

CONSUMER SENTIMENT, THE STOCK MARKET,
AND CONSUMPTION FUNCTIONS

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I. INTRODUCTION

A number of recent studies have examined the question of whether consumer sentiment or the level of stock prices is the more significant variable in determining consumer expenditures. Friend and Adams [5, p. 993] concluded that it was not possible from their results to establish a clearcut advantage for either variable in explaining consumer expenditures and that there was considerable overlap in the effect of the two variables; Shapiro and Angevine [9, p.242], using Canadian data, found that stock-price variables were not significant in explaining consumer expenditures when a consumer-sentiment variable was also included in the equation; and Hymans [6, pp. 184-185] found that the filtered version of the consumer-sentiment variable that he used completely dominated a stock-price variable. Two of these studies also examined the relationship between consumer sentiment and stock prices. Friend and Adams [5, p. 989] found consumer sentiment and stock prices to be positively correlated,¹ and Hymans [6, p. 177], using multiple regression analysis, found stock prices, along with the rate of inflation, to be significant in explaining consumer sentiment. Also, with respect to the effect of consumer sentiment on consumer expenditures, Evans [3, pp. 463-466] has argued that if variables can be found to explain consumer sentiment, then these variables, rather than consumer-sentiment variables, should be used in consumer-expenditure equations.

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¹Stock prices in this case were measured as deviations from a moving average trend.

The purpose of this paper is to examine the relationship between consumer sentiment and stock prices and to consider the question of whether consumer-sentiment variables and stock-price variables should be included in consumer-expenditure equations. The two main arguments of the paper are 1) that observed consumer-sentiment and stock-price variables are likely to be simultaneously related and 2) that consumer-sentiment variables should be included in consumer-expenditure equations even if other variables can be found to explain consumer sentiment. In Section II the theoretical basis of the paper is presented and previous empirical results are discussed. In Section III a simple simultaneous-equations model determining consumer sentiment and stock prices is developed and estimated.

II. THEORETICAL ISSUES

Consumer Sentiment and Stock Prices

The theory of the determination of stock prices is well formulated and needs little discussion here.² Let SP_t denote the stock price for period t , let D_{t+i}^e denote the expected level of dividend payments for period $t+i$, $i=1,2,\dots$, expectations being made in period t , and let r_{t+i}^e denote the expected discount rate for period $t+i$, $i=1,2,\dots$, expectations also being made in period t . Then

$$(1) \quad SP_t = \sum_{i=1}^{\infty} \frac{D_{t+i}^e}{(1+r_{t+i}^e)^i}$$

is the equation determining SP_t . Data on expected dividend payments and expected discount rates are, of course, not directly available, and if an equation explaining stock prices is to be estimated, some proxy for these expectations must be found.

²See, for example, Malkiel and Cragg [8] for a recent bibliography.

With respect to consumer sentiment, the most widely followed consumer-sentiment variable is the Michigan Survey Research Center index of consumer sentiment. The index, which will be denoted as MOOD, is based on answers to five survey questions about current and expected future personal financial conditions and current and expected future general business conditions.³ Two of the questions, for example, are:

Now, looking ahead -- do you think that a year from now you people will be better off financially, or worse off, or just about the same as now?

Now turning to business conditions in the country as a whole -- do you think that during the next twelve months we will have good times financially, or bad times, or what?

The MOOD variable can thus be interpreted as measuring people's expectations of future economic conditions. Given this, there are a number of factors that are likely to affect MOOD. Factors that have been mentioned at one time or another in the Michigan Survey Research Center reports (e.g., [7]) include the current rate of inflation, the current state of the economy, as measured by the unemployment rate or some aggregate income variable, proposed or enacted tax-rate changes, current or expected strike activity, the current level of interest rates, the current level of stock prices, and the existence or likelihood of wars and domestic strife. Adams and Green [1] found two employment variables, the length of the average work week in manufacturing and the difference between the accession and layoff rate in manufacturing, to be most important in explaining consumer sentiment for the 1954-1963 kperiod.⁴ Also, as mentioned above, Friend and Adams [5] found stock prices and consumer sentiment to be positively correlated, and Hymans [6] found stock prices and the rate of inflation to be significant in explaining consumer sentiment for the 1956-1968 period.

³See, for example, Katona et al. [7], p. 278.

⁴Many other variables were tried by Adams and Green, but the two employment variables proved to be the most significant. The consumer-sentiment index used by Adams and Green was based on answers to six questions.

The question of the direction of causality between consumer sentiment and stock prices is an interesting one and one that has not been carefully examined in the literature. Given that stock prices are a function of expected future dividend payments and that the MOOD variable measures expectations of future economic conditions, it may be the case that the MOOD variable affects stock prices as well as stock prices affecting the MOOD variable. In order to examine the direction of causality between consumer sentiment and stock prices it will be helpful to distinguish between the case of a single individual and the case of a group of individuals. Consider first the case of a single individual. Since the stock market is one of the most widely followed economic indicators, it seems reasonable to suppose that the general state of the stock market, along with a number of other factors, will have an effect on an individual's expectations of future economic conditions. It may also be the case, on the other hand, that an individual's expectations of future economic conditions affects her or his decision to buy and sell stocks. If expectations of future economic conditions are pessimistic, for example, then expectations of future dividend payments are likely to be pessimistic, and this may cause an individual to sell, or at least not buy, stocks. The effect of any one individual's actions on the stock market is, of course, negligible, and ^{so} for the case of a single individual the causality runs from stock prices to expectations but not from expectations to stock prices.

Consider now the case of a group of individuals. Since individuals as a group can affect stock prices, it seems reasonable to suppose that individuals' expectations of future economic conditions, along with a number of other factors, will have an effect on stock prices. Assume, for example, that some event, such as a presidential announcement, has changed people's expectations. The changed expectations should cause stock prices to change, which may then in turn cause

expectations to change even more, which should then cause stock prices to change again, and so on. There is thus likely to be a causality back and forth between expectations or consumer sentiment and stock prices. On, say, a daily or hourly basis it is not really the case that consumer sentiment and stock prices are simultaneously related -- there is rather a feedback relationship between the two -- but on a quarterly or even monthly basis, consumer sentiment and stock prices will be in effect simultaneously related. It is not possible from monthly or quarterly data to pick up very short-run feedback relationships, and so the specification of a simultaneous relationship between consumer sentiment and stock prices would appear to be the most realistic specification when dealing with monthly or quarterly data. In Section III a simultaneous-equations model determining consumer sentiment and stock prices will be developed and estimated. The model is fairly simple, but it is at least meant to capture the simultaneous relationship between consumer sentiment and stock prices.

The Role of Consumer Sentiment and Stock Prices in Explaining Consumer Expenditures

Some of the discussion in the literature as to whether consumer-sentiment variables or stock-price variables should be used in consumer-expenditure equations reveals a confusion regarding a basic econometric point. Consider as an example the following model:

$$(2a) \quad y_{1t} = \alpha_0 + \alpha_1 y_{2t} + \alpha_2 y_{3t} + \alpha_3 x_{1t} + \epsilon_t ,$$

$$(2b) \quad y_{2t} = \beta_0 + \beta_1 y_{3t} + \beta_2 x_{2t} + \mu_t ,$$

$$(2c) \quad y_{3t} = \gamma_0 + \gamma_1 y_{2t} + \gamma_2 x_{3t} + v_t ,$$

where ϵ_t is uncorrelated with x_{1t} , x_{2t} , x_{3t} , μ_t , and v_t and has zero mean

and constant variance. Say that an investigator is concerned with estimating equation (2a). Then consistent and efficient estimates of the α_i coefficients can be obtained by estimating the equation directly by ordinary least squares. One should not solve for y_{2t} and y_{3t} in terms of x_{2t} and x_{3t} and substitute these expressions into equation (2a) before estimating the equation. Among other things, this introduces the errors μ_t and v_t into equation (2a) and leads to less efficient estimates. It is perfectly conceivable for y_{2t} and y_{3t} to be simultaneously related, as in (2b) and (2c), and yet for both to have independent effects in an equation like (2a). The proper way to test for the independent effects of y_{2t} and y_{3t} in (2a) is to estimate the equation directly and see if both coefficient estimates are significantly different from zero. If α_2 is zero so that y_{3t} does not belong in equation (2a), then with a large enough sample, regressing y_{1t} on y_{2t} , y_{3t} , and x_{1t} should result in an insignificant coefficient estimate for y_{3t} , even though y_{2t} and y_{3t} are related.⁵

Assume in the present context that y_{1t} is a consumer-expenditure variable, that y_{2t} is a consumer-sentiment variable, and that y_{3t} is a stock-price variable. Assume also, as argued above, that consumer sentiment and stock prices are simultaneously related (as in (2b) and (2c)). Now, it seems quite reasonable to postulate that consumer sentiment has an effect on consumer expenditures. Consumers for the most part have considerable discretion in how

⁵It is true that if y_{2t} is excluded from the regression, then it is likely that y_{3t} will pick up some of the effect of y_{2t} on y_{1t} . Therefore, even if α_2 is zero, it is likely that its coefficient estimate will be significant when y_{2t} is excluded from the regression. This is not very interesting in itself, however, since the correct test is to estimate equation (2a) with all of the variables included. Sample limitations may, of course, prevent any definitive conclusions from being made about independent effects of different variables.

much they purchase in a given period, and if they have pessimistic expectations about future economic conditions, they are likely to spend less and save more than if they have more optimistic expectations. On the permanent income theory, consumption is a function, among other things, of expected future income, and adding a consumer-sentiment variable to a consumer-expenditure equation is a way of accounting for the effect of expectations on consumer expenditures.

If consumer sentiment has an effect on consumer expenditures, then stock prices have an effect on consumer-expenditures through their effect on consumer sentiment. It may also be the case, however, that stock prices have an independent effect in determining consumer expenditures. Changing stock prices change consumers' wealth, and so to the extent that wealth has a direct effect on consumer expenditures (independent of expectations about future economic conditions), stock prices will have a direct effect on consumer expenditures. It may thus be the case that both y_{2t} and y_{3t} belong in equation (2a) explaining y_{1t} even though y_{2t} and y_{3t} are themselves related. Only if the stock component of consumers' wealth has no direct effect on consumer expenditures should y_{3t} not be included directly in equation (2a).

As mentioned above, Friend and Adams [5], Shapiro and Angevine [9], and Hymans [6] have all examined empirically the question of whether consumer sentiment or the level of stock prices is the more significant variable in determining consumer expenditures. Friend and Adams could find no clearcut advantage for either variable, whereas Shapiro and Angevine and Hymans found that consumer-sentiment variables dominated stock-price variables in explaining consumer expenditures. Hymans concluded from his results that the stock-price variable that he used is an incomplete measure of consumer sentiment.⁶ In view of the

⁶Hymans [6], pp. 184-185.

above discussion, however, Hyman's conclusion from his results should not be that the stock-price variable is an incomplete measure of consumer sentiment -- it obviously is an incomplete measure -- but that the stock-price variable does not have an independent effect in determining consumer expenditures. The results from these three studies thus suggest that stock prices may not have a direct effect on consumer expenditures, although the inconclusive results of Friend and Adams indicates that more data are needed before a definitive conclusion can be reached.

The above discussion also suggests that Evans' view that if variables can be found to explain consumer sentiment, then these variables, rather than consumer sentiment variables, should be used in consumer-expenditure equations is not warranted. These are rather strong reasons for believing that expectations have an effect on consumer expenditures, and unless one can find a better measure of consumer expectations than, say, the MOOD variable, then the MOOD variable should be included directly in consumer-expenditure equations. Unless the MOOD variable can be explained perfectly, it is inefficient to use the determinants of the variable in place of the variable itself in the equations. It may be, of course, that some of the determinants of the MOOD variable (such as stock prices) also have a direct effect on expenditures, but this only means that both the determinants and the MOOD variable should be included in the expenditure equations.

Evans' own results actually bare out the view that consumer-sentiment variables should be included directly in consumer-expenditure equations. Evans includes as one of the explanatory variables in his automobile-expenditure equation the unemployment rate. The unemployment rate is viewed primarily

as a measure of "cyclical attitudes."⁷ The unemployment rate is significant when included without a consumer-sentiment variable, but when a consumer-sentiment variable is added to the equation, it is significant and the unemployment rate completely loses its significance. ([3], p. 169, equation (15.3a)). The fit of the equation only slightly improved when the consumer-sentiment variable was added. Evans concluded from these results that the two variables explain the same general phenomena and that the consumer-sentiment variable does not add any new information. This is not, however, the appropriate conclusion to be drawn from these results. The appropriate conclusion is that, because of its insignificance, the unemployment rate does not have an independent effect in explaining automobile expenditures. The only possible effect of the unemployment rate on expenditures would be its possible effect on consumer sentiment. It will be seen in the next section that the unemployment rate does have a significant effect in explaining consumer sentiment.

III. A SIMULTANEOUS-EQUATIONS MODEL DETERMINING CONSUMER SENTIMENT AND STOCK PRICES

The Model

The model estimated in this section is not meant to be a complete specification of the determinants of consumer sentiment and stock prices. Much more work would need to be done before one could hope to capture all of the important determinants of consumer sentiment and stock prices. The model estimated in this section is merely meant to illustrate the simultaneous relationship between consumer sentiment and stock prices and to point out a few of the other major determinants of consumer sentiment and stock prices.

⁷Evans [3], p. 166.

The following equation was chosen as the basic equation explaining the MOOD variable:

$$(3) \text{MOOD}_t = \beta_0 + \beta_1 \text{SP}_t + \beta_2 \text{CPI}_t + \beta_3 \text{UR}_t + \beta_4 \text{AF}_t + \beta_5 t + \mu_t ,$$

where SP denotes the level of stock prices, CPI the consumer price level, UR the unemployment rate, and AF the level of the armed forces. t refers to period t . MOOD_t , UR_t , and AF_t in equation (3) are essentially trendless variables, but SP_t and CPI_t both have pronounced positive trends. What has been assumed here regarding the effect of SP_t and CPI_t on MOOD_t is that at any point in time consumers have formulated "normal" levels of stock prices and consumer prices, say SP_t^n and CPI_t^n , and that it is deviations from these normal levels that affect MOOD_t . SP_t larger (smaller) than SP_t^n is assumed to have a positive (negative) effect on MOOD_t and CPI_t larger (smaller) than CPI_t^n is assumed to have a negative (positive) effect on MOOD_t . SP_t^n and CPI_t^n are then assumed to be linear functions of time, $\text{SP}_t^n = \delta_0 + \delta_1 t$ and $\text{CPI}_t^n = \phi_0 + \phi_1 t$,⁸ which merely introduces a constant term and time trend in equation (3). Likewise, consumers are assumed to have formulated normal levels of the unemployment rate and the size of the armed forces, and deviations from these normal levels are assumed to affect MOOD_t . In these two cases the normal levels are merely assumed to be constants, the constants then being absorbed in the constant term in equation (3). The size of the armed forces is taken as a measure of the preparation or participation of the United States in wars, and

⁸ Consumers, in other words, are assumed to believe that linear growth paths in stock prices and consumer prices are normal. It is only deviations from linear growth paths that are assumed to have a positive or negative effect on consumer sentiment.

positive (negative) deviations from normal are assumed to have a negative (positive) effect on $MOOD_t$.⁹

The following equation was chosen as the basic equation explaining the SP variable:

$$(4) \quad SP_t = \gamma_0 + \gamma_1 MOOD_t + \gamma_2 t + \gamma_3 RAAA_t + \gamma_t,$$

where RAAA denotes the AAA-rated corporate bond rate. Equation (4) is meant to be a simple approximation to equation (1), with the time trend serving as a proxy for the expected future trend of dividends, with the MOOD variable serving as a measure of expected short-run deviations from this trend, and with the bond rate serving as a proxy for the expected future discount rates. More specifically, let $MOOD_t^n$ denote the level of consumer sentiment corresponding to an expected normal level of economic activity. Then $MOOD_t - MOOD_t^n$ is postulated to have a positive effect on stock prices, where $MOOD_t^n$ is taken to be a constant and absorbed in the constant term of the equation. $MOOD_t - MOOD_t^n$, in other words, is taken as a measure or proxy for the expected short-run deviation of dividends from some expected long-run trend. With respect to the time trend in equation (4), almost any trend variable would prove to be significant in the equation because of the pronounced positive trend in stock prices over the period of estimation and because the bond rate and $MOOD_t$ are essentially trendless variables. Given the approximate nature of the equation,

⁹Theoretically, the size of the armed forces could be conceived of as being a measure of national security and thus as having a positive effect on consumer sentiment. The period of estimation, 1956-1970, was dominated by the Vietnam War, however, and the war is likely to have had a negative effect on consumer sentiment.

it did not seem likely that the data could pick out any one trend variable as being the best measure of the expected future trend of dividends, and so on grounds of simplicity a linear time trend was used as the trend variable.

The Data

The data that have been used to estimate equations (3) and (4) are listed at the bottom of Table 1. The one problem that arose in estimating the two equations is that the data on MOOD are not evenly spaced over time. Before 1962, for example, the surveys of the Michigan Survey Research Center were taken less than four times a year, and even since 1962, the four surveys taken each year have not all been conducted in the same four months of each year. The survey takes about four weeks to complete, and in the fourth quarter, for example, the survey is sometimes taken in October-November (roughly the last half of October and the first half of November), sometimes in November only, sometimes in November-December, and sometimes in December only.

This problem of uneven spacing was handled in the following way. First, it was assumed that any data collected from a survey spanning two months pertained only to the second month of the survey. Next, a discontinuous monthly series for $MOOD_t$ was constructed. In 1969, for example, values of $MOOD_t$ were available for February, June, September, and November. Finally, monthly series for all of the other variables were constructed to correspond to the $MOOD_t$ series. The time trend, for example, was taken to be 1 in January of 1954, 2 in February of 1954, and so on; and so the values of the time trend relevant for 1969 were 182, 186, 189, and 191 for February, June, September, and November respectively. The equations were estimated for the May 1956-August 1970 period, which included a total of 50 data points. The corporate

bond rate, $RAAA_t$, was lagged one month behind the other series, as this gave slightly better results than the use of the current rate.

The Estimation Techniques

Equations (3) and (4) form a simultaneous set of equations. SP_t and other variables affect $MOOD_t$ and $MOOD_t$ and other variables affect SP_t . Also, because of the simple nature of both equations, the error terms in the two equations are likely to be serially correlated. Many variables have doubtlessly been omitted from both equations and this omission is likely to add to the serial correlation of the error terms. Consequently, both equations were estimated under the assumption of first and second order serial correlation of the error terms. The equations were estimated under this assumption by three techniques: ordinary least squares (OLSAUTO2), two-stage least squares (TSLSAUTO2), and full information maximum likelihood (FIMLAUTO2).¹⁰ For TSLSAUTO2 and FIMLAUTO2, $MOOD_t$ and SP_t were treated as endogenous, with all of the other variables being taken to be predetermined. The OLSAUTO2 estimates are, of course, not consistent, and they are presented merely for comparison with the TSLSAUTO2 and FIMLAUTO2 estimates. In order to account for serial correlation, it had to be assumed that each residual was correlated with the residuals corresponding to the preceding two data points and not necessarily with the residuals corresponding to lags of three and six months. An assumption

¹⁰ See Fair [4] for a description and comparison of these techniques. The variables used in the first stage regressions for TSLSAUTO2 were the following: a constant, t , CPI_t , UR_t , AF_t , $RAAA_t$, and $MOOD_t$, SP_t , CPI_t , UR_t , AF_t , $RAAA_t$ all lagged one and two data points. For FIMLAUTO2 (as well as for OLSAUTO2 and TSLSAUTO2), the matrices of first and second order serial correlation coefficients were assumed to be diagonal.

like this had to be made since, as discussed above, not all of the data points are evenly spaced. It seemed better, however, to make this kind of an assumption than to ignore serial correlation problems altogether.

The Results

The results of estimating equations (3) and (4) by the three techniques are presented in Table 1. The results definitely indicate that stock prices and consumer sentiment have important effects on one another. The TSLSAUTO2 estimates of the coefficients of SP and MOOD in the respective equations are larger than the OLSAUTO2 estimates, and the FIMLAUTO2 estimates are larger than the TSLSAUTO2 estimates, but all three sets of estimates are quite significant.¹¹ In the MOOD equation, the unemployment rate is significant for all three estimates, the consumer price index is significant for the OLSAUTO2 and FIMLAUTO2 estimates and nearly significant for the TSLSAUTO2 estimate, and the level of the armed forces is significant for the OLSAUTO2 and TSLSAUTO2 estimates. The time trend is only significant for the FIMLAUTO2 estimate. In the SP equation, the time trend is significant for all three estimates, but the corporate bond rate is significant only for the OLSAUTO2 estimate. Both equations have a fairly high degree of serial correlation, with estimates of the first order coefficient ranging between .443 and .880 and estimates of the second order coefficient ranging between -.101 and -.387.

¹¹In the following discussion, a coefficient estimate will be said to be "significant" if it is greater in absolute value than twice the size of its estimated standard error. A variable will be said to be "significant" if its coefficient estimate is significant. "t-statistic" will be used to refer to the ratio of the coefficient estimate to its estimated standard error.

Table I
Estimates of the MOOD-SP Model

Estimation Technique	Dependent Variable	Explanatory Variables							$\hat{\rho}_1$	$\hat{\rho}_2$	R^2	RA^2	SE	
		MOOD _t	SP _t	Const.	t	CPI _t	UR _t	AF _t						RAAA _t
OLSAUTO2		.229 (2.28)	209.3 (9.67)		.108 (1.63)	-.998 (-4.66)	-267.7 (-3.18)	-.00789 (-2.43)		.612	-.239	.876	.571	2.536
TLSAUTO2		.580 (3.72)	157.3 (5.42)		-.083 (-0.89)	-.534 (-1.98)	-189.4 (-2.04)	-.00983 (-2.90)		.443	-.125	.846	.467	2.825
FIMLAUTO2		1.069 (4.45)	85.4 (5.90)		-.347 (-3.86)	-.225 (-2.16)	-43.3 (-2.11)	-.00078 (-1.47)		.855	-.374			
	SP _t													
OLSAUTO2		.478 (3.15)	-3.1 (-0.18)		.451 (9.33)					-.0451 (-2.50)	-.225	.963	.401	3.573
TLSAUTO2		.734 (4.06)	-29.6 (-1.47)		.435 (8.23)					-.0357 (-1.84)	-.101	.962	.373	3.655
FIMLAUTO2		.791 (4.63)	-43.9 (-2.63)		.359 (15.61)					.0012 (0.48)	-.387			

Notes: t-statistics are in parentheses. $\hat{\rho}_1$ and $\hat{\rho}_2$ are the estimates of the first and second order serial correlation coefficients respectively. RA^2 is the percent of the variance of the change in the dependent variable explained by the regression. MOOD_t is the consumer sentiment index for month t. SP_t = the average of the Standard and Poor's daily price index of 500 stocks for month t. CPI_t = the consumer price index for month t. UR_t = the civilian unemployment rate, seasonally adjusted, for month t. AF_t = the total level of the armed forces for month t. RAAA_t = the interest rate on AAA-rated corporate bonds, Moody's series, for the month preceding month t. t = time trend: 1 in January 1954, 2 in February 1954, and so on. Period of estimation was May 1956-August 1970, 50 observations.

A disturbing feature of the results in Table 1 is the fairly different estimates that are obtained using the three techniques. It is particularly disturbing that the TSLSAUTO2 and FIMLAUTO2 estimates are no closer than they are since both sets of estimates should be consistent under the statistical assumptions of the model. The difference in estimates may be a reflection of the simple and incomplete specification of the model, and a more complete specification of the model would probably lessen this difference as well as lessen the degree of serial correlation of the residuals in the model. The results do indicate, however, that consumer sentiment and stock prices have important effects on one another, which is the main point to be emphasized here.

IV. CONCLUSION

In this paper it has been argued that monthly or quarterly consumer-sentiment and stock-price variables are likely to be simultaneously related and that consumer-sentiment variables should be included in consumer-expenditure equations even if variables can be found that explain consumer sentiment. The latter argument is based in part on the simple econometric point that two variables can be related (perhaps simultaneously) and yet both belong in an equation explaining a third variable. With respect to consumer sentiment and stock prices, it does appear from the results in Section III that the two variables are simultaneously related. With respect to the question of whether both consumer-sentiment and stock-price variables belong in consumer-expenditure equations, the results in the literature suggest that stock prices may not have an independent effect in determining consumer expenditures. More results are

needed, however, before a definitive conclusion can be drawn.¹² Finally, the results of Evans [3] as interpreted in the present framework indicate that the unemployment rate may not have an effect on automobile expenditures except through its effect on consumer sentiment.

¹²Stock prices do play an important role in determining consumption in the MIT-FRB-PENN model (see, for example, [2]), but it is not clear that any conclusions can be drawn from this about the possible independent effect of stock prices in consumer-expenditure equations. First, it is consumption of services rather than consumer expenditures that is determined directly in the MIT-FRB-PENN model. Second, no consumer-sentiment variables were tried in the consumption equations. And third, stock prices enter the consumption equation through a wealth variable, so that it is not possible to separate the effect of stock prices from the effects of the other factors that are included in the wealth variable.

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