

*The Impact
of Monetary Policy
on a Revised Version
of "Consumer Spending"*

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Once upon a time in a faraway place, cattle was used for money. Alas, one black and gloomy day a wicked witch destroyed half the herd. With the fall in the supply of money, consumption of milk and meat declined. In such a golden age, it is easy to construct a link between the money supply (or monetary policy) and consumption. Thus to reduce the debate among economists, maybe the U.S. should switch to the bull standard.

Until the fortunate day arrives, it is necessary to determine the less obvious links between monetary policy and consumption in both the short and long run. This paper will concentrate on the short run in which the appropriate definition of consumption is the *purchase* of durable and nondurable goods and services.

Suppose for the moment that the monetary policy undertaken is an increase in the money supply.¹ It is important to realize that such increases are not accomplished by the dropping of currency from a helicopter but by changing the monetary base through open market operations or through changes in reserve requirements. How could such changes in the money supply affect consumers? The four possible channels through which consumption could be affected are: wealth, interest rates, nonprice rationing, and consumer confidence. Let us consider in detail each of these possible routes.

¹Other monetary policy actions are changes in the supply of Federal government bonds (bills and notes) and/or credit terms. We will consider the effects of these changes.

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The Wealth Effect

The Federal Reserve could increase the money supply and thus banks' net worth. Even with such an increase in the short run (real) interest rates could remain constant though eventually the rate should decrease. Of course an increase in bank net worth would also be reflected in consumer wealth. In addition the value of consumer wealth would increase when interest rates dropped and bond and stock prices rose.

Should an increase in wealth lead to an increase in current consumption? The standard answer of monetarists and others is yes, because it is presumed that current consumption is not an inferior good. This answer is presumably based on a model in which people allocate consumption over time with a budget constraint that includes initial wealth plus present and future earnings. Such a model certainly is given in Klein.² However, the most provocative discussions of such a model are contained within the permanent income hypothesis of Friedman³ and the lifetime earnings hypothesis of Modigliani and Brumberg.⁴ But as I understand their models, the wealth effect induced by counter-cyclical money supply and interest rate changes should have only minimal effects because

²Klein, L., *The Keynesian Revolution*, The MacMillan Company, 1907.

³Friedman, M., *A Theory of the Consumption Function*, Princeton University Press, 1957.

⁴Modigliani, F., and Brumberg, K., "Utility Analysis and Aggregate Consumption Functions: An Attempt at Integration" (mimeo).

TABLES and FIGURES

Figure 1	Ratio of Consumption to Disposable Income	169
1	Lagged Responses of Consumption (Revised Data)	171
2	Effects of Beginning Net Worth (Revised Data)	175
3	Some Household Operations and Transportation Equations	177
4	Official and Revised Personal Disposable Income for 1964	179
5	Official and Revised Personal Consumption Expenditures for 1964	180

permanent and lifetime income would be changed trivially.⁵ But temporary changes in income are supposed to be saved.⁶

Still people may not have such long run expectations and the wealth effect may play a role. (If an increase in the money supply eventually leads to price increases, the Pigou effect also can affect consumption.) It is important to note, however, that logically total consumer wealth and not the money supply is relevant and that the short run correlation between the two series need not be strong. If the major linkage between monetary policy and consumption is via this route, and if the correlation between money and wealth is weak, then the monetarists have been backing the wrong mastadon.

Effect of Interest Rate Changes

Next, consider the effect of interest rate changes. At this point we will worry about the substitution between present and future consumption. If one treats consumption in each future time period as a different good, then a change in the interest rate need not discourage present consumption if it is a complement to some future consumption.⁷ I believe, however, that most monetarists and Keynesians would agree that the short-run interest rate substitution effect on present consumption is small, almost negative. In principle, however, there is a type of monetary policy which should generate large impacts. Suppose the banks were to have clearance sales on auto or other durable good loans. Then consumers should be willing to advance their purchase date for the durable.⁸

⁵Of course each individual could expect to switch back into money before the next counterbalancing interest rate increase. I don't think that either Professor Friedman or Professor Modigliani would be comfortable basing his analysis on such a fallacy of composition.

⁶However, in these theories saving includes investment in durables. Such investment should be included in consumption for short-run analysis.

⁷See Patinkin, D., *Money, Interest and Prices*, Row, Peterson and Co., 1955, and Leviatan, N., "Multiplied Future Consumption as an Aggregate," *American Economic Review*, 1966.

⁸In general, the stock of durables provides services of varying quality. In the short run, consumers may vary the quality of services by advancing or postponing purchase dates or by substituting repairs for replacement. A fairly big impact could occur here. Cf Chow, G., "Statistical Demand Functions and Their Use for Forecasting," *The Demand for Durable Goods*, A. Harberger ed., University of Chicago Press, 1960.

Nonprice Credit Rationing

The third possible linkage is via nonprice rationing of credit. If for some reason banks have not set market clearing prices for consumer loans, then an increase in the money supply could lead to more loans and more consumption at a given interest rate. While it is often alleged that commercial banks, S&L's and others do use nonprice rationing, it is difficult to demonstrate this in general and in particular for consumer oriented loans.⁹ Except in a few crisis periods and immediately thereafter, it might be expected that credit rationing is an unimportant link. There are, however, several reasons why this conclusion could be wrong. First I would argue that until recently banks were very wary of consumer instalment debt, auto loans etc. and treated these items as residual loan categories. Thus for consumers a form of nonprice credit rationing was in existence, though in varying proportions for much of the period.¹⁰ Secondly banks can respond to money supply changes by altering the borrower characteristics that are acceptable. Since the available data do not present interest rates by risk class for consumer loans, we could have a situation where "average" interest rates are unchanged but where loans and consumption increase. These linkages would be very difficult to isolate by specific variables, but even the money supply is probably not a good proxy because of the greater acceptability of consumer loans by banks during the sample period.

Consumer Confidence

The final linkage between the money supply and consumption can be through consumer confidence. Keynes, if not Keynesians, would argue that the marginal propensity to consume varies with confidence and/or with expectations. Why would the money supply be related to confidence? Changes in the money supply can affect interest rates and stock market capitalization rates. In turn it has been shown that variations in stock prices (about a trend) are correlated with consumer attitudes and with consumption (net of the

⁹However, as explained below, an important part of consumption is related to housing starts, which can be affected by credit rationing and interest rate changes.

¹⁰Moreover, such a situation means it is very difficult to estimate the demand for auto and other loans. See Dhrymes, P., and Taubman, P., "An Empirical Analysis of the Savings and Loan Industry," *Study of the Savings and Loan Industry*, I. Friend ed., Federal Home Loan Bank Board, 1969.

impact of disposable income).¹¹ On the other hand many other cyclical variables such as the unemployment rate and the length of the work week have also been found to be correlated with consumption and automobile purchases.

To me there are still some basic problems that must be resolved before accepting the expectation linkage. First, stock market changes affect directly only a very small percentage of the population. (In any sample period, extending back into the 50's, the percentage would have been even smaller.) Of course confidence is supposed to be different from the capital gains included in wealth effects; thus, people other than stockholders could be affected by stock market developments. But I would be surprised if most people follow the market. Of course peoples' confidence can be affected by cyclical developments they know about, e.g. unemployment, but then the effect of monetary changes would have to come via the previous linkages. Thus I would not be willing to accept monetary policy as having a direct link via confidence.

Monetary policy has more slings than the money supply. As far as the monetarists are concerned, it is an outrageous fortune that one can find statements in Friedman to the effect that changes in the supply of bonds should affect the economy as much as changes in the money supply.¹² Of course open market operations have offsetting effects on the supply of bonds and money. Since such switches would cause the types of effects discussed earlier, there would be no need to study the supply of bonds and money separately. But the government can leave money unchanged and issue new bonds to cover a deficit. Thus even if monetarists do not want to include all consumer wealth in the consumption function, some of them should include government bonds.

Other policy tools such as interest rate ceilings can lead to rationing type linkages which can have an indirect impact on consumption. For example such ceilings can affect housing starts but a large amount of consumer durables (stoves, air conditioners) are installed when the housing unit is built (see below).

¹¹See for example Friend, I., and Adams, G., "The Predictive Ability of Consumer Attitudes, Stock Prices and Non-Attitudinal Variables," *Journal of the American Statistical Association*, 1964.

¹²I am sure the effects would be the same for credit rationing.

Finally we should at least acknowledge the possibility that consumption determines the money supply with increased demand for durables leading to more loan demand and deposits. I would think however, that such an explanation is more relevant for business investment.

The Data

Ultimately all the above arguments should be subjected to empirical verification. I think such validation is extremely difficult to accomplish not only because some of the concepts and mechanisms are hard to quantify, but also because the standard data on consumption and income available from the Department of Commerce are quite inappropriate for the purpose of short-run employment (and price) analysis. Indeed they are the data I would characterize as the weakest link in the verification of the various theories.

In a longer paper from which this one is drawn, I give a more detailed analysis of the deficiencies (for short-run analysis) of the standard data and of the changes I have made. To save space I will give only a brief summary here. A comparison of the data in 1964 is given in the appendix. Some items of consumption do not cause employment as conventionally measured.¹³ The most well known example is the imputed consumption for owner-occupied homes. There are also corresponding items of income that cannot be spent on those consumption items that cause employment. I eliminate these items from consumption and income. Second, disposable income includes current employer contributions to and earnings on private pension funds while benefits paid do not enter into disposable income. I reverse this procedure and treat private pensions in a manner similar to the public pensions (Social Security). Personal non-taxes, which are fines and payments to public hospitals and colleges, are currently subtracted from personal income. Instead, following the suggestion in Klein,¹⁴ I treat these items as consumption. Finally the household sector currently includes nonprofit institutions, but to the extent possible, I remove them.

¹³On the other hand, the data include consumption expenses such as brokers' fees which are for personal business. These items should be included in consumption for my purposes but not for welfare comparisons. Cf Machlup, F., *The Production and Distribution of Knowledge in the United States*, Princeton University Press, 1962.

¹⁴Klein, L., "Saving Concepts and Data," *Savings in the Modern Economy*, W. Heller ed., University of Minnesota Press, 1953.

In figure 1, the ratios of consumption to disposable income on the official and revised bases for annual data are given. Thus the new series has a lower average propensity to consume, it has a different cyclical pattern, and it does not have the increase in level for 1959-64 apparent in the official series. Both series show a sharp drop in the average propensity since 1964. I will comment on the cause of this decline later.

I have estimated functions for each of the categories of food, clothing, personal care, household operations, housing, transportation, personal business, recreation, education, medical, and foreign travel. These categories are functional groupings that in some instances include items that are durable, nondurable, or services.^{15,16}

The equations have been estimated by ordinary least squares for the period 1954-1965 without taking into account interequation restrictions and without specifying a utility function. (The reasons for these choices are given in the larger paper.) Where appropriate, I have corrected for serial correlation using the scanning technique described in Cochrane-Orcutt. All flow variables are expressed in real per capita terms.

Results

The (quarterly) equations to be discussed are given in Tables 4 and 5. First let us finish some preliminary matters. For the period 1954-1965, my revised quarterly series appear to be more useful than the official data. For example in those consumption categories in which there have been no revisions, revised disposable income yields a higher R^2 than does the official income series. Moreover, the revised series has an elasticity of consumption with respect to disposable income much closer to 1.

¹⁵This breakdown was chosen because it combines those items among which there is much substitution. A durability breakdown does not accomplish this goal as well. A more detailed functional breakdown was used by Houthakker, H., and Taylor, L., *Consumer Demand in the United States, 1929-1970*, Harvard University Press, 1966, while a more aggregative one was used by Pollak, R., and Wales, T., "Estimation of the Linear Expenditure System," *Econometrica*, 1969.

¹⁶Some of the quarterly data were obtained by interpolating annual series.

Speed of Adjustment

One important question for both monetary and fiscal policy is how quickly and consistently responses occur. The results I have obtained for disposable income, which I would expect to be pinned down more easily than wealth or interest rate effects, are not encouraging. For example, one way to examine the lags in responses is to include in the equation a number of previous quarters of disposable income. For each category of consumption, I computed equations in which each of up to four quarters of lagged disposable income was entered as a separate variable. Whether I used two, three, or four lags (and regardless of other variables included) seldom is more than one disposable income figure significant, and never more than two. Except for the housing and transportation categories, only the current disposable income figure was important. These results, which suggest a quick response to income changes, may be because of multicollinearity.

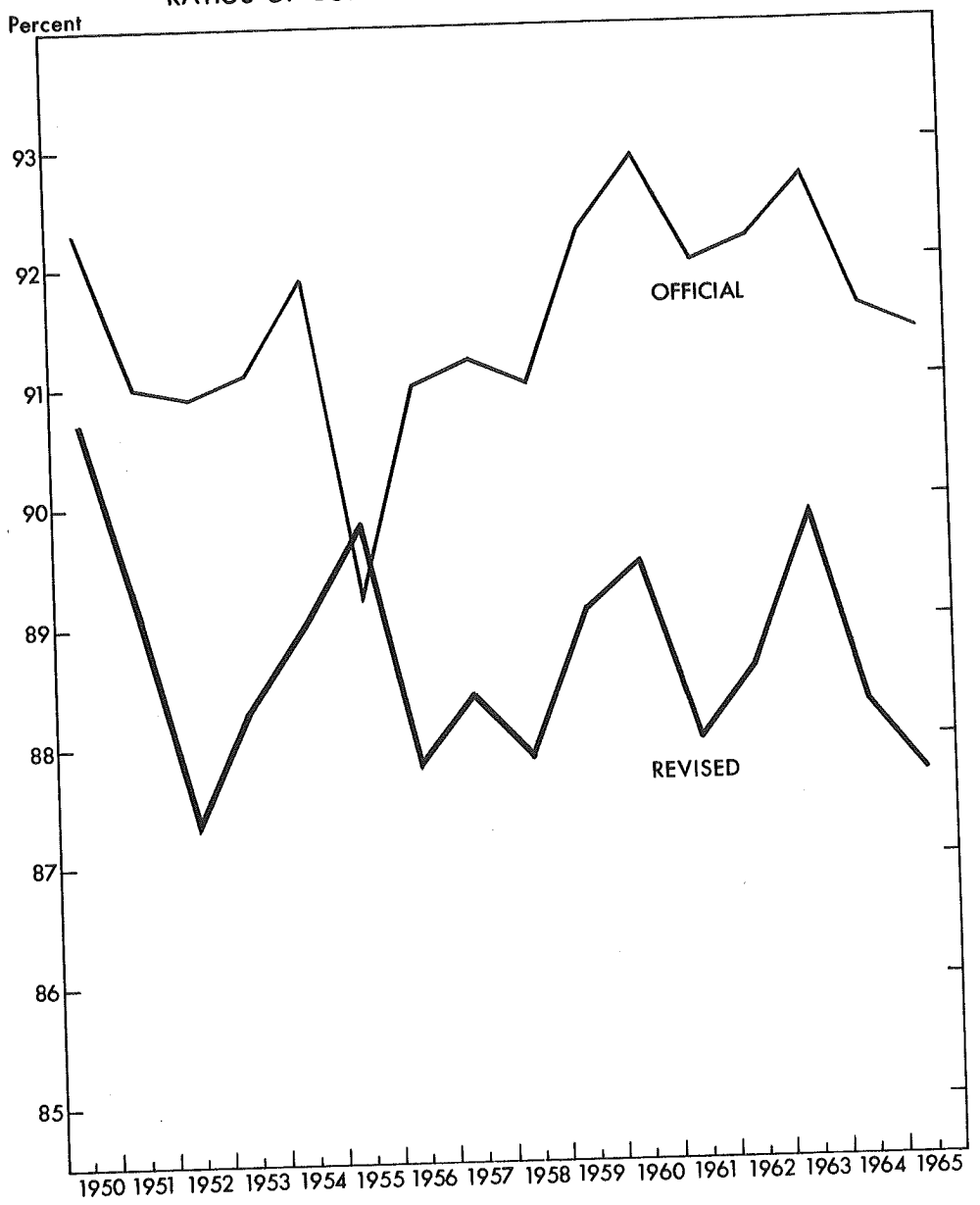
An alternative way to examine the speed of adjustment to income changes is to include the lagged dependent variable. (There are other roles that such a variable can play.) When the lagged dependent variable is included in the various equations, as shown in Table 1, we find a coefficient ranging from .7 to .98 in seven categories (clothing, personal care, housing, medical expenses, foreign travel, recreation, and education).¹⁷ With such speeds of adjustments, less than 60 percent or 30 percent respectively of the long-run effect of a change in income is felt in one year. Given such slow adjustments, one would expect some of the lags in disposable income to be significant.¹⁸ Of course it could be argued that the inclusion of the lagged dependent variable — even with serial correlation — is not appropriate, but I remain to be convinced of that.

The explanation for these contradictory results may be the following: Over the span of, say, a year, the effect of a change in income can have an impact of X, but the particular impact felt in any quarter could be highly uncertain and variable for several reasons. First, the quarterly income and consumption series may have a large

¹⁷ As noted earlier, we have eliminated the effect of serial correlation in these equations.

¹⁸ Even if it were argued that we have omitted some longer lags of Y, these omitted variables should be positively correlated with both consumption and the included lags in disposable income; hence, the coefficients on the included income variables should be biased upward.

FIGURE I
RATIOS OF CONSUMPTION TO DISPOSABLE INCOME



amount of offsetting error from quarter to quarter (because of seasonal adjustment and other smoothing techniques). Second, the effect of an income change on consumption may be dependent on many other variables. The lagged dependent variable is significant because it tends to pick up the long-run cumulative impacts. An alternative explanation is that the lagged dependent variable is significant because of other phenomena and that it is wrong to interpret the coefficient as a speed of adjustment.

Another somewhat surprising aspect of these results is that transportation and household operations, which contain most of consumer durables, do not have significant lagged dependent variables. But this can be explained in terms of a Houthakker-Taylor derivation of the equation estimated. In their analysis the lagged dependent variable's coefficient can represent either a habit or a stock adjustment effect. For food the declining average propensity to consume in the sample period apparently is captured by the negative coefficient. For the other two categories the stock adjustment effect (on the transformed lagged stock) is outweighing any other effect of C_{t-1} . Thus when estimates of the stock of autos and of durables are included in the equations for transportation and household operations, there is only a marginal improvement in the equation but the coefficients on C_{t-1} increase. Moreover when housing starts are included in the household operations, equation C_{t-1} becomes positive and significant. (See below for a more complete discussion.)

Accepting the results for each equation in Table 1 at face value, the one quarter effect of an income tax change would be .43 or 60 percent of the long-run effect (in equations with C_{t-1}).

While I consider these results interesting, they are not particularly germane to the topic of this conference. As a first step in examining the linkages problem, I included an individual's net worth series in each of my equations. The net worth variable, which was kindly supplied by Robert Rasche from the Fed-MIT-Penn model data bank, includes a) financial assets net of liabilities b) the value of physical assets such as houses, autos and other durables.¹⁹ As noted earlier, it is the net worth variable and not the money supply that should be relevant to consumption.

Even after eliminating serial correlation, and thus some spurious correlation connected with the business cycle, there are some effects of the wealth variable as shown in Table 2. For example, coefficients

¹⁹The net worth variable is in real, per capita terms.

TABLE 1

LAGGED RESPONSES OF CONSUMPTION (REVISED DATA)

Category	Constant	Y_t	Y_{t-1}	14-24	25-34	65+	Rel. Price	C_{t-1}	$\bar{R}^2/D.W.$	$\frac{\lambda}{\rho}$	Long Run MPC
Food	272.0 (4.6)	.212 (5.5)	-.086 (2.1)	6.236 (2.8)	.97 (.6)	2.834 (1.4)	-62.3 (1.4)	-.164 (1.3)	.90 2.1	-.20	.11
Food	228.4 (5.4)	.199 (5.8)	-.093 (2.5)	5.777 (2.9)	.950 (.6)	2.797 (1.5)	-54.0 (1.3)	— —	.90 2.2	-.34	.11
Clothing	-61.4 (2.5)	.081 (4.9)	-.069 (4.1)	4.732 (4.5)	-.614 (.9)	1.741 (2.2)	40.1 (1.9)	.815 (11.4)	.95 2.2	-.57	.06
Clothing	177.3 (2.0)	.102 (4.2)	-.012 (.5)	4.687 (2.2)	.172 (.1)	-.695 (.3)	-175.0 (2.7)	— —	.91 2.9	.16	.09
Personal Care	3.6 (.4)	.006 (3.3)	-.006 (2.8)	.043 (.3)	-.108 (.9)	-.098 (.8)	.5 (.1)	.963 (24.2)	.99 2.0	-.40	.01
Personal Care	18.8 (1.0)	.001 (2.0)	.007 (1.5)	.554 (1.4)	-1.284 (4.8)	-.195 (.5)	7.7 (.5)	— —	.93 1.7	.70	.01
Housing	95.8 (3.3)	.001 (.08)	.025 (3.3)	-.040 (.1)	.325 (1.2)	1.000 (2.5)	-119.3 (5.2)	.723 (13.8)	.99 1.9	.15	.09
Housing	247.6 (4.8)	.020 (1.6)	.048 (3.3)	.283 (.3)	-.069 (-1.8)	1.140 (1.1)	-264.8 (4.8)	— —	.93 1.9	.25	.07
Household Operations	136.9 (1.5)	.121 (5.4)	.059 (2.3)	.601 (.3)	-.097 (.1)	.673 (.4)	-189.5 (2.9)	-.052 (.4)	.95 1.8	.72	.17
Household Operations	137.3 (1.6)	.119 (5.6)	.053 (2.3)	.655 (.4)	-.123 (.1)	.572 (.3)	-187.1 (2.9)	— —	.95 1.9	.70	.17
Medical	20.1 (1.3)	.012 (2.1)	-.005 (.9)	1.346 (3.6)	-.718 (2.2)	-.090 (.3)	-6.8 (.8)	.826 (13.0)	.99 2.1	-.18	.04
Medical	1.4 (.05)	.022 (2.5)	.013 (1.3)	1.850 (2.6)	-1.450 (2.5)	-.116 (.2)	47.1 (2.7)	— —	.97 1.9	.65	.04

TABLE 1 (cont'd)

Personal Business	.7 (.1)	.013 (4.5)	.004 (1.2)	.519 (2.4)	-.300 (2.4)	-.155 (.7)	-3.0 (17.5)	.091 (1.7)	.99 1.9	.62	.02
Personal Business	-2.3 (.3)	.014 (5.3)	.005 (1.6)	.474 (2.2)	-.302 (2.2)	-.092 (.4)	-3.0 (20.2)	-	.98 .5	.69	.02
Transportation	431.4 (1.5)	.023 (.3)	.152 (1.8)	-4.539 (.7)	-5.494 (1.0)	-8.816 (1.3)	-271.8 (1.9)	.110 (.8)	.41 1.9	.61	.20
Transportation	412.8 (1.4)	.027 (.4)	.168 (2.1)	-6.043 (1.0)	-4.772 (.9)	-8.301 (1.2)	-276.4 (1.9)	-	.32 1.8	.66	.19
Recreation	41.5 (2.2)	.043 (6.0)	.016 (1.7)	.552 (1.0)	-.301 (.8)	-.547 (.9)	-38.6 (3.5)	.050 (.4)	.92 1.7	.70	.06
Recreation	41.1 (2.2)	.043 (6.1)	.018 (2.5)	.548 (1.0)	-.256 (.7)	-.510 (.9)	-39.3 (3.7)	-	.918 1.6	.73	.06
Education	-1.5 (.2)	.003 (1.2)	-.002 (.8)	.285 (2.4)	-.022 (.3)	.062 (.5)	-1.8 (.4)	.929 (18.9)	.96 2.1	-1.14	.01
Education	-8.5 (.9)	.006 (2.4)	.004 (1.4)	.221 (1.1)	-.144 (.9)	-.160 (.7)	-.40 (.1)	-	.36 1.9	.87	.01
Religious Activity	Put into Personal Outlays										
Foreign Travel	2.0 (2.0)	.0003 (1.0)	-.003 (.9)	.020 (1.0)	-.025 (1.3)	-.003 (1.7)	.5 (.4)	.827 (8.6)	.99 2.7	-.31	0
Foreign Travel	5.1 (2.5)	-.0005 (.8)	.0002 (.4)	.075 (1.9)	-.043 (1.1)	-.114 (3.0)	6.6 (5.9)	-	.97 2.0	.30	0
\sum Coefficients <u>a/</u>		.43	.08	9.0	-6.3	-3.4					
\sum Coefficients <u>b/</u>		.55	.21	9.1	-7.3	-5.4					
<u>a/</u> Equations with C_{t-1}											
<u>b/</u> Equations without C_{t-1}											

significant at the 5 percent level can be found in medical expenditures and personal care (when C_{t-1} is not used) and at the 10 percent level for food and recreation. While each of these coefficients is positive, their sum is less than .02 in the first quarter.

Personally I am surprised at the categories given above. There are, however, several things to consider. First, a colleague, who has done substantial work in the consumption area, has told me that these - rather than durables - are the items in which he would expect the wealth effect to appear.²⁰ Second, in equation 2 in Table 3, we present a household operations equation which has a significant coefficient of .009 on the real net worth variable. This equation differs from the earlier ones in the inclusion of the number of housing starts of the previous quarter. The logic for including this variable is that household durables which behaved countercyclically in much of the postwar period,²¹ are built-in (or included) with the erection of new single- and multi-family housing units.

In Table 3 we also present some transportation equations which contain a strike dummy (for autos) for the fourth quarter of 1964 and the unemployment rate. Despite the inclusion of these variables, transportation is not related to real net worth.

While Houthakker and Taylor,²² have shown that the equation estimated can be derived from a stock adjustment mechanism, some readers may feel better if a durable stock were introduced directly. When we do so, we find that the coefficients in household operations and transportation are not significant once we correct for serial correlation. We also introduced an interest rate variable into household operations and the average weekly payment into the transportation equation, but neither variable is significant (see Table 3).

Thus, what we have found is that real net worth has an impact on food, personal care, medical care, recreation and household operations with the biggest effect (in the short run) on household operations. In addition, household operations are related to housing starts, which in turn are related to interest rates as well as to

²⁰I have told him that being so, I would only accept dinner invitations conditional on the interim stock and bond market developments.

²¹See Guttentag, J., "The Short Cycle in Residential Construction," *American Economic Review*, 1961.

²²Houthakker and Taylor, *op. cit.*

nonprice credit rationing.²³ There are, however, no direct interest rate effects on consumption. Thus, there are some links between monetary policy and consumption.

These equations of course are estimated only through 1965. I have not yet tested the equations for the last half of the 60's, which contain major variations in monetary and fiscal policy.

But I leave the reader the following piece of information to reconcile with his prejudices and various theories: If one examines the ratio of the various types of consumption to disposable income (either the official series or my definition), the only category in which there is a sharp and continuing drop is food and tobacco. Thus, the increase in the saving rate is due to the decrease in average propensity to consume food (primarily for home use) and, to a lesser extent, tobacco.

²³Dhrymes and Taubman, *op. cit.*

TABLE 2

EFFECTS OF BEGINNING NET WORTH
(REVISED DATA)

Category	Constant	Y_t	Y_{t-1}	14-24	25-34	65+	Rel. Price	C_{t-1}	N.W. ₋₁	$\bar{R}^2/D.W.$	$\hat{\rho}$	Long Run MPC*
Food	262.4 (4.4)	.221 (5.7)	-.098 (2.4)	6.031 (2.7)	1.024 (.6)	.999 (.4)	-31.2 (.6)	-.187 (1.5)	.009 (1.7)	.91 2.1	-.17	.10
Food	215.5 (5.1)	.206 (6.1)	-.105 (2.8)	5.520 (2.8)	.986 (.7)	1.177 (.6)	-26.2 (.6)	— —	.008 (1.7)	.90 2.3	-.34	.10
Clothing	-75.5 (2.2)	.083 (4.9)	-.070 (4.1)	5.185 (4.0)	-.904 (1.0)	1.411 (1.4)	59.9 (1.5)	.795 (10.1)	.002 (.6)	.95 2.2	-.56	.06
Clothing	125.8 (1.4)	.102 (4.2)	-.019 (.7)	4.806 (2.2)	.521 (.3)	-.488 (.2)	-127.4 (2.0)	— —	.004 (.5)	.53 2.7	.87	.08
Personal Care	3.6 (.4)	.006 (3.2)	-.006 (2.7)	.043 (.3)	-.108 (.9)	-.098 (.7)	0.5 (.1)	.963 (13.3)	-.0001 (.003)	.99 2.0	-.40	.01
Personal Care	35.3 (2.4)	.002 (.6)	.005 (1.2)	.826 (3.1)	-1.217 (6.5)	1.104 (4.2)	4.8 (.4)	— —	.006 (8.6)	.99 1.8	.43	.01
Housing	93.1 (3.2)	-.0002 (.03)	.0215 (3.1)	-.048 (.1)	-.290 (1.0)	.939 (2.1)	-119.0 (5.1)	.749 (12.4)	.0004 (.3)	.99 1.9	.15	.10
Housing	251.3 (5.1)	.026 (2.0)	.054 (3.9)	-.305 (.3)	-1.911 (3.8)	1.979 (2.2)	-263.2 (7.3)	— —	-.008 (3.8)	.95 1.5	.25	.08
Household Operations	135.3 (1.5)	.121 (5.3)	.061 (2.2)	.619 (.3)	-.199 (.2)	.725 (.4)	-187.0 (2.8)	-.052 (.4)	-.001 (.2)	.95 1.8	.72	.17
Household Operations	135.6 (1.5)	.119 (5.5)	.056 (2.2)	.671 (.4)	-.226 (.2)	.627 (.3)	-184.5 (2.8)	— —	-.001 (.2)	.95 1.9	.71	.17
Medical	38.8 (2.2)	.017 (2.9)	-.007 (1.3)	1.595 (4.3)	-1.040 (3.0)	-.526 (1.5)	-14.7 (1.7)	.710 (8.7)	.002 (2.2)	.99 1.9	.49	.03
Medical	19.8 (.7)	.028 (3.2)	.003 (.3)	2.220 (3.4)	-1.415 (2.5)	-.404 (.6)	-24.9 (1.4)	— —	.005 (2.5)	.98 1.92	.49	.02

TABLE 2 (cont'd)

Personal Business	1.0 (.1)	.013 (4.4)	.004 (1.3)	.518 (2.4)	-.323 (2.2)	-.147 (.7)	-3.0 (17.4)	.091 (1.6)	-.0002 (.3)	.98 1.9	.62	.02
Personal Business	-2.0 (.3)	.014 (5.2)	.005 (1.6)	.477 (2.1)	-.319 (2.1)	-.087 (.4)	-3.0 (20.0)	— —	-.0002 (.3)	.98 1.8	.69	.02
Transportation	460.1 (1.5)	.025 (.3)	.146 (1.6)	-4.655 (.7)	-5.482 (1.0)	-9.494 (1.3)	-298.1 (1.8)	.109 (.7)	.006 (.2)	.37 1.9	.62	.19
Transportation	439.4 (1.4)	.030 (.4)	.161 (1.9)	-6.201 (1.0)	-4.715 (.9)	-8.887 (1.2)	-302.1 (1.8)	— —	-.006 (.2)	.28 1.8	.67	.19
Recreation	40.6 (2.3)	.045 (6.3)	.006 (.6)	.592 (1.1)	-.128 (.3)	-.662 (1.2)	-40.1 (3.7)	.132 (1.2)	.003 (1.8)	.94 1.7	.58	.06
Recreation	42.1 (2.3)	.044 (6.3)	.014 (1.8)	.559 (1.0)	-.099 (.2)	-.582 (1.0)	-42.3 (4.1)	— —	-.003 (1.5)	.93 1.6	.67	.06
Education	-.3 (.04)	.003 (1.2)	-.002 (.7)	.291 (2.4)	-.054 (.5)	.085 (.7)	-2.7 (.5)	.924 (18.3)	-.002 (.6)	.96 2.1	-.14	.02
Education	-9.1 (.9)	.006 (2.3)	.004 (1.4)	.232 (1.1)	-.156 (.9)	-.152 (.7)	.19 (.0)	— —	-.0004 (.5)	.36 1.9	.87	.01
Religious Activity	Put into Personal Outlays											
Foreign Travel	2.2 (2.0)	.0003 (1.0)	-.0003 (.9)	.020 (.9)	-.026 (1.3)	-.039 (1.7)	.4 (.4)	.817 (8.1)	.0001 (.5)	.99 2.6	-.30	0
Foreign Travel	5.6 (2.7)	-.0004 (.7)	.0001 (.1)	.076 (1.9)	-.042 (1.1)	-.131 (3.2)	6.2 (5.1)	— —	.0001 (1.0)	.97 2.0	.26	0

*Calculated from each equation but ignoring the effect of N.W.₁.

TABLE 3

SOME HOUSEHOLD OPERATIONS AND TRANSPORTATION EQUATIONS

	Constant	y_t	y_{t-1}	14-24	25-34	65 +	Rel. Price	C_{t-1}
Household Operations								
1.	-35.5 (.3)	.098 (3.6)	.082 (2.8)	.632 (.3)	-1.062 (.6)	-.430 (.1)	48.1 (.5)	— —
2.	-46.8 (.4)	.099 (3.5)	.057 (1.7)	2.014 (.9)	1.402 (.8)	-.952 (.4)	69.9 (.7)	.170 (1.2)
3.	-96.8 (1.5)	.107 (4.1)	.045 (1.5)	— —	— —	— —	65.3 (.9)	.195 (1.5)
4.	100.5 (1.1)	.101 (4.4)	.005 (.2)	2.976 (1.9)	-.751 (1.1)	-2.211 (1.6)	-178.9 (3.2)	.284 (2.8)
5.	162.4 (2.3)	.091 (4.4)	-.002 (.09)	1.897 (1.5)	-.767 (1.3)	-2.384 (1.8)	-160.2 (3.0)	.392 (4.3)
Transportation								
6.	207.9 (.5)	.027 (.3)	.170 (2.0)	-3.945 (.5)	-2.907 (.5)	-6.103 (.7)	180.1 (.7)	— —
7.	99.9 (.2)	.033 (.4)	.108 (1.2)	1.280 (.1)	-2.780 (.5)	-6.361 (.7)	288.0 (1.0)	.260 (1.7)
8.	-46.2 (.2)	.012 (.2)	.140 (1.7)	— —	— —	— —	170.3 (.7)	.260 (1.1)
9.	815.8 (2.8)	-.037 (.6)	.087 (1.3)	-2.449 (.4)	-12.120 (2.5)	-10.926 (1.8)	-217.4 (1.4)	-.014 (.1)

TABLE 3 (cont'd)

	N.W. _{t-1}	Dist	Stk Dur _{t-1}	Int	Housing Starts _{t-1}		R ² D.W.	β̂
Household Operations								
1.	.007 (1.0)	-20.4 (.3)	-.020 (.6)	-3.9800 (1.4)	— —	— —	.97 1.76	.64
2.	.009 (1.3)	-5.2 (.1)	-.044 (1.3)	-4.4700 (1.6)	— —	— —	.96 (1.85)	.47
3.	— —	— —	.011 (.6)	-2.3170 (1.1)	— —	— —	.96 1.88	.50
4.	.007 (2.0)	86.3 (1.2)	— —	— —	.081 (5.0)	— —	.98 2.10	.24
5.	.009 (2.5)	— —	— —	— —	.073 (5.0)	— —	.98	.12
			Stk Auto _{t-1}	Monthly Payment	Unemp Rate	Stk Dummy		
Transportation								
6.	-.004 (.2)	-188.4 (1.0)	.001 (.02)	-1.6210 (1.4)	— —	— —	.37 1.65	.65
7.	.002 (.1)	-170.5 (.9)	-.003 (.1)	-1.8490 (1.7)	— —	— —	.55 1.86	.45
8.	— —	— —	-.019 (.9)	-1.9940 (1.9)	— —	— —	.50 1.79	.59
9.	.005 (.3)	— —	— —	— —	-10.3 (4.2)	-16.4 (3.1)	.10 2.00	.79

TABLE 4

OFFICIAL AND REVISED PERSONAL DISPOSABLE INCOME FOR 1964
(BILLIONS OF DOLLARS)

	Official	Revisions	New Series
Total	438.1	Given Below	399.7
1. Wage and Salary	333.7	0	333.8
2. Other Labor Income	16.6	+ Pension Benefits	
		- Pension Contributions	4.1
3. Proprietor's Income	52.3	- Noncorporate and Farm Inventories	
		- Nonprofit Property Income	
		- Imputations	47.4
		- Taxes on Proprietor's Income	
		- Income Received by Fiduciaries but Not Distributed	
4. Interest Income	34.8	- Services Furnished Without Pay by Financial Intermediaries	24.0
		- Bank Service Charges and Trust Services and Safe Deposit Rent	
5. Rental Income of Persons	18.0	- Net Rentals to Owner- occupied Dwellings	.5
		- Property Taxes	
6. Transfer Payments	36.7	- Business Transfers	34.2
7. Dividends	17.8	0	17.8
8. Personal Contribution for Social Security	-12.5	0	-12.5
9. Personal Tax and Nontax	-59.4	a) - Capital Gains Tax	
		b) + Personal Nontaxes to Public Institutions	-49.4
		c) + Estate and Gift Taxes	

TABLE 5

OFFICIAL AND REVISED PERSONAL CONSUMPTION EXPENDITURES FOR 1964
(BILLIONS OF DOLLARS)

	Official	Revisions	New Series
Total Consumption	<u>401.2</u>	Given Below	<u>353.2</u>
1. Food and Tobacco	100.8	0	105.8
2. Clothes, Accessories	40.4	0	40.4
3. Personal Care	7.1	0	7.1
4. Housing	59.3	Subtract Out	
		a) Owner-occupied Nonfarm	22.1
		b) Farm Rental	
		c) Space Rental-institutional	
5. Household Operations	58.1	0	58.1
6. Medical Care	25.8	Add "Nontax" Payments to Public Hospital	29.4
7. Personal Business	20.1	Subtract Out	11.9
		a) Bank Service Charges	
		b) Services Furnished by Financial Institutions	
8. Transportation	51.4	0	51.4
9. Recreation	24.6	0	24.6
10. Private Education and Research	5.2	Subtract Out Education Expenses	4.7
		Add Student Fees and Veteran Tuition	
11. Religious	5.7	Subtract Out All	0
12. Foreign Travel	2.8	0	2.8

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DISCUSSION

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Taubman's paper is basically an adapted version of one originally designed for a rather different use. Essentially, the paper looks at consumption regressions using a rather standard set of variables: income, age distribution, relative prices, and assorted lags. A net worth variable constitutes an added starter, so to speak, to see how its coefficient behaves in the context of a standard consumption model. It is important to note, for evaluating the paper, that Taubman's major contribution is an emphasis which says that the trouble with many of our empirical consumption functions is that they do not pay enough attention to the basic data underlying the regressions. Taubman looks particularly at the income variable, and re-estimating it to reflect more of a cash flow concept, and less of an accrual.¹ Taubman thus has gotten away from saying that income is what the Office of Business Economics says it is, and has seriously tried to structure an income variable which ought to be more closely associated with the consumption categories whose behavior he is trying to explain.

In general terms, this is certainly in the spirit of the kind of experiment one would like to see done. It is only in the context of a model that provides a really good specification of the influence of other variables that one can hope to identify the influence of monetary or wealth variables on consumption. In that sense, the paper makes a significant contribution to the subject of the conference.

¹This useful contrast was made at the conference by Jim Tobin.

Model Explains Long-term Trends

There are some questions about the paper which I think ought to be raised, and there are some other related questions that are worth dwelling on for a few moments. To begin with, there are two very different sorts of models to examine if one is interested in looking at wealth or monetary effects on consumption. I would distinguish between models whose basic thrust is to explain trends in consumption from one whose basic thrust is to explain cyclical variability. The thrust of the Taubman model is to explain trends or longer term kinds of influences, since the variables in the model, with the exception of income, are all variables with little cyclical content.

Part of the reason for this choice, which I take to be a conscious one, is Taubman's definition of consumption as expenditure by consumers. This is not my preferred definition, and it is not a definition that the profession has increasingly adopted. Most studies recognize the important distinction between consumption as a flow of services and consumer expenditures as a flow of dollars. Taubman lumps together "consumer capital" expenditures with expenditures that represent flows of services. If one wishes to examine the cyclical content of consumer expenditures, it is surely going to be found mainly in consumer capital spending -- houses, cars, major durables, etc. One of the ways in which the minimal cyclical content of the model shows up is in the use of a single income variable. Taubman does not differentiate expected or permanent income from transitory or unexpected income, and that distinction is, of course, critical for analysis of expenditures on consumer capital. One cannot make any sense out of equations designed to explain consumer capital outlays, whether on automobiles, housing, or home appliances, unless permanent or expected income is distinguished from transitory income. The only variable in the Taubman paper which approximates that distinction is the unemployment rate, which is a very good proxy for transitory income; but that variable appears toward the back of the paper where Taubman takes a more careful look at expenditures on household operations and transportation.

Net Worth Variables

Secondly, I would like to raise some questions about the net worth variables. These queries apply not only to Taubman's paper, but to both the Modigliani and Tobin-Dolde papers as well. Taubman is using a total (marketable) net worth variable in the regressions.

The relevant wealth variable could conceivably be more narrowly defined or more broadly defined than that. For example, net worth for most people consists almost entirely of future earnings. One might argue that the influence of future earnings is picked up with an income or wage rate variable. But that may not be true, and the relation between current earnings and discounted future earnings may vary over time. Let me be more explicit. If we think that a major part of wealth is human wealth, and that this part of wealth has an important impact on the flow of consumption over time, I think we also have to recognize that the discount factors applied to expected future earnings are not necessarily invariant with respect to the economic environment. To illustrate, one might reasonably take a much longer view at the present time of the relevant horizons for income and consumption decisions than 15 or 20 years ago, simply because certain kinds of economic vicissitudes have become much less frequent in the last few decades. Hence the influence of net worth, measured as expected future earnings, may well be different in a consumption equation now than it would have been in previous years because the uncertainty factors applying to future earnings are less, given the reduced cyclical variability of the system. People may be willing to bet on a more predictable path for future earnings. While this kind of influence creates difficulties for time series regressions, I don't think it can be ignored.

Secondly, and moving in the opposite direction, some part of net worth as defined in the Taubman variable (and also in the Modigliani and Tobin-Dolde papers) is housing equity. While housing equity is all very nice, there are very few situations in which one can use it to finance consumption expenditures. Moreover, the degree to which housing equity can be monetized has probably changed over time because of changes in the attitudes of borrowers as well as in the practices of financing institutions. Still and all, most families probably do not view housing equity as being available for anything -- it just sits there and grows indefinitely or until the house is sold. Thus it may have little influence on the kind of consumption decisions examined in these models, and perhaps ought therefore to be removed from the net worth construct in consumption equations.

Nonprice Rationing

Next, let me make a few comments about Taubman's nonprice rationing discussion. To begin with, I would like to correct a misconception that seems widespread among the conferees. When a

group of monetarists get together and talk about interest rates, they use numbers like 5, 6, and 7 percent. When a group of consumption economists get together and talk about interest or finance rates, they don't talk about rates like 5, 6, or 7 percent, but about ones that range from 12 to 40 percent and up. So my notion of the relevant rate, if we are talking about consumer borrowing decisions, is an order of magnitude different from that of the monetarists. For example, the *penalty* rate for low income households in the Tobin-Dolde paper is 10 percent. Even after tax, that seems low by a factor of about 3.

A second point, which bears on nonprice rationing, relates to some evidence appearing in a paper I put together some years back with Bob Shay. We found very marked differences in the responsiveness of classes of households, characterized as rationed and unrationed, to interest rates. Rationed households were those that did not have the option, given the market rates they faced, of borrowing for preferred maturities or of borrowing preferred amounts, and they were generally constrained from borrowing except when simultaneously acquiring an asset. That is, rationed consumers could borrow to buy a car because the car was collateral, but they could not in general borrow for consumption. Unrationed consumers were those who could generally borrow preferred amounts at going rates.

What we found in the analysis was that rationed consumers were in general quite unresponsive to changes in interest rates; they were already constrained to borrow lower amounts than they preferred at existing rates, and changes in market rates were therefore irrelevant. For unrationed consumers this was not the case; changes in rates led to changes in borrowing decisions.

Given our definitions of rationed and unrationed consumers, it is probable that the proportions of these two household types have been changing over time, and that the proportion of unrationed consumers (with free access to capital markets) is growing rapidly while the proportion of rationed consumers is declining. To the extent that that is the case, smoothing out the life-cycle consumption pattern by borrowing is a much more plausible mode than under circumstances where the great majority of consumers are tightly constrained in their borrowing options. My guess is that steady changes of this sort have been going on, and I would therefore expect that, whatever the influence of monetary policy on consumption 10 years ago, it is probably different now and probably stronger.

Consumer Confidence

Now let me turn to the consumer confidence question. There is a comment in Taubman's paper to the effect that, if one views confidence as acting via changes in stock market capitalization rates, changes in confidence are not very important because they apply to a small fraction of the population -- and to an even smaller fraction during the period that Taubman investigates. In the first place, I am not sure that changes in the stock market really affect only a small fraction of the population; that seems an open question. Many people have a stake in pension funds that are invested in equities. While I don't think that people generally make careful calculations about how much their pension equity has grown in the last year, I do think that people are generally aware of their retirement provisions. If pension equities get to be a little healthier than before, people may well think that it is not quite so important to sock funds away for retirement, and they may tend to be a little more relaxed about spending current income. That describes a wealth effect on consumption, operating via the influence of equity in pension funds. The same is true of equity in mutual funds, where a great many families have something invested.

It is also possible that the notion of who "owns" stock is really a function of how the family is defined. A large fraction of wealth is concentrated among relatively older people. Many of these people have children with families of their own, and it is not uncommon for parents to finance expenditures for children. It may also not be uncommon that a good year in the stock market means a larger amount of intergenerational transfers.

All those considerations add up to the fact that one should not be dogmatic about the consequences for consumption of changes in wealth that take the form of equities. There are many routes by which consumption could be affected, and the fact that one percent of the population owns a large fraction of the total may not carry much weight when it comes to determining the consumption effects.

Secondly, even if it were true that the relative importance of the wealth variable has changed over time, I see no reason why the relationship cannot be handled statistically. There are straight-forward ways of handling variables that do not have the same influence in every period of time. The combination of an equity variable which measures wealth and an interaction variable which measures the changing influence of wealth on consumption is surely not unmanageable. And in trying to measure the consumption

influence of wealth and of monetary policy, my judgement would be that the monetary variables have become considerably more important over time in their impact on consumption.

There have been several comments at the conference, mainly in the Modigliani paper, regarding the degree to which it is useful to take into account empirically something called consumer sentiment or mood (as it is called in the Fair paper and elsewhere). One way to bring this variable into the analysis is to recognize that changes in consumer sentiment may represent much the same phenomenon as changes in capitalization rates for equities. That is to say, there may well be a difference between the subjective perception of wealth and a number that someone at the Federal Reserve Board or the Office of Business Economics records as wealth. The relevant behavioral variable is not necessarily a particular number that OBE says is total net worth, but is presumably a subjective notion that people have as to how well off they are. And this depends heavily on how people view the world -- their uncertainties, their hopes and fears, and the discount they apply to the future.

The consumer sentiment variable seems to represent this kind of phenomenon. As has been shown before, sentiment is related to stock price movement. However, it is determined by other things as well, and I tend to regard it as kind of a catchall for measuring changes in perception of overall well-being and thus as representing a subjective estimate of total (human plus nonhuman) wealth. But does the sentiment variable improve empirical estimates of consumption? My view is that sentiment is used incorrectly in the Modigliani model, and also in the Fair model. In work that I have done, and also in Saul Hyman's Brookings paper, consumer sentiment or subjective wealth has an explanatory value only when it is changing systematically or changing by large amounts. Modigliani's results don't, I gather, support the proposition that the sentiment variable in its continuous form has a net impact. This was also true of Hyman's paper in its original form, where it was tried as a cyclic variable in a fully specified stock adjustment model for durables. But when Hyman substituted a filtered version of the same variable eliminating all but the systematic or large changes, the result improved dramatically. One explanation is that when sentiment is not changing, the standard measure of wealth is fine; but when sentiment is changing, the standard measure of wealth needs to be adjusted -- essentially a kind of capitalization effect.

The empirical results using the filtered sentiment variable are very strong in the Hyman paper and they are equally strong in my own

work; both papers are concerned only with durables expenditures. I would not expect filtered or unfiltered sentiment to have an impact on nondurables, nor on the flow of consumption services. And I would expect that Modigliani would get very similar results if he tried the filtered version of consumer sentiment rather than the continuous version.

Let me make this one final point on methodology. As I indicated earlier, what seemed most useful in the Taubman paper was recognition of the simple fact that one is not going to make significant progress in estimating the effects of monetary policy or wealth on consumption unless one pays serious attention to the data. It also seems to me that we are about at the limit of what can be expected from analysis of time series data. There must be millions of consumption functions now in existence, half of which use wealth and half of which don't, and there must be negative degrees of freedom left in the data. The computers are too fast and it is too easy to run regressions. Thus the notion of trying to get behavioral results out of time series data strikes me as excessively optimistic. For that reason, I am much attracted to the general approach that Jim Tobin and Walt Dolde use in their paper. They essentially argue: let's forget about the time series, try instead to structure a micro-relationship, and then aggregate. I really don't see any way to get at wealth effects other than by approaching the data at the micro-level. This implies different kinds of data than we have been accustomed to using, and it implies much greater expenditures for data. But if we are not going to be here ten years from now, saying roughly the same things except that the intervening experience will have a lot more weight and this year's experience a lot less, we have to move in the direction of using micro-analysis to specify behavioral relationships, building in initially arbitrary and subsequently less arbitrary assumptions about the parameters, and then trying to produce macro-models by aggregating. In short, I don't see any hope for progress in this or many other areas unless we begin to move in the direction of serious empirical micro-models that attempt to take account of the kinds of complexities that actually exist.