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Consumer Debt and Spending:
Some Evidence From Analysis of a Survey

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CONSUMER DEBT AND SPENDING: SOME EVIDENCE FROM ANALYSIS OF A SURVEY

by James Tobin*

1. The Approach and the Data

A survey of the consumer debt position of a sample of households at the beginning and end of a year provides an opportunity for statistical analysis of variables associated with the size of a household's consumer debt and with the amount and direction of change in that debt during the year. The objective of such analysis is to assist in the estimation of stable economic behavior relationships which can serve as tools in forecasting and in assaying the effects of alternative policies. As will become amply clear in the course of the paper, this objective is a difficult one to achieve; the results of statistical analysis of cross-section data are likely to be susceptible to a variety of possible interpretations. Still the attempt must be made; the ambiguities of econometric analysis of aggregate time series are, if anything, even greater than those confronting the analyst of cross-sections of individual economic units.

Households differ from each other in economic behavior for a great variety of reasons, some of which are measured in surveys and some of which are not. Many of the relevant differences among consumers -- e.g., age of head, location, occupation, personality -- may be of very little

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interest to the economist. His central interest is in the effects on economic behavior of differences in economic variables such as income and wealth. Yet he ignores the other variables at his peril. Expenditure on some commodity, for example, may appear to be positively related to income. But suppose it is also positively related to size of family, age, size of city, and educational attainment. Income happens to be positively related to all these things too. Perhaps the apparent positive effect of income on expenditure is only an illusion, mirroring the effects of the demographic variables with which income is associated. If so, the economist will be fooled when national income rises the next year. He will expect a rise in expenditure that does not occur; it does not occur because, even though income fluctuates, the basic demographic determinants change very little from year to year.

To avoid this kind of pitfall, the approach of the analyst of survey data must be resolutely multivariate. Two- and three-variable frequency tables are interesting and suggestive. But it is net or ceteris paribus effects rather than gross associations that we wish to estimate. For this reason, the present paper relies heavily on the technique of multiple regression. An attempt is made to estimate, by this technique, the effects of the size of existing debt on three kinds of subsequent behavior, holding constant a variety of other variables relevant to this behavior. Likewise, the net effects of a variety of factors on change in consumer debt are estimated.

1.1 The nature of the sample.

The data for the calculations reported in this paper came from the 1952 and 1953 Surveys of Consumer Finances conducted by the Survey Research Center,

University of Michigan, for the Board of Governors of the Federal Reserve System.*

* The author is grateful to the Center and to the Board for the opportunity to have access to these Surveys, and to the Center for its assistance in undertaking this study during a semester's visit in the fall of 1953.

The sample used in this analysis consists of spending units who were interviewed both in the 1952 Survey in early 1952 and in the 1953 Survey a year later. The number of spending units reinterviewed was 1036, roughly a third of the entire Survey in either year. The reinterview sample is somewhat unrepresentative of the national population of spending units. Certain kinds of units are systematically excluded from the sample: units which were formed or dissolved during the year, and in this case, units which moved from one dwelling unit to another. This disadvantage is outweighed, for the purpose of studying behavior relationships, by the analytic advantages of having two observations of each unit. Re-interviewing increases the accuracy of relevant financial data. Income in 1951, and such stock variables as asset holdings and outstanding debt as of January 1, 1952, can be obtained more reliably in February 1952 than in February 1953. Accordingly, financial flow variables for 1952 can be estimated, with less reliance on respondents' memory, by comparing the stock reported in the 1953 interview with the stock reported by the same respondent a year earlier.

For the purpose of the statistical analysis, farm spending units and secondary spending units are excluded. (A secondary spending unit is a unit of one or more persons that maintains its own finances but shares the dwelling unit of some related or unrelated primary spending unit.) In addition, spending units are excluded who did not give responses on one or more of the relevant variables. The remaining

units are then divided into two groups for separate analytic treatment, as follows:

1952 income greater than \$1000	652
1952 income less than \$1000	<u>55</u>

The reason for treating separately spending units with low incomes is as follows: In general, it is desirable, for statistical and economic reasons, to use as variables ratios in which income is the denominator. Income is a powerful variable, with which both the dependent variable and the other independent variables in a regression are likely to be highly correlated. The use of ratios to income focusses attention on explaining, by means of other variables, the share of income devoted to some particular purpose. From a statistical point of view, the use of ratios to income diminishes heteroskedasticity in a sample of households: the variance of the dependent variable, expressed in dollars, is roughly proportional to income, and dividing by income tends to make the variance homogeneous. This procedure, however, leads to extreme values when the income denominator is small or negative. Consequently the low-income spending units are here analyzed in terms of dollar variables, rather than fractions of income.

The spending units in this sample did not have equal probabilities of being included. Some were deliberately given a greater probability of selection than others. These differentials in sampling rate were designed to compensate for anticipated differentials in the variance of the attributes the sample was intended to measure. Thus high-income households had a greater probability of selection than low-income households, because it was believed to require more observations to get an estimate with given accuracy for high- than for low-income units. In addition to deliberate differentials in sampling rate, there are unintended differences due to failures to obtain responses from spending units drawn for

the sample. As a consequence, each observation in the sample stands for a different number of spending units in the population: an observation of a low-income unit represents more unobserved households than an observation of a high-income unit. For some purposes, it is important to weight the observations in the sample accordingly. It is important to do so whenever the sample is used to estimate a population parameter which might be expected to differ among the differentially sampled population groups. This will be true of almost all characteristics of single-variable distributions: averages and frequencies of income, expenditure, debt, liquid asset holdings, and other financial and economic variables. It is also important to use the weights whenever the sample is used to estimate a parameter of the distribution of a variable whose variance is in fact inversely proportional to the weights. If the observations are not weighted in such a case, the less reliable observations will have too great an influence on the estimate.

In the calculations of the present paper, the weights were not used. The objective was to estimate regression coefficients and other characteristics of multivariate distributions, not to estimate parameters of univariate distributions. Thus the single-variable means and frequencies calculated here as by-products are unweighted and, therefore, biased estimates of populations means and frequencies; this should be remembered in interpreting any single-variable statistics. This bias does not extend, it is believed, to the regression coefficients and other multivariate parameters. While expenditures for durable goods, for example, are obviously different for high-income than for low-income groups, the marginal propensity to spend for durable goods is not necessarily different for one group than for the other. If it is, the remedy is not

weighting to obtain a properly averaged slope but fitting a non-linear relationship that allows for differences in slope. The other reason for weighting -- to avoid heterogeneity of variances -- also does not apply, provided other measures to avoid this malady are employed. As explained above, the use of ratios to income is an attempt to produce homogeneity of variance. It is, in effect, a more systematic and, for many observations, a more drastic weighting scheme than the use of the sampling weights; to use the sampling weights also would be to make an over-correction for heterogeneity of variance.

1.2. Regression variables.

The variables used in the analysis are as follows:

- Y 1952 income of the spending unit, after estimated federal tax liability, as reported in 1953 Survey.
- Y_{-1} 1951 income of the spending unit, after estimated federal tax liability, as reported in 1952 Survey.
- E expenditure, net of trade-ins and sales, of the spending unit on cars and major household goods during 1952, as reported in 1953 Survey, regardless of how financed.
- E_{-1} the same for 1951, as reported in the 1952 survey.
- L total holding of liquid assets January 1, 1952 reported by the spending unit in the 1952 Survey, including checking accounts, savings accounts, and savings bonds.
- L_{+1} the same for January 1, 1953 as reported in the 1953 Survey.
- $\Delta L = L_{+1} - L$. change in liquid asset holding during 1952.
- D outstanding personal debt (debt other than business and real estate indebtedness) as of January 1, 1952, as reported in the 1952 Survey.
- D_{+1} the same for January 1, 1953, as reported in the 1953 Survey.
- $\Delta D = D_{+1} - D$. change in outstanding personal debt during 1952.
- $N = L - D$. "net asset position" at January 1, 1952.

$\Delta N = \Delta L - \Delta D$. change in "net asset position" during 1952.

A age of the head of the household as reported in the 1953 Survey, on the following scale:

Age 18-24	A = 1
25-34	A = 2
35-44	A = 3
45-54	A = 4
55-64	A = 5
65-	A = 6

M marital status of the head of household:

M = 1 if married and spouse present,
M = 0 otherwise.

In the analysis of spending units with incomes over \$1000, the three dependent variables are as follows:

E/Y	ratio of expenditure on durable goods to disposable income.
$\Delta L/Y$	ratio of change in liquid asset holding to disposable income.
$\Delta D/Y$	ratio of change in personal debt to disposable income.

In the analysis of the units with incomes under \$1000, the three dependent variables are simply E, ΔL , ΔD .

1.3. The Regression and Correlation Calculations

Regressions of the three dependent variables on a common set of independent variables were calculated, and the correlations among the three dependent variables were examined. The purpose is (1) to estimate the effects of certain pre-determined variables on the durable goods spending, liquid saving, and debt behavior of households, and (2) given these effects, to determine the pattern of association among these three kinds of behavior. Results of the regression calculations for the 652 primary spending units with income above \$1,000 are given in Tables 1, and regressions for the 55 units with lower income are shown in Table 2.

In Table 1 income change enters each regression in two forms: as a continuous variable, and as a three-way principle of classification. The reason for introducing it in the second form is to allow for interaction effects between income change and the other explanatory variables, as well as additive effects.

Table 3 presents coefficients of correlation among the three dependent variables, computed for the households with incomes above \$1000. The correlations were first computed on the variables as reported "before" regression; then they were computed on the residuals from the regressions of Table 1. Both simple and partial correlations are presented; the partial correlations are net of the third variable in every case. Table 3 shows that debt accumulation and durables expenditure are significantly positively correlated; this correlation is greater on the residuals than on the original variables. However, this is the only pair among the three kinds of behavior for which a significant association exists. The apparent correlations among other pairs turn out to reflect no more than the common effects of the independent variables, removed by the regressions.

2. Difficulties in the Interpretation of Cross-section Data

Does large personal indebtedness deter consumers from buying durable goods, from further borrowing, and from depleting their liquid reserves? Given their incomes and their other circumstances, are consumers more likely to make net reductions in their indebtedness and to curtail their spending when their existing debt is large than when it is small? Are they more likely to borrow, and to buy durable goods, when they are relatively debt-free?

Answers to these questions would greatly contribute to an appraisal of the economic consequences of a given volume of consumer debt. If the answers are affirmative, a high ratio of debt to income would have to be interpreted as a deflationary sign, an indication that consumer spending would decline. If there is no such relationship between debt and consumer spending and borrowing, a student of business cycles could not view a high debt level as itself a cause of subsequent recession. He might, however, wonder about the longer-run social and economic consequences of heavy debt in case a recession developed from other causes. If there is no automatic tendency for debt to deter further borrowing and spending, consumers and their expenditures will be highly vulnerable to drastic reductions of income.

Surveys of cross sections of households, such as the survey which is the basis for the calculations of this paper, may help to answer these questions. But the essential limitations of single-time cross sections must be borne in mind. The use of cross section data for the estimation of economic relationships depends on a crucial assumption. The assumption is that economic behavior in response to changes in circumstances over time can be inferred from differences in observed behavior among individuals in differing circumstances at the same moment of time. For many purposes this assumption is justified, especially when account can really be taken of the many relevant respects in which the circumstances of individuals differ. But the assumption can be a treacherous one in attempting to estimate relationships between stocks and flows, as in the present case, where we seek to estimate the dependence of spending, debt change, and liquid asset change on outstanding debt. The reason that the assumption may be treacherous in such a case is that stocks are the resultant of the past behavior of households and flows represent their current behavior.

Any correlation, positive or negative, between the past behavior and current behavior of individual households will tend to be reflected in a correlation between stocks and flows in a cross-section of households. There are several possible sources of such correlations.

2.1. Periodicity in durable goods expenditure.

Since some durable goods purchases are large "lumpy" expenditures, they do not occur every year for a given household. In a year when such a purchase does occur, the household's total expenditure for durable goods is large; but in the following year it is small. Suppose that the large purchase is financed by incurring installment debt. Then debt will rise in the year of the lumpy purchase and fall in the subsequent year. A cross-section "snapshot" of households at a single year will find some making a large lumpy purchase and other households repaying debt incurred for such purchases in the previous year. In the cross-section, therefore, small current expenditure and debt repayment will tend to be associated with high levels of outstanding debt; while large expenditure and large additions to debt will be associated with low levels of debt. But it would be a mistake to conclude from these negative relationships between D and E and between D and ΔD that for the economy as a whole debt is a deterrent to durable goods expenditure and to further increase in debt. That conclusion would be justified only if it could be shown that the negative correlations still exist among households at the same phase in the lumpy-expenditure cycle, e.g., that, within the group of households who are making a large lumpy purchase, more is spent by those who are relatively free of debt than by others.

This kind of nuisance correlation would be the more likely to occur the narrower the range of commodities included in the category of expenditures E . The variety covered by the category in the present survey means that the household has considerable scope for smoothing even within a single year. It should also be remembered that expenditure is measured net of trade-ins and includes expenditure for second-hand as well as new items. Thus there is a greater divisibility in E than one might conclude from concentrating his attention on periodic purchases of new automobiles. The personal debt concept of the survey is also quite comprehensive, so that the relations of D , ΔD , and E should not be dominated by the mechanical correlation due to periodicity in lumpy expenditures.

Fortunately the data of the reinterview survey on durable goods expenditure in the previous year E_{-1} make it possible to guard against this kind of correlation. If we find that, holding E_{-1} constant, there is a negative relationship between D and E or ΔD , we can conclude that this is not due merely to periodicity in durable goods purchases.

2.2. Persistent "personality" differences among households.

It is reasonable to expect that there are persistent differences among households in respect to a set of attributes suggested by such words as thriftiness, foresight, conservatism, self-restraint, venturesomeness. People differ in the degree of calculation and care with which they arrive at decisions. They differ also in the contingencies that they foresee and attempt to allow for, from obsessive concern with improbable catastrophes at one extreme to a happy-go-lucky disregard of the future at the other. These differences are reflected in their behavior towards consumers' goods and personal debt. Some households regard such debt as a convenience to be

continuously exploited in order to increase their collection of durable goods at the fastest possible rate. Households of a more "thrifty" disposition, at the other extreme, regard buying on time as sinful. Most households, of course, are located at intermediate positions of a continuous spectrum. This spectrum -- let us call differences in location along it "personality differences" -- are not directly measured in the usual economic survey of households. (There is no insuperable obstacle to measuring them, and recent Surveys of Consumer Finances have made attempts in this direction.) Neither are "personality differences" adequately represented by the variables that economic surveys generally do measure.

These persistent "personality differences" tend to produce a positive correlation between existing debt D and either change in debt ΔD or expenditure on durable goods E , and a negative correlation between D and liquid asset change ΔL . The same attitudes and values that led a household to accumulate a large debt in the past in order to buy durable goods continue to dispose the household to borrow and to spend in the current year. The same scruples that kept a family out of debt before continue to inhibit it from going into debt and possibly also to give the accumulation of liquid reserves priority over the acquisition of consumers' durables.

Correlations of this kind between stocks and flows -- let us call them "personality correlations" -- are of interest in the broadest contexts of the study of human behavior. But for such a purpose as appraising the economic effects of the burden of consumer debt over time, they are quite irrelevant. For a given family, or within a group of families of common personality traits, the economic behavior relationship may go in the opposite direction -- the more debt the less borrowing and spending and the more repayment and liquid saving. But the "behavior relationship" may be partially or completely obscured, in a

single-time cross-section, by the "personality correlations."

3. Effects of outstanding Debt on Expenditures on Durable Goods.

According to Tables 1 and 2, the regression coefficients representing the effect of debt on durable goods expenditure are insignificantly different from zero. For households with 1952 incomes under \$1000 (Table 2), the coefficient is negative in sign; this is the only one of the four coefficients that is greater in absolute value than its estimated standard error. The three coefficients of D/Y in the E/Y regression, for households with incomes greater than \$1000, are all small positive numbers. But the significance of the regression would have been increased by the omission of D/Y ; the F-ratio for testing the significance of its inclusion is .17 (3 and 638 degrees of freedom.)

In order to eliminate any effect due to periodicity in lumpy purchases of durable goods, E_{-1}/Y was introduced as an additional independent variable in the E/Y regression. The net relationship of E/Y to E_{-1}/Y turned out to be positive rather than negative, and insignificantly different from zero. The estimated coefficients of D/Y were moved somewhat closer to zero.

These results can be interpreted to mean that there may be in fact a negative behavior relationship between debt and durable goods expenditure, a relationship which has been prevented from displaying itself in this cross-section of households by the positive personality correlation. To this interpretation two objections might be made.

First, it might be objected that the "personality correlation," if at all important, would have shown up in a significantly positive relation of E/Y to E_{-1}/Y . However, E_{-1}/Y is a very imperfect representative of personality. There are many reasons other than its location on the thriftiness spectrum for a household to have made high or low durable goods expenditures in the previous year.

It would be better to have, as an indicator of position on this spectrum, the residual of E_{-1}/Y_{-1} from a regression for 1951 similar to the one shown for 1952 in Table 1; but the data do not permit calculation of such a regression. In any case, the relevant personality traits would be better measured by a summary of a considerable range of past behavior than by behavior in the immediately preceding year alone.

Second, it might be objected that the variable D may stand not only for the stock of debt but also for the stock of durable goods, since the acquisition of durable goods is associated with going into debt. Any negative relationship between D and E which we detect may, according to the objection, represent the deterrent effect of a large stock of durable goods on further purchases of durables rather than the deterrent effect of consumer debt per se. It is unfortunate that a direct measurement of the stock of durable goods could not be included in the regression, so that "saturation effects" could be estimated separately and disentangled from other relationships. But even so, the objection does not seem too serious. Although it is true that there is positive correlation between debt change ΔD and expenditure on durables E (see Table 2), this correlation is too loose to permit the summation of ΔD over a period of past years, which is D , to represent the stock of durable goods, which is the summation of E less depreciation over a past period. Age A and marital status M almost certainly constitute together a better proxy for the stock of durable goods than D . Saturation effects, if any, have probably entered the regression through these variables rather than through debt.

4. Effects of Outstanding Debt on Change in Personal Debt

The regressions reported in Tables 1 and 2 indicate a highly significant negative relationship between change in debt ΔD and initial debt. Other things equal, households with large debts tend to reduce, and households with small or zero debts to increase, their indebtedness. According to these results, there are certain average equilibrium debt levels, to which households tend to adjust their debt if their circumstances remain unchanged.* For example, consider households with

* Mr. Orcutt has pointed this out very effectively in his illuminating comments on this paper.

stable incomes above \$1000, in which the head is married and in the 35-44 age group. Suppose that the household holds liquid assets equal to three months income. According to the second of the three $\Delta D/Y$ regressions in Table 1, inserting the values

$$M = 1, A = 3, L/Y = 1/4, Y_{-1}/Y = 1,$$

$$\Delta D/Y = .059 - .573 D/Y$$

The equilibrium ratio of debt to income — the level at which $\Delta D/Y$ will be zero — is thus $.059/.573$ or about .10. If the existing debt is greater or smaller than 10 % of income, the household will move about 57% of the distance to the equilibrium level in the course of a year.

However, we must use caution in interpreting the negative coefficients in these regressions. There are several reasons why such results might be expected. One is the possible periodicity in debt-financed expenditure, discussed above. Such periodicity would result in a cross-section pattern

showing repayment by last year's heavy borrowers and large additions to debt by households who enter this year relatively free of debt. There is no evidence of this pattern in the data. The variable E_{-1}/Y does not make a significant addition to the $\Delta D/Y$ regression reported in Table 1; and its inclusion would not change the values of the coefficients of D/Y .

A second reason for a negative relation between D and ΔD may be found in the constraints within which households operate, rather than in behavior reflecting their own choices. A household does not have an unlimited line of credit. Households whose debt is the maximum available to them have only one direction in which to move, though it is conceivable that some of them would gladly increase their debt if more credit were available.* At the other end, debt is by definition a non-negative quantity;

* I am again indebted to Mr. Orcutt for pointing out the possible statistical consequences of this upper constraint.

one cannot pay off more debt than he owes. Indeed in some cases repayment of debt ahead of the schedule of installments may be difficult or impossible, or the possibility may not occur to the household. Thus among households who are inclined by circumstances and preferences to reduce debt, there are mechanical reasons why the size of the reduction will be positively related to the size of the initial debt.

The upper limit, imposed by the line of credit, does not appear to have a serious influence on our results. Since the credit limit depends on income, it should apply least to households with rising incomes. These households,

even if they were previously in debt to the limit of their credit line, should now be able to borrow more if they choose. In fact, however, they show a greater tendency to reduce their debt (a coefficient of $\Delta D/Y$ on D/Y of $-.733$) than households of stable income (coefficient of $-.573$).

The effect of the lower limit on the statistical pattern displayed by a cross-section is more difficult to evaluate; but it does not seem sufficient to account for the observed negative coefficients relating ΔD to D . Those negative coefficients evidently reflect both a greater willingness to add to debt and a willingness to add larger amounts when initial debt is low than when it is high; they do not reflect merely the mechanical fact that households who reduce debt have greater repayments to make when their initial debt is high. Of the 322 spending units who had no personal debt at the beginning of 1952, about 25% added to debt during 1952. (Table 4). Of the 330 spending units who began the year in debt, 41% added to debt during the year. However, as Table 4 shows, these additions were concentrated in spending units with low initial debt ratios; those with initial debt higher than 10 % of income were not likely to add to debt. It must also be remembered that other variables (age, income, "personality" etc.) are more likely to be favorable to use of debt by the group already in debt than by the debt-free group. Therefore these figures do not support the conclusion that willingness to add to debt is independent of initial debt level. Further evidence is provided by the regressions of Table 5. For households who are already in debt and are not short of gross liquidity, group IV, the regression shows an even stronger negative relationship

of ΔD to D than the regression for the whole sample, shown in Table 1. The coefficient is too high to reflect merely the mechanical relation of repayments to initial debt among the debt-reducers.

The conclusion is that there is a real behavior relationship between onstanding debt and subsequent change in debt. High initial debt deters further use of debt, while low initial debt encourage borrowing. This conclusion is indicated by the regression coefficients, whose significant negative values do not appear to be due, in any great degree, to irrelevant special characteristics of the cross-section sample.

5. Interrelations between Debt and Liquid Asset Holdings

The regressions and correlations in Tables 2-3 indicate that liquid asset holdings and debt are virtually independent in consumer decisions. Only in the highest income-change group does initial debt seem to affect significantly the value of change in liquid asset holdings ΔL . That group is also the only one for whom initial liquid asset holdings influence measurably the subsequent change in debt. The correlation between $\Delta D/Y$ and $\Delta L/Y$ is very low even before any account is taken of their joint dependence on a common set of independent variables. Between the residuals from the $\Delta D/Y$ and $\Delta L/Y$ regressions there is no correlation at all. The impression of independence given by these calculations suggests the desirability of a closer look at the interrelations between debt and liquid asset holdings, both initial stocks and changes in stocks.

5.1 Some theoretical considerations.

A given net asset position N for a household is consistent with a range of alternative amounts of liquid asset holdings L and debt D . For example a net asset position of + \$100 may represent \$100 in liquid assets and \$0 of debt, or \$1000 of liquid assets and \$900 of debt, or \$550 of liquid assets and \$450 of debt. What factors may be expected to determine one of these alternatives rather than the others?

The costs of borrowing a dollar are greater than the earnings on a dollar of liquid assets. The financial costs of borrowing are reinforced, for many individuals, by psychological costs. These cost considerations would lead a household with a given net asset position to minimize its debt. However, the minimum would by no means always be at zero debt. There are minimal requirements of gross liquid asset

holdings, transactions balances to handle normal expenditures in between periodic income payments and precautionary balances to meet contingencies requiring extraordinary expenditures or entailing losses of expected income. These requirements may make it worth while to incur the cost of simultaneous holding of liquid assets and debt. They will make it worthwhile to the extent that the opportunity to borrow is not always available when a contingency that requires extra liquidity occurs. It is, for many households, easier to borrow at the time of purchasing new durable goods than later, because "easy" credit ^{is} ~~is~~ offered by the seller to facilitate the sale; if the opportunity is passed up, borrowing to obtain needed liquidity later may be impossible, or may entail much greater costs.

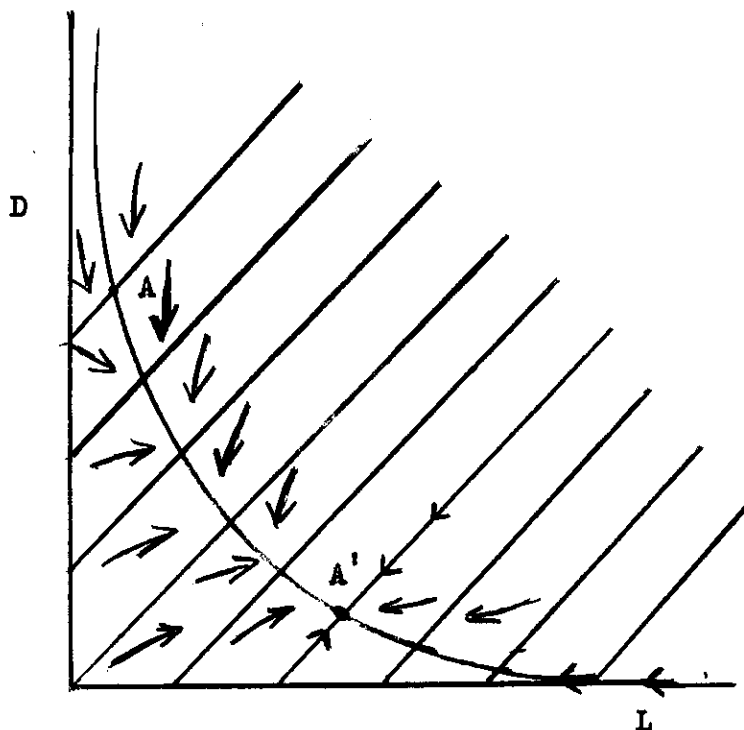
If calculations of this nature lay behind a household's behavior, there would be an optimal level of gross liquid asset holdings for the household. Since the household's income could stand as a measure of the scale of the transactions and contingencies for which liquidity is required, this optimum could be expressed as a proportion of income. Some households would set the optimum ratio higher than others, because of differences in striking the subjective balance between costs of borrowing and risks of illiquidity. By and large, the optimum gross liquid asset ratio would be higher, the greater the net asset position of the household. Households who have to borrow to obtain liquidity would settle for less gross liquidity than wealthier spending units.

This pattern of behavior would have some observable consequences, depicted in idealized fashion in Figure 1. For households similar to each other in income and in other respects, Figure 1 shows debt outstanding

D on the vertical axis and liquid asset holding L on the horizontal axis. A set of parallel 45° lines is shown; each line represents a locus of combinations L and D such that the net asset position $N = L - D$ is constant. A line lower and to the right represents a higher net asset position. Points A and A' and other points on the curve connecting them represent optimal combinations of D and L. As argued above, the optimal gross liquid asset holding L will be greater the higher the household's net asset position. Strictly speaking, since the optima differ for different households, the locus AA' describes the average of optimum positions. There will be, according to the hypothesis, a general tendency for actual observations of D and L to cluster about the locus AA'. However, there will always be some households who, by virtue of changes in income or other circumstances, are out of adjustment. These will move towards AA'.

If households were always satisfied with their net asset position, these movements towards AA' would always be along a given 45° line, like the arrows towards A' in the figure. But presumably changes in net asset positions will be occurring at the same time as adjustments in the balance between debt and liquidity. Suppose that households with negative or low net asset positions seek to improve them and that households with high net asset positions reduce them in favor of consumers' durables and other expenditures. Then the adjustments of D and L will be in the general directions indicated by the arrows in Figure 1.

Figure 1



This pattern of behavior may, however, be less important than some irrational elements in household debt behavior. Households may be unaware of the costs of borrowing, or may consider them to be of minor importance. At the same time, they may find installment debt a desirable means of self-discipline. If they use up liquid assets to buy a washing machine, they will never restore their net asset position; income will be frittered away in current luxury expenses rather than saved. But if they hang on to the liquid assets and go into debt to get the washing machine, the pressure of paying installments will prevent the frittering away of income and restore their net asset position.

This implies that somehow the liquid assets are less accessible for these dispensable expenditures than current income. Once segregated as a contingencies fund, say, savings deposits and bonds are un-touchable except for real emergencies. It requires a deliberate decision to violate this self-imposed restraint, and this makes the restraint more enforceable.

If this trend of behavior is significant, the pattern of rational behavior may be completely cancelled or even reversed. The possession of large liquid assets may be an encouragement to acquire debt, rather than a stimulus to its repayment. If one has assets, he can afford to buy things with debt financing, because certain contingencies that might otherwise compete with the installment payments are already provided for.

5.2. The empirical test.

To test for the presence of the "rational" pattern of behavior of which Figure 1 is an idealized representation, the 652 observations with incomes greater than \$1000 have been divided into four classes. The median ratio L/Y of liquid assets to income was determined, and those below the median were separated from those above the median. Then each of these categories was divided between those who had no debt at the beginning of the year and those who had some positive debt. Let us consider what Figure 1 would lead us to expect for each of these classes.

I. No debt, low liquidity ratio. These households should show predominantly positive changes in debt, ΔD , and in asset holdings, ΔL , positively correlated in amount with each other and inversely related in amount to the initial liquid asset holding L .

II. No debt, high liquidity ratio. These households should show predominantly negative changes in asset holdings, ΔL , inversely related in amount to the initial liquid asset holding L . They should show little if any change in debt, and little systematic relation of ΔD to L or correlation between ΔL and ΔD .

III. Positive debt, low liquidity ratio. These households will be dominated by the need to improve their net asset position, largely by repayment of debt. The amount of debt change will depend negatively on the initial amount of debt D , and will bear little relation to L . These households will show little systematic relation of ΔL to D and L .

IV. Positive debt, high liquidity ratio. Households in this position will tend to diminish their costs by using their liquid assets to reduce their debt. This tendency will overshadow any tendency to change the net asset position. Thus both ΔD and ΔL will be negatively related to D and L ; and ΔD and ΔL will be positively correlated with each other.

On the whole, the calculations reported in Table 5 conform to a priori expectations derived from the "rational" pattern.

The 103 spending units in category I increased their debt by an average of 6.7% of their incomes, and their asset holdings by an average of 7.7% of income. As Table 5 shows, there is some evidence that the amounts of increase of debt and asset holdings were inversely related to initial asset holdings, but the coefficients are not significant. There was, moreover, no significant correlation between $\Delta D/Y$ and $\Delta L/Y$. The 232 households in category II showed, as expected, an inverse relation of $\Delta L/Y$ to initial liquid asset

position L/Y and, again as expected, no significant effect of L/Y on $\Delta D/Y$. These spending units showed little tendency to change debt; the average change was an increase of 2.2% of income. They also added to liquid assets an average of 7.9% of income. The fact that the average increase in liquid asset holdings is greater in category II than in I may reflect some "personality correlation" effects, even though such effects are not evident within the categories.

Spending units in category III sought to improve their net asset position, increasing liquid assets an average of 5% of income while leaving debt virtually unchanged, on the average. However, the expected inverse relation between existing debt and subsequent debt change did not materialize; perhaps because of "personality correlation" effects, the relationship was the other way. The most striking result for category III is the inverse relation between liquid asset change and initial debt. Households with high initial debt were more likely to borrow than small debtors, but evidently the large debtors borrowed for expenditure purposes while the small debtors borrowed to improve their liquidity. The pattern of borrowing to improve liquidity is reflected in the positive correlation between the residuals of $\Delta D/Y$ and $\Delta L/Y$. The force of the desire to improve liquidity, within this group, was independent of the initial liquidity position. Households in category IV seem to behave as expected, and this is the most crucial test of the "rational" pattern. As anticipated, both $\Delta D/Y$ and $\Delta L/Y$ were inversely related to D/Y and L/Y ; the four coefficients are all significant. Both debt and asset holdings were decreased by this group, debt by an average of 7.7% of income and assets by an average of 19.1%.

It may fairly be concluded that the hypothesis of "rational" behavior with respect to debt and liquid assets is not refuted. If "personality correlation" effects could be eliminated, the hypothesis should stand up even better. The "irrational" self-discipline pattern does not show up in these results. The initial impression, from the over-all regressions, that debt and liquid assets are treated independently in consumer decisions has to be revised. The over-all independence conceals several important interrelationships, which

are revealed when the sample is broken into the four categories based on initial debt and asset positions.

6. Other Factors associated with Change in Debt

Decisions to increase or reduce debt are, of course, affected not only by the initial debt and liquid asset levels but also by other economic and demographic circumstances of the household. The present section will discuss estimation of the effects of these other variables.

6.1 Income and Income Change.

The regressions that have been calculated allow for effects both of current year's income Y and previous year's income Y_{-1} . It is necessary, therefore, to distinguish between long-run and short-run income effects. A "long-run effect" is the change in ΔD associated with a dollar change in Y , or Y_{-1} , on the assumption that the household's income is stable ($Y_{-1} = Y$). A "short-run" effect is the change in ΔD associated with a dollar change in Y , for fixed level of previous year's income Y_{-1} . The long-run effect is the relevant one for such purposes as projecting the effects of secular growth in income on the propensity to go into debt. The short-run effect is the relevant one for models that attempt to forecast year-to-year changes in business activity.

For spending units with incomes above \$1000, the long run effect can be estimated from the regression coefficients shown for $\Delta D/Y$ in Table 1. By definition, Y_{-1}/Y is to be set equal to 1, and this means that the applicable coefficients are the ones for "little change"

in income. If we then multiply the regression through by Y we have:

$$\Delta D = (.001 + .019M - .006A)Y - .011L - .573D$$

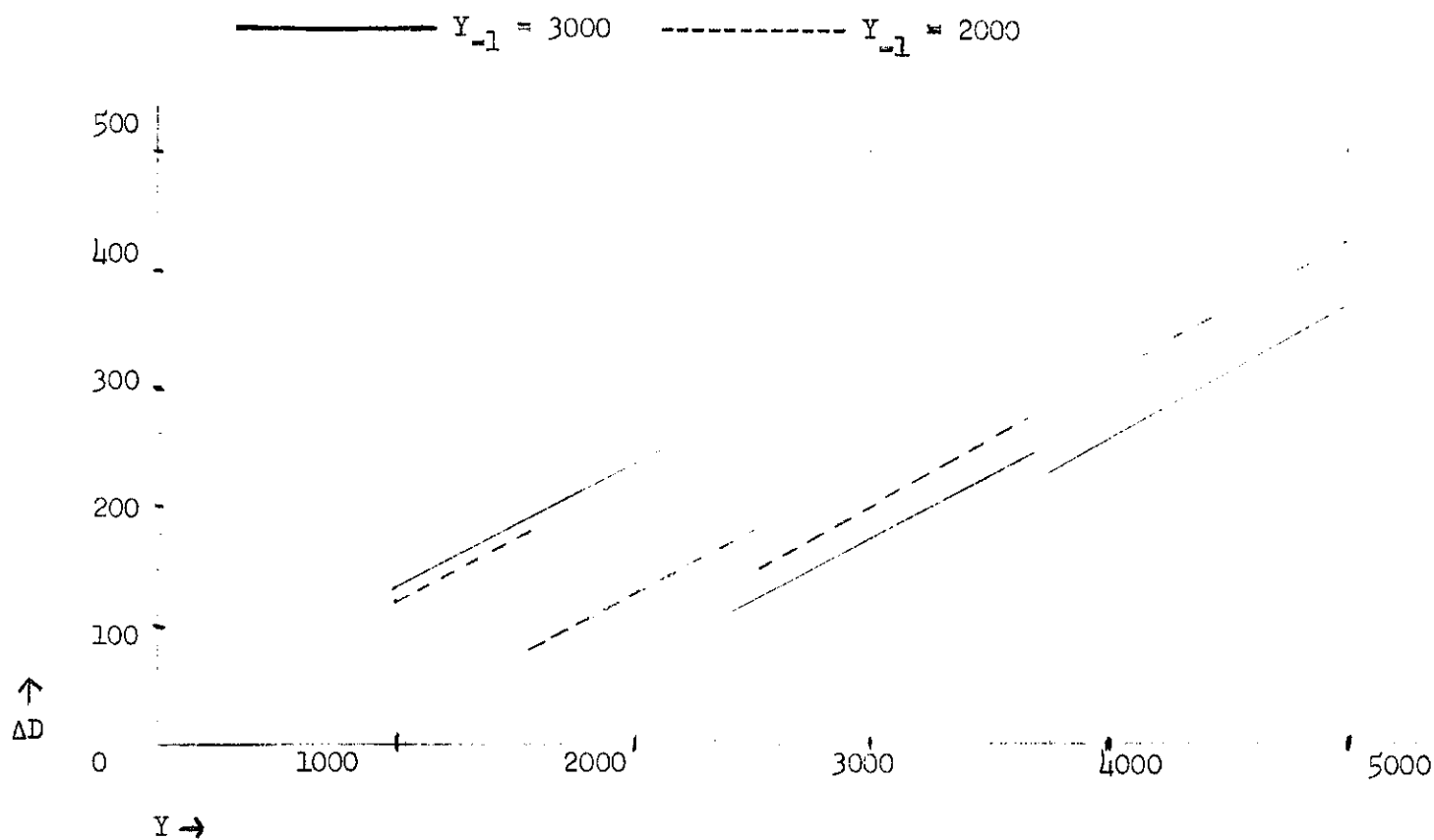
For married spending units with the head aged 18-24 ($M = A = 1$), this says that every dollar of permanent increase in income leads to an increase of 7.4 cents in ΔD . For single-person spending units in the highest age bracket ($M = 0$ and $A = 6$), however, the long-run income effect would be only 2.5 cents for every dollar of income.

For spending units with incomes below \$1000, the ΔD regression shown in Table 2 indicates an income effect in the opposite direction. An increase of a collar in income is associated with a decline of 97 cents in additions to debt. In this income range, borrowing is evidently often an emergency measure rather than a means of obtaining luxuries; in consequence, additions to debt are greater the worse off the household.

The short-run income effect takes past income Y_{-1} as given and measures the change in ΔD due to change in current income Y alone. The regression for low-income spending units estimates a \$1.04 mere increase in debt for every \$1 increase in current income. For units with incomes over \$1000, short-run income effects are more complicated. They are plotted in Figure 2, drawn for $M = 1$, $A = 3$, $L = 0$, $D = 0$ and for two alternative assumptions regarding Y_{-1} , \$2000 and \$3000.

Figure 2

Estimated Short-run Effects of Income on Change in Debt Spending Units
with Incomes over \$1000



The effects of previous year's income Y_{-1} appear to differ in direction depending on current income level. For incomes below \$1000, additions to debt will be greater the higher the previous income level; the coefficient is small but significant. Its sign probably reflects differences among households in pressure to maintain accustomed consumption standards and in access to credit, both of which will vary with past income. At

current income levels above \$1000, Figure 2 illustrates the change in direction of the effect of Y_{-1} . At low current income, additions to debt are smaller when previous income was \$2000 than when it was \$3000. But the opposite is true for incomes above \$2308 ($\$3,000$ divided by 1.3). At higher income levels borrowing is less a symptom of distress than a means of speeding the acquisition of worldly possessions appropriate to the household's economic and social status. This is likely to be a more urgent order of business for families for whom this status is newly achieved than for those whose present income represents little increase over previous levels.

6.2. Other Independent Variables.

The independent variables in the regressions of Table 1 are financial, economic, or demographic characteristics of the spending unit. There are, of course, other characteristics that might be expected to affect the debt behavior of households. Some of these are further details of the economic, demographic, and geographic circumstances of the spending unit. Others are answers to questions designed to elicit the respondent's feelings of optimism or pessimism regarding his personal economic situation and the national economic picture.

Change in debt may appear to be significantly related to one of these variables when we examine the correlation without taking account of any others. But our multivariate approach teaches us to beware of simple correlations. The variable under test may, like change in debt, be related to variables in the regression of Table 1. A more meaningful way of testing the influence of additional variables, either singly or in combination, is to examine their correlation with

the residuals from the regressions in Table 1. If there is no significant relationship, one may conclude that the tested variables contain no information relevant to explanation of the dependent variable beyond what is already contained in the regression independent variables. It is still possible, of course, that the candidates under test could substitute for one or more of the regression independent variables. If the test reveals a significant relationship with the residuals, then a fortiori the variables tested are significantly related to the dependent variables. To measure this relationship, it would be necessary to recompute the regression, introducing the additional variables and allowing for their correlations with the other independent variables.

A number of tests of this kind, both on the original variables and on the residuals from the regressions of Table 1, have been computed. Table 6 reports the results. The technique used is analysis of variance. That is, the hypothesis under test is that the mean value of the dependent variable (or residual) is the same regardless of the value or class of the independent variable. The test-statistic is an F-ratio, and it is this which is reported in Table 6. A high F-ratio indicates that the hypothesis of no influence should be rejected. Cases in which significantly high ratios have arisen are marked with one asterisk (5 percent level) or two asterisks (1 percent level).

Among the financial, demographic, or geographic variables tested in Table 6, net worth at the beginning of 1953 was significantly related to change in debt during 1952. The lower the net worth bracket, the higher the ratio of 1952 addition to debt to 1952 income. The

phenomenon is more pronounced for the regression residuals than for the raw variable. Unfortunately, it is not possible to tell how much of this relationship is a spurious correlation, due simply to the fact that persons who went into debt during 1952 would automatically tend to have high debt and low net worth at the beginning of 1953. This spurious correlation is probably not the whole story, since one would expect it to have more influence on the original variables than on the residuals. But net worth information is not available for early 1952; hence the question remains in doubt.

None of the demographic and geographic variables tested proved significant.

Of the attitudinal variables tested, only the question on intentions to buy durable goods during 1952 (II-7) proved to be significantly related to change in debt. Similar calculations for E/Y show that the predictive value of information on intended expenditure is even greater for that variable. Since E/Y and $\Delta D/Y$ are fairly highly correlated, it is not surprising that intended expenditure is also a useful predictor of that change. It is noteworthy that intentions to buy add significantly to the information contained in the regression variables. Indeed intended expenditure is complementary to the "objective" variables included in the regression; its F-ratio is greater for the regression residuals than for the original variables, indicating that it is a better predictor in combination with the regression variables than alone.

None of the more diffuse attitudinal questions appeared to be

significantly related to change in debt. In order to test the possibility that a combination of attitudes, rather than individual attitudes considered singly, might be important for debt behavior, a test (II-8) was made of a 1952 attitudinal index, constructed from questions 1, 2, 3, and 5, as follows: For each question, the answer of a respondent was valued as optimistic (+1), neutral or no answer (0), or pessimistic (-1). These values were summed over the four questions to give each respondent a score, some integer from -4 to +4 inclusive. In Table 5, II-8, a test of linear regression on the index score is reported. A test for the significance of differences in the dependent variable for the nine possible scores was also carried out, with similar results. This index is similar in construction to the index the Survey Research Center has computed to summarize its periodic attitudinal surveys and to indicate the over-all trend of attitudes over time; but the index here tested has fewer components.

It is possible that further tests of attitudinal variables will yield different results. With the exception of II-4, the attitudes here tested were responses to questions at the beginning of the year. Conceivably some households who made optimistic responses in early 1952 may already have acted on their optimism by borrowing in 1951; these optimists may have been repaying debt during 1952, while others were borrowing. Debt behavior might, for this and other reasons, turn out to be more closely related to attitudes expressed at the middle or end of the year, or to some combination of attitudes held during the year. It is also possible that the optimism-pessimism dimension, to which the attitudinal questions of this survey were mainly directed,

is not a particularly relevant dimension for debt behavior, whatever its importance may be for other aspects of household economic behavior. While optimism may lead some households to go into debt, secure in their anticipation of their ability to carry the burden, it may lead others to clear up their debts, confident that in future they can get along without them.

Summary

Calculations on this cross-section of households suggest the following conclusions regarding household behavior in relation to consumer debt:

1. The evidence suggests that, other things equal, high debt levels deter expenditure on durable goods. Otherwise, it is hard to understand why a positive association between these variables, which would be expected in a cross section of households as a result of persistent differences in thriftiness and related characteristics, failed to appear.
2. The evidence is more clear-cut that high debt levels deter further use of debt in financing purchases. Household behavior displays a genuine inverse relationship between initial stock of debt and subsequent change in debt.
3. There are important interrelations between debt and liquid assets in consumer behavior. These result from balancing the cost of borrowing against the needs for liquidity to handle normal and emergency transactions. The economic consequences of a given distribution of consumer debt in the population cannot be adequately appraised without considering simultaneously the distribution of liquid assets.

4. Additions to debt are negatively related to current income and positively related to previous income among low-income spending units, where borrowing is frequently an emergency measure. These relationships are reversed at higher income levels. Single individuals are less apt to add to debt than married spending units; and, except among low-income units where distress borrowing reverses the relationship, young heads of households are more disposed to add to debt than older consumers. There may be a negative relationship between net worth and changes in debt, but the absence of ex ante net worth information leaves this question in doubt. Change in debt is significantly correlated with both actual and anticipated purchases of durable goods. But it does not appear to be significantly related to attitudes of economic optimism or pessimism.

revised November 30, 1956

Table 1

Regression Coefficients (Estimated Standard Errors)											R ²	Standard error of estimate
Δ/Y	D/Y			Y ₋₁ /Y			Constants					
	Y ₋₁ /Y < .8	.8 ≤ Y ₋₁ /Y < 1.3	1.3 ≤ Y ₋₁ /Y	Y ₋₁ /Y < .8	.8 ≤ Y ₋₁ /Y < 1.3	1.3 ≤ Y ₋₁ /Y	Y ₋₁ /Y < .8	.8 ≤ Y ₋₁ /Y < 1.3	1.3 ≤ Y ₋₁ /Y			
	+0.056 (.093)	+0.010 (.029)	+0.006 (.097)	+0.026 (.077)	-.117* (.052)	+0.032* (.008)	+.113* (**)	+.240* (**)	+.070* (**)	.23	.125	
	-2.64* (0.58)	-.075 (.200)	-.212 (.232)	-.113 (.633)	-.097 (.270)	+.367 (.044)	+.377* (**)	+.186* (**)	-.560* (**)	.38	.768	
	-.733* (.059)	-.573* (.051)	-.886* (.104)	-.070* (.041)	-.032 (.023)	+.010 (.011)	+.117 (**)	+.093 (**)	+.104 (**)	.35	.155	

g the hypothesis that they are, except for
does not really affect the level of the
.2 with 2 and 638 degrees of freedom) and
rejected for Δ/Y (F-ratio of .05).

Table 2

Primary Non-farm Spending Units with 1952 Incomes under \$1000

Dependent Variable	Regression Coefficients (Estimated Standard Errors)						R ²	Standard error of estimate
	M	A	L	D	Y ₋₁	Y		
E	-6.04 (14.61)	-3.53 (3.95)	+0.005* (.002)	-.079 (.067)	+0.043* (.007)	-.092 (.263)	.68**	\$53.5
ΔL	+370.0 (348.0)	-21.9 (94.1)	-.153* (.044)	+1.28 (1.60)	-.778* (.160)	+3.73 (6.27)	.65**	\$1273
ΔD	+79.5* (15.6)	+2.07 (4.21)	-.002 (.002)	-.672* (.076)	+0.068* (.007)	-1.04* (.28)	.82**	\$56.8

* Significant at 10% level

** These represent the proportions of the variances of the dependent variables about zero explained by the regressions, which include no constant term. Of these same variances about zero, the means of the variables would explain the following proportions: .05, .04, and .00.

Table 3

Correlations Among Dependent Variables

	$\Delta L/Y$		$\Delta D/Y$		
E/Y	.219**	.028	.212**	.305**	Simple
	.206**	.026	.199**	.305**	Partial
$\Delta L/Y$	Before regression	After regression	.089*	.011	Simple
			.044	.002	Partial
			Before regression	After regression	

* Significant at 10% level.

** Significant at 1% level.

Table 4

Primary Non-farm Spending Units with
1952 Incomes greater than \$1000.
(Number of spending units)

Change in Debt during 1952	Debt at beginning of 1952 as Ratio of 1952 Income				
	D/Y = 0	0 < D/Y < .1	.1 ≤ D/Y < .3	.3 ≤ D/Y	All
Decrease in Debt	-	93	69	27	189*
No change in debt	245	1	1	1	248
Increase in Debt	77	105	28	5	215
All	322	199	98	33	652

* Of these 189 spending units 81 made complete repayment of their debt.

Table 5

Primary Non-farm Spending Units with 1952 Incomes \$1000 or greater

Category	Number of cases	Dependent Variable	Regression Coefficients (standard errors)						R ²	Coefficients of correlation between $\Delta D/Y$ and $\Delta L/Y$	
			M	A	I/Y	D/Y	Y_{-1}/Y	constant		Before regression	After regression
I. D/Y = 0, L/Y below median	103	$\Delta L/Y$	+.064 (.058)	+.026 (.018)	-.782 (.173)	-	-.065* (.039)	+.030 (.097)	.068	-.005	-.021
		$\Delta D/Y$	-.010 (.019)	-.000 (.014)	-.484 (.395)	-	+.006 (.032)	+.092 (.081)	.019		
II. D/Y = 0, L/Y above median	232	$\Delta L/Y$	-.395* (.190)	+.127* (.061)	-.358** (.057)	-	+.425** (.037)	-.179 (.310)	.375	+.046	+.037
		$\Delta D/Y$.007 (.015)	.003 (.005)	-.005 (.004)	-	+.002 (.003)	+.007 (-.024)	.007		
III. D/Y > 0, L/Y below median	223	$\Delta L/Y$	-.016 (.017)	+.011** (.004)	+.159 (.105)	-.863** (.031)	-.026* (.013)	+.168** (.023)	.794	-.031	+.355**
		$\Delta D/Y$	+.034 (.048)	-.022* (.011)	+.614* (.294)	+.297** (.086)	-.035 (.038)	+.008 (.066)	.084		
IV. D/Y > 0, L/Y above median	94	$\Delta L/Y$	+.074 (.183)	+.029 (.053)	-.431* (.042)	-.380* (.183)	+.395* (.220)	-.397 (.331)	.581	+.286**	+.090
		$\Delta D/Y$	+.014 (.062)	-.008 (.018)	-.024* (.014)	-.766** (.062)	-.063 (.074)	+.160 (.112)	.659		

* Significant at 10 % level

** Significant at 1 % level.

Table 6

Tests of significance of relation of $\Delta D/Y$ to selected variables.

Variable	Number of classes into which observations were divided (k)	F-ratios	
		Original variable (d.f. k-1 and 652)	Residuals from Table 1 regression (d.f. k-1 and 638-k)
I. Economic, demographic, geographic variables.			
1. Net ^W worth brackets, early 1953.	11	4.7*	8.0**
2. Education of head of household	5	0.8	0.1
3. Occupation of head of household	7	0.7	1.3
4. Region	4	0.5	2.6
5. Size of locality	5	1.1	0.8
II. Attitudinal variables			
1. Would you say you folks are better off or worse off financially now than you were a year ago? Asked in 1952.	4	0.4	0.1
2. Are you folks making as much money now as you were a year ago, or more or less? Asked in early 1952.	4	1.2	0.6

Table 6 continued

Variable	Number of classes into which observations were divided (k)	F-Ratios	
		Original variable (d.f. k-1 and 652-k)	Residuals from Table 1 regression (d.f. k-1 and 638-k)
3. How about a year from now -- do you think you people will be making more money or less money than you are now, or what do you expect? Asked in early 1952.	4	1.5	0.5
4. Same question as 3 but asked in early 1953.	4	1.4	1.0
5. Do you think this is a good time or a bad time to buy automobiles and large household items? Asked in early 1952.	6	0.9	0.8
6. Now, speaking of prices in general, I mean the prices of the things you buy, do you think they will generally go up during 1952, or go down, or stay about where they are now? Asked in early 1952.	9	0.8	0.7
7. Linear regression on ratio of total anticipated 1952 expenditure on cars and large household items to realized 1952 income.	2 parameters estimated	5.8*	9.5**
8. Linear regression on attitudinal index (see text)	2 parameters estimated	0.5	0.0