will be performed. First, equation (6) will be reestimated for two subsamples in an attempt to delete some cases of dubious quality; second, possible non-linearity with respect to income and wealth will be examined; third, an adjustment for heteroscedasticity, which often arises in cross-section work, will be made; and lastly, another source of specification bias alluded to in Section II will be considered.

In the first subsample, households which did not provide sufficient detail about stock ownership were dropped; and in the second, a number of quality checks were applied. For example, households with saving greater than normal income and negative net worth were excluded, and so on.[13] This led to an increase in $\bar{R}^2$ in most cases, the coefficient of G^o changed signs in one or two instances, and some of the t-values were higher. The basic conclusions that asset effects varied greatly across income classes, and that G^c generally had a positive effect on saving remained unaffected. The only negative coefficient for G^o which was significant previously

($50-100,000 bracket) became positive and insignificant. In fine, there was no capital gains coefficient in these two subsamples which was both negative and statistically significant.

To test for possible non-linearities, $(Y^n)^2$ and A^2 were included in some of the regressions. The new income term was significant in the top income class and $25-50,000 category, while A^2 was significant in three brackets between $3,000 and $15,000. There was little change in results about asset effects: None of the coefficients of stock market gains changed signs although their magnitudes were slightly altered. There were no significant negative coefficients for G^c, and as before, only one for G^o, in the income bracket $50-100,000. For households with incomes between $15,000 and $25,000, and between $3,000 and $5,000, coefficient of G^o switched from negative to positive, but it was not significant in the first category.

Since saving equations are being estimated for individual income classes, heteroscedasticity is not as serious a problem as it commonly is in aggregate cross-section data. Nonetheless, in some regression runs, data (dollar variables and the constant term) were deflated by the square root of normal income, Y^n. The coefficient of G^c became negative and insignificant in the lowest income class, but nothing drastic happened in any other category. For G^o, the biggest change occurred in the lowest income bracket: the coefficient jumped from .386 to .973 (and became significant). In other income classes, changes were relatively minor: none of the coefficients switched signs, nor did their t-values alter much.

Specification Bias Once Again

We have been forced to use data on actual accrued gains whereas the theoretical specification calls for expected gains. If it is assumed that expectations are generated by a distributed lag mechanism, G_{t-1}, G_{t-2}, etc., should have been included in the equation. If $\hat{\beta}_{1i}$ is the estimated coefficient of, say, G_t^c in the i^{th} income class,

$$E[\hat{\beta}_{1i}] = \hat{\beta}_{1i} + \hat{\beta}_{2i} \cdot b_{21} , \qquad (7)$$

where $\hat{\beta}_{2i}$ is an estimate of lagged gains in the correctly specified equation, and b_{21} is the coefficient of G_t^c in a regression in which lagged gains are the dependent variable, and all other variables in (6) are included as independent variables. Although $\hat{\beta}_{1i}$ is positive in several cases, it is possible that $E[\hat{\beta}_{1i}]$ is negative, for example, when $\hat{\beta}_{2i}$ is also positive but b_{21} is negative, i.e., when there is a strong negative serial correlation in the G-series. This could well be the case here, especially for corporate stock, because data developed by Bhatia (1973) show that there were accrued losses in 1960, large gains in 1961, heavy losses in 1962, and big gains again in 1963 on the stock market. On the other hand, losses accrued on real estate in just one of these four years, 1962, and their amount was relatively small. Unfortunately, there is no satisfactory way of allocating past gains to the households in the FRB sample. Therefore, it is hard to say if the specification bias has been strong enough to reverse the sign of the estimated coefficient. Panel data for a number of years will be needed to verify this point.

Aggregate mps Out of Capital Gains?

Given the results reported in the preceding section, it is not clear how aggregate mps out of accrued gains should be computed from the wide range of asset effects found here for different income classes. The result about pooling certainly suggests that the coefficients of G^c and G^o estimated from pooled data cannot be interpreted as aggregate marginal propensities to save. The overall effect of such gains on aggregate saving in the economy as a whole will have to be some average of what households in different income brackets do.

One possibility is to take a weighted average, using the inverse of the variance of each coefficient as weight. That is, the larger the variance, the smaller is the reliability of a coefficient, hence the lower is its weight in the averaging process. Accordingly, if β_i is the coefficient of capital gains and $V(\beta_i)$ its variance in the saving regression for the i^{th} income class,

$$\bar{\beta} = (\Sigma\, \beta_i \cdot \frac{1}{V(\beta_i)})/(\Sigma\, \frac{1}{V(\beta_i)}) \,, \qquad i=1,\ldots,9 \tag{8}$$

and $\bar{\beta}$ might be treated as a measure of aggregate mps. From the numbers in Table 2, for stock market gains, $\bar{\beta}$ turns out to be 0.103 and -0.116 for other accrued gains.

This estimate of mps out of stock market gains is definitely at odds with the results in the literature. In terms of the theory underlying equation (6), it implies that, when stock prices rose, on an average, households increased their target wealth more than they reduced their planned saving. It is not unlikely that, coming on the heels of the heavy losses in 1962, the big gains on the stock market in 1963 did lead households to raise their wealth targets considerably while facilitating a rebuilding of their portfolios. If this was indeed the case, the results from FRB data cannot be generalized or compared to conclusions based on time series data. Other samples, for different years, will be needed to resolve the controversy about aggregate asset effects. These estimates nevertheless are directly comparable to FL's, and they do question FL's key conclusions. Their estimates of marginal propensity to save out of stock market gains are invalid unless there is a good reason to dismiss the all important result about pooling.

Other gains have not been separately examined in earlier studies, but one can consider the overall effect of both types of gains. The first year mpc out of <u>all</u> accrued gains ($G^c + G^o$) was found to be .014 by Bhatia (1972). Here, that turns out to be .013 (the sum of $\bar{\beta}$ for G^c and G^o, with the opposite sign). Strictly speaking, these two numbers are not comparable because Bhatia's estimate was derived from a distributed lag function, with weights optimally chosen for both expected income and expected gains. In the present analysis, expected income is a simple average of two years' income, and expected gains are simply current year gains. Both, however, are first-year coefficients and capture similar short-run asset effects. On the whole, this comparison is better than the one FL made between their coefficient of G^c (estimated from pooled data, with G^o omitted) and coefficients of <u>all</u> gains derived in time series studies.

VII. Conclusions and Economic Implications

This paper has focussed on the cross-section evidence about the effects of capital gains on household saving and consumption derived from the FRB survey of changes in family finances conducted in 1964. There are good reasons to believe that different income classes will respond differently to changes in asset prices, yet all empirical work on this topic so far has been done with aggregate data. Even the FRB data were pooled across income classes in earlier work although this survey was unique in providing an adequate number of observations for every income category. There are no direct estimates of accrued gains in the FRB survey, but there is plenty of information about households' assets and liabilities from which Friend and Lieberman (1975) computed stock market gains, and we have managed to derive a measure of gains accruing on other assets. A saving equation, based on the life-cycle hypothesis, is specified to distinguish between the two types of gains and to incorporate a number of features that vary across income classes. The main conclusions are:

1. There is a wide range of asset effects on household saving. Even within the same income class, stock market gains might increase saving while other gains have the opposite effect.

2. The FRB data were collected from a stratified sample based on income. The null hypothesis that regression coefficients are the same for all income classes cannot be sustained. Pooling of data across income strata, therefore, is unwarranted, so results derived from pooled data are called into question.

3. Whenever gains from corporate stock have been statistically significant, their coefficient has been positive. Earlier studies have found a strong support for a negative effect, with both cross-section and time series data. The key results derived here from micro data are not much affected by changes in specification, sample size, and adjustments for heteroscedasticity, but they might be altered if a potential source of bias could be determined (which would require panel data).

4. Other capital gains, which have been incorporated into a cross-section analysis for the first time, have a positive effect on saving in some categories and negative in others.

5. Almost all of the statistically significant coefficients occur in income classes below $15,000. The only exception is the second highest bracket, $50,000-100,000, in which other gains are negative and significant. This lends some support to the putative notion that gains have hardly any influence on saving and consumption decisions of households in upper income brackets to whom they mostly accrue.

Economic Implications

These results have important implications for the two principal themes pursued in the paper.

So far as the controversy about the timing and magnitude of aggregate asset effects is concerned, our analysis strongly suggests that the existing cross-section evidence about the effects of stock market gains is flawed and cannot be relied upon to support findings of the type of consumption equations used in the MPS model. Analysis of FRB data shows that households in most income classes increased their saving when stock prices rose, which is contrary to what time series studies have indicated. The controversy, therefore, is far from settled. When all accrued gains are considered, the aggregate mpc turns out to be moderately lower than the estimates based on time series data.

Perhaps a more significant contribution of the paper is the empirical evidence about the rich diversity of asset effects, varying by income class and asset type, which have been alluded to but not analyzed before. These results have a direct bearing on a number of policy issues. For example, in taxation, one argument in favor of preferential tax treatment of capital gains, which benefits upper income and wealth groups disproportionately, is that they promote saving, especially by households with high incomes. Our results suggest that if saving is to be promoted, the case for lighter taxation of stock market gains is stronger than for other gains. Moreover, tax policies should be designed to favor households with incomes between $5,000 and $15,000 (in 1963 dollars). Others will most likely reduce saving when asset prices rise.

TABLE 1. PERCENTAGE DISTRIBUTION OF NET WORTH, CAPITAL GAINS, AND CORPORATE STOCK BY INCOME CLASS IN THE FRB SAMPLE[a]

1963 Income	G^c	Stock Holdings	G^o	Net Worth
< 3,000	11.5	6.9	4.1	11.9
3-5,000	5.3	5.1	5.5	12.5
5-7,500	4.0	3.9	3.4	9.9
7.5-10,000	5.7	10.8	5.7	12.7
10-15,000	18.6	15.0	7.9	15.5
15-25,000	9.2	8.0	8.1	9.4
25-50,000	22.4	18.4	19.0	13.7
50-100,000	10.8	12.4	26.3	7.8
100,000 or more	12.5	19.5	20.0	6.6

[a]Percentages have been computed from weighted totals. G^c denotes accrued stock market gains and G^o is gain on other asset-types during 1963. Stockholdings and net worth have been evaluated at the end of 1962.

TABLE 2. ESTIMATES OF EQUATION (6) WITH FRB DATA, 1963

1963 Income Class (dollars)[a]

Variable	Pooled Data	<3,000	3-5,000	5-7,500	7.5-10,000	10-15,000	15-25,000	25-50,000	50-100,000	100,000 or more
CONS.	-.429 (-.56)	-.135 (-.28)	1.660 (.98)	-.639 (-.48)	-5.756 (-1.68)	-1.030 (-.38)	-5.180 (-.71)	2.758 (.14)	-4.44 (-.07)	235.00 (1.05)
Y^T	.319 (3.46)	.597 (4.73)	-.546 (-1.09)	.096 (.33)	1.239 (2.32)	.555 (1.69)	.947 (1.72)	-1.130 (-1.41)	2.149 (1.37)	1.746 (1.83)
Y^n	.268 (6.16)	.233 (1.98)	-.075 (-.18)	.154 (.64)	.802 (1.82)	.332 (1.46)	.287 (.72)	-.195 (-.27)	2.183 (1.74)	1.362 (1.53)
G^c	-.026 (-1.54)	.078 (1.97)	.330 (1.24)	1.015 (4.95)	.678 (3.93)	.183 (2.18)	.154 (1.23)	-.078 (-.99)	.125 (1.08)	.009 (.14)
G^o	-.085 (-6.19)	.386 (1.23)	-.280 (-.79)	-.498 (-.54)	2.973 (4.32)	1.251 (4.61)	-.074 (-.40)	-.134 (-.58)	-.157 (-4.34)	-.055 (-.85)
A	-.009 (-5.11)	-.016 (-1.89)	.013 (1.06)	-.072 (-7.02)	-.083 (-7.64)	-.022 (-1.68)	-.035 (-2.69)	.002 (.30)	.013 (1.42)	-5.729 (-2.12)
Age	-.001 (-.086)	-.003 (-.49)	-.019 (-1.40)	.031 (2.64)	.036 (1.36)	-.012 (-.44)	.137 (1.87)	.087 (.31)	-1.104 (-1.25)	-.016 (-1.85)
Size	-.133 (-1.46)	-.068 (-1.09)	-.094 (-.95)	-.152 (-1.79)	-.125 (-.84)	-.173 (-1.13)	-.834 (-1.76)	.623 (.44)	-5.703 (-1.02)	3.698 (.19)
Occ.	.782 (1.34)	-1.19 (-2.61)	-.242 (-.33)	.596 (1.08)	-.522 (-.43)	2.212 (2.72)	1.989 (1.11)	4.673 (1.02)	12.562 (.84)	9.018 (.18)
$\bar{R}^2$	.06	.19	.02	.17	.18	.13	.12	.03	.13	.17
No. of cases	2,164	333	272	346	296	356	196	169	122	74

[a]Dependent variable is saving net of depreciation on owned homes. Net purchases of automobiles are excluded from both saving and net worth. Figures in parentheses are t-statistics. All dollar values are in thousands, and $\bar{R}^2$ is R^2 adjusted for degrees of freedom.

Footnotes

*University of Western Ontario. Thanks are due to Aman Ullah for many stimulating discussions, and to Serena Ng for competent research assistance. I am specially grateful to Charles Lieberman for his data on stock market gains and numerous conversations, to James Davies for access to the FRB tape, and to Erling Thoreson of the Federal Reserve Board for answering many a query.

[1] One exception is Peek (1980) who starts out by distinguishing among four categories of gains in his time series analysis, but at the estimation stage, only gains on durable goods are distinguished from the rest.

[2] See Franco Modigliani's comments in Mishkin (1977).

[3] According to the estimates reported by Bhatia (1970), these other gains amounted to $16.6 billion, which is 48 percent of the FL figure for corporate stock.

[4] Data compiled from tax returns show that in every year between 1960 and 1965 (the FRB data are for 1963), individuals with income below $25,000 accounted for 40 to 50 percent of all realized gains.

[5] According to the Haig-Hicks-Simon definition of income, accrued gains are a component of income. This issue was considered by Bhatia (1972, 1979), but hypotheses along these lines--"the income approach"--were rejected. Although cross-section evidence on this question is of interest, that will take us away from the main concerns of this paper.

[6] Taxation of capital gains in the United States is a complicated matter. Realized long-term gains, and not the accrued gains incorporated into the theoretical specification here, are taxed at one half the marginal

rate applicable to income. Gain on the sale of an owner-occupied house is exempt if it is applied to the purchase of a new home within a certain period. For more details, see Pechman (1977), Chapter 4.

[7]For more discussion of "saturation" and "habit-persistence" in this context, see Katona (1951), pp. 167-70. Also see Thore (1961), pp. 75-77.

On the question of non-linearity, Morgan (1954) finds significant asset-income interaction in several cross-section saving regressions.

[8]Estimates of tax liability used by Projector were not recorded on the FRB data tape and cannot be found although, even if these were obtainable, for reasons mentioned in the text, their reliability would be in doubt. In our calculations, mean disposable income is very close to that reported by Projector for the entire sample and for income classes below $25,000, but for the three highest brackets, our estimate falls short of Projector's by as much as 25 percent in some cases.

Data compiled in the Statistics of Income from individual tax returns show that in 1963, realized gains were less than 2 percent of adjusted gross income for individuals with income below $25,000. This percentage rises steadily to almost 50 percent in the highest category, $100,000 and above.

[9]Equation (6) was also estimated by including net purchases of automobiles in both saving and net worth without any appreciable difference in results. Depreciation on housing was estimated at 1.5 percent of the value of owned home, as in FL.

[10]Except for the introduction of G^o, these definitions and procedures are the same as in FL. Also, we have 2164 observations. FL, for some inexplicable reason, had only 2159.

[11]If money income is used instead of disposable income, the coefficients of Y^n and Y^T do drop well below unity for the three highest income classes, and for the income bracket $7,500-10,000, the coefficient of Y^T becomes 1.

[12]It is not unlikely that α was indeed close to unity in 1963. Between January and June of 1962, stock prices declined by about 27 percent which reduced household net worth by almost 10 percent in less than six months. Real estate prices also declined in 1962. As the stock market turned around, and prospects began to look good (stock prices continued to increase for the next 11 quarters. Cf. Bhatia (1973), Table 2), households tried to rebuild their portfolios.

[13]As Ferber _et al_ indicated, those who reported number of shares owned probably provided fairly accurate information about actual stock-holdings. This and other quality checks were also used by FL (pp. 629-30).

References

Arena, J. J., "Capital Gains and the 'Life-Cycle' Hypothesis of Saving," American Economic Review, March 1964, 54, 107-111.

____________, "Postwar Stock Market Changes and Consumer Spending," Review of Economic Statistics, November 1965, 47, 379-391.

Bhatia, K. B., "Capital Gains and the Aggregate Consumption Function," American Economic Review, December 1972, 62, 866-879.

____________, "Accrued Capital Gains, Personal Income and Saving in the United States, 1948-64," Review of Income and Wealth, December 1970, 16, 363-378.

____________, "The Estimation of Accrued Capital Gains on Individuals' Corporate Stock Holdings," Journal of American Statistical Association, March 1973, 68, 55-62.

____________, "Capital Gains and Inequality of Personal Income: Some Results from Survey Data," Journal of American Statistical Association, September 1976, 71, 575-580.

____________, "Corporate Taxation, Retained Earnings, and Capital Formation," Journal of Public Economics, September 1979, 11, 123-134.

Bosworth, B., "The Stock Market and the Economy," Brookings Papers on Economic Activity, 2, 1975, 257-300.

Feldstein, M. S., "Tax Incentives, Corporate Saving, and Capital Accumulation," Journal of Public Economics, March 1973, 5, 159-171.

Ferber, R., J. Forsythe, H. W. Guthrie, and E. S. Maynes, "Validation of Consumer Financial Characteristics: Common Stock," Journal of American Statistical Association, June 1969, 64, 415-432.

Friend, I., and C. Lieberman, "Short-Run Asset Effects on Household Saving and Consumption: The Cross-Section Evidence," American Economic Review, September 1975, 65, 624-633.

Friend, I., and P. Taubman, "The Aggregate Propensity to Save: Some Concepts and Their Application to International Data," Review of Economic Statistics, May 1966, 68, 113-123.

Katona, G., Psychological Analysis of Economic Behavior, New York, 1951.

Klein, L. R., A Textbook of Econometrics, New Jersey, 1974.

Klein, L. R., "Statistical Estimation of Economic Rélations from Survey Data," in Katona, G., et al (ed.), Contributions of Survey Methods to Economics, New York, 1954.

Mishkin, F. S., "What Depressed the Consumer? The Household Balance Sheet and the 1973-75 Recession," Brookings Papers on Economic Activity, 1977, 123-174.

Morgan, J. N., "Factors Related to Consumer Saving When it is Defined as a Net-Worth Concept," in Katona, G., et al (ed.), Contributions of Survey Methods to Economics, New York, 1954.

Pechman, J. A., Federal Tax Policy, Washington, 1977.

Peek, J., "Capital Gains and Personal Saving Behavior," Discussion Paper No. 105, May 1980, Boston College.

Projector, D. S., Survey of Changes in Family Finances, Washington, 1968.

Projector, D. S. and Weiss, G. S., Survey of Financial Characteristics of Consumers, Washington, 1966.

Rasche, R. H., "Impact of the Stock Market on Private Demand," American Economic Review, May 1972, 62, 220-228.

Rosen, L. J., "Stock Market Capital Gains and Consumer Expenditures," unpublished Ph.D. dissertation, Yale, 1971.

Shore, S., Household Saving and the Price Level, Stockholm, 1961.

U.S. Treasury Department, Statistics of Income, Individual Income Tax Returns, Washington, 1979.