Economic Determinants of Consumer Sentiment

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A few objective variables explain most fluctuations in the Index of Consumer Sentiment. These relationships reveal sources of consumer satisfaction and can test hypotheses from psychological economics. The study questions the practical value of the Index to forecasters because objective data contain the same basic information. However, the Index reflected Watergate and the Arab oil embargo, and information on consumer response to such extraordinary nonsystematic factors might assist forecasters. Granger causality tests support the exogeneity of certain explanatory variables and are consistent with the hypothesis that consumer sentiment affects automobile sales and purchases of consumer durables without feedback.

A key principle of Katona's "psychological economics" is that consumer spending depends on both "ability to buy" and "willingness to buy." Katona [7] has argued that psychological factors—motives, attitudes, and expectations—condition people's responses to economic stimuli. Identical configurations of objective stimuli, including income and other measures of ability to pay, elicit different levels of expenditure as households become more or less optimistic about the economy. To track changes in consumer attitudes, the Survey Research Center, University of Michigan, compiles an Index of Consumer Sentiment (ICS). Hymans [5], Juster and Wachtel [6], and others found that the Index helps explain aggregate purchases of durable goods, a volatile component of consumer spending. Researchers also have sought the objective factors that influence consumer sentiment, although Katona [7, p. 101] criticized such studies as attempts to "shove human beings and psychological variables off the stage of economic research." This study examines the economic determinants of consumer sentiment, and it confirms that a small set of objective variables explains most variations in ICS. However, there exists some evidence that ICS contains additional nonsystematic information, which might be of limited use to forecasters.

Three reasons exist for studying the objective determinants of consumer sentiment. First, if stable relationships exist, it may be

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possible—as previous researchers have noted—to improve forecasts of consumer spending by predicting ICS, and structural econometric models could incorporate such equations to combat simultaneity bias. Second, certain hypotheses from psychological economics can be tested by statistical methods. Third, the coefficients of variables determining ICS may convey normative information. Consumer welfare is a nebulous concept, but it surely relates to consumer attitudes and uncertainties. Although income may be a useful approximation to welfare in some theoretical exercises, Scitovsky [12] noted that this conception oversimplifies greatly. Most policy issues require a broader understanding of human satisfactions. Katona [8] and Lovell [9] interpreted the determinants of ICS as sources of consumer satisfaction and anxiety. However, Katona raised the following objections to econometric investigation:

> The search for objective data that would replace attitudinal data disregards the pliability of human behavior due to man's ability to learn [7, p. 101].
>
> ... the relative importance of the various causal factors varies over time. If it is true that the reasons for change in sentiment differ from time to time, prediction of the Index by substituting other factors for it would be very difficult [8, p. 205].

Learning and structural stability are serious issues, but they need not be insurmountable. Other fields of inquiry cope with these difficulties, and there exist explicit tests of stability and formal models of learning. The findings here suggest that statistical methods can contribute to the scientific study of consumer welfare.

The Search for Objective Determinants

The Survey Research Center samples consumer attitudes and expectations quarterly. The Index of Consumer Sentiment is based on the answers to five questions, paraphrased as follows:

1) Is your family better or worse off financially than it was a year ago?
2) Do you expect it to be better or worse off one year from now?
3) Will general business conditions be good or bad during the next year?
4) Will general business conditions be good or bad during the next five years?
5) Is this a good time to buy major household items?

Subtracting the percentage of unfavorable answers from the percentage of favorable answers, then adding 100, gives a relative score for each

question. The Index of Consumer Sentiment is an average of the five relative scores, adjusted to the base February 1966 = 100. As the component questions reveal, ICS blends the current satisfactions of households and their anxieties about the future. It has important expectational elements, and these expectations will be revised as new information appears.

Hymans [5], Lovell [9], and Mishkin [11] studied the economic determinants of ICS. These investigators provided little theoretical foundation for their models, although Hymans referred to Katona's work and apparently had in mind some of the arguments in the following section. It is important to subject their models to ever more stringent testing. Here, their basic specifications are reestimated over the interval 1962-I to 1978-I; this sample period includes more recent data but omits observations from 1953–1961 when the surveys of consumers were sporadic. (Hymans employed the sample period 1962-I to 1968-IV, plus the observations 1956-III, 1956-IV, 1958-I, 1958-II, 1960-I, 1960-II, 1961-I, and 1961-II. Lovell used the 76 observations available from 1954-I to 1975-I. Mishkin's sample period was 1954-I to 1976-IV, and he interpolated values for quarters when a survey was not taken. The major sources of data for this study were U.S. Department of Commerce [16, 17]. The data on household debt and financial assets were supplied by the Division of Research and Statistics, Board of Governors of the Federal Reserve System.) Hymans explained the Index of Consumer Sentiment using stock prices, real disposable income, and the inflation rate. Updated versions of Hymans' specifications—Eq. (1) is an example—performed fairly well:

$$\begin{aligned} \mathrm{ICS} = {} & 282.14 - 81.05\ \mathrm{DYRT} + 19.06\ \mathrm{SP}_{-1}/\mathrm{SP}_{-2} \\ & (3.68) \quad (-2.09) \qquad (2.11) \\ & + 23.81\ \mathrm{AVSP}_{-1}/\mathrm{AVSP}_{-2} - 198.62\ \mathrm{PCRT} + 0.59\ \mathrm{ICS}_{-1} \\ & (1.33) \qquad\qquad (-3.99) \qquad (5.97) \\ & R^2 = 0.89 \qquad h = -1.46 \qquad \mathrm{SE} = 3.80, \end{aligned} \tag{1}$$

where

DY = real disposable personal income,

$\mathrm{DYRT} = \mathrm{DY}/(\frac{1}{8}\sum_{0}^{7} \mathrm{DY}_{-i})$,

SP = index of five hundred common stock prices,

$$\text{AVSP} = \tfrac{1}{4} \sum_{0}^{3} \text{SP}_{-i},$$

PC = GNP implicit price deflator, and

$$\text{PCRT} = \text{PC}/(\tfrac{1}{8} \sum_{0}^{7} \text{PC}_{-i}),$$

For regression results, this paper presents t statistics in parenthesis beneath the coefficients, and h is Durbin's h statistic, appropriate when there are lagged dependent variables (see Durbin [2]). The major drawback of Eq. (1) is the counterintuitive negative sign on DYRT. Other variables behave about the same as in Hymans' study, although PCRT, not surprisingly, has stronger impact in the updated sample.

Lovell employed similar explanatory variables but measured them differently, and he substituted the unemployment rate or its first difference for real disposable income. Equation (2) is an estimate of the basic Lovell specification over 1962-I to 1978-I.

$$\begin{aligned} \text{ICS} = {} & 40.45 - 1.29\ \text{DCPI} + 0.19\ \text{UE} + 0.10\ \text{DSP} \\ & (3.84)\ (-3.66) \qquad (0.45) \qquad (2.28) \\ & + 0.59\ \text{ICS}_{-1} \\ & (6.22) \end{aligned} \tag{2}$$

$$R^2 = 0.89 \qquad h = -0.86 \qquad \text{SE} = 3.78,$$

where

DCPI = 100 (CPI/CPI$_{-4}$ − 1), annual percentage change in the Consumer Price Index,
UE = unemployment rate, and
DSP = 100 (SP/SP$_{-4}$ − 1), annual percentage change in stock prices.

The unemployment rate is statistically insignificant in Eq. (2), as was its first difference in other regressions.

Mishkin interpreted ICS as a measure of consumer perceptions of the probability of financial distress. He found consumer sentiment to be correlated positively with household financial assets and negatively with household indebtedness. A reestimate of Mishkin's basic equation is as

follows:

$$\begin{aligned} \text{ICS} = {} & 478.23 - 8.03\ \text{DYRT} - 376.86\ \text{PCRT} - 366.07\ \text{DEBT} \\ & (3.54) \quad (-0.15) \qquad (-3.66) \qquad (-0.59) \\ & + 188.35\ \text{FIN} - 12.92\ \text{DUM} + 0.77\ u_{-1} \\ & (1.30) \qquad (-4.49) \end{aligned} \tag{3}$$

$$R^2 = 0.91 \qquad \text{DW} = 1.96 \qquad \text{SE} = 3.49$$

where

DEBT = real per-capita debt of households,
FIN = real per-capita financial assets of households, and
DUM = dummy variable equal to one in 1974-I; zero otherwise.

DYRT, DEBT, and FIN are all statistically insignificant for the updated sample. Mishkin's interpretation of ICS seems unsatisfactory because the variables he emphasized most, DEBT and FIN, perform poorly.

Tests of a Preferred Model

Except for one new variable, the preferred model resembles Lovell's work, and it is similar in spirit to Hyman's. However, the rationale of this approach is presented, and the model is subjected to stringent empirical tests. Stability is examined in response to Katona's critique of econometric research. Information content here means the extent to which ICS can be explained by economic time series versus nonsystematic socioeconomic and political shocks. Neither type of determinant pushes human behavior off the stage of research, but, if nonsystematic factors are unimportant, forecasters naturally will forego survey evidence in favor of the objective data.

According to Katona [8], the Index of Consumer Sentiment measures a complex of attitudes and expectations, which act as intervening variables in the consumption decision, and which have both cognitive content and emotional connotations. Although psychological economics does not directly provide an estimable function, it does constrain the specification more than many readers might expect. These constraints follow from three basic principles of psychological economics. First, social learning occurs slowly. New attitudes and behavior patterns require mutual reinforcement and information exchange among peer groups, and a uniform mass response emerges only after months or years. This principle indicates some lag formulation is necessary;

following Hymans and Lovell, the preferred equation incorporates a partial-adjustment model. Second, the law of large numbers implies most random factors and personal experiences cancel out in aggregate behavior. Research should focus on economic indicators and events transmitted by the mass media and comprehended by households in a uniform manner. Just a few economic time series receive mass attention—for example, stock prices, unemployment, GNP, inflation, and the balance of payments. These variables also have broad personal impact on households. Even media coverage of economic and political events often relates to these series in that the events are reactions to new reports about the state of the economy.

A third principle is "adaptation" or "habituation." Katona [7, p. 202] wrote that "when the same kind of news continues over prolonged periods, it ceases to be news." Scitovsky [12, p. 40] argued that organisms adapt to a given level of stimulus; arousal is produced by divergences from what is familiar. In other words, it is changes in economic conditions relative to recent experience, not levels of income or consumption, that please or alarm households. Over the years, real income in the United States has risen dramatically, yet the proportion of Americans who reported themselves happy has hardly changed. If ICS is a measure of economic arousal, the regression model should stress changes in the economic situation; explanatory variables should be formulated in terms of rates of change or perhaps even departures from an anticipated rate of change.

The preferred regression model includes one new variable, DIRT, the ratio of the annual rate of change in real per-capita disposable income to an eight-quarter average of this rate of change. DIRT embodies the notion that, in the years since World War II, Americans have come to expect continuing improvement in their standard of living, and consumers are aroused by income growth slower or faster than expected. Thurow [15, p. 12] expressed this idea well in the following diagnosis of economic discontent in the 1970s:

> ... real incomes have risen but the rate of increase has been cut in half ... Anyone who experiences a 50% reduction in the growth of his real standard of living is going to find life frustrating. People are not going to be able to afford what they expected to be able to afford. Lowering expectations is always painful.

The regression model shares three variables with Lovell's equation: DCPI, DSP, and ICS_{-1}. The inflation rate, DCPI, is a key economic indicator, which also directly affects the distributions of income and wealth. One might expect adaptation to inflation just as there is adaptation to real income growth, but an inflation variable similar to

DIRT was empirically unsuccessful. This may reflect the low inflation rate early in the sample period and the incomplete adaptation of economic institutions to sustained inflation. Because many contracts and financial instruments are not perfectly indexed in the United States, any inflation affects consumer welfare. In a country like Argentina, institutional adaptation is more complete, and consumer sentiment should depend on departures of the inflation rate from recent experience. DSP, the annual rate of change in stock prices, also affects wealth directly, but stock ownership is highly concentrated among the wealthiest households. The significance of DSP probably stems more from its role as an economic indicator, which is widely watched even by households without stocks. ICS_{-1}, the lagged dependent variable, appears because of the partial-adjustment process. Finally, the unemployment rate meets our criteria; it is an economic statistic with broad impact on households and extensive media coverage. The first-difference of unemployment outperforms the level, but both variables are statistically insignificant. This finding could reflect the short average duration of unemployment in the U.S., the uneven incidence of unemployment, or the availability of unemployment compensation. Nevertheless, the failure of this variable is surprising.

Equation (4) is an estimate of the preferred model for the sample period 1962-I to 1978-I:

$$\begin{aligned} ICS = {} & 35.16 - 1.15\ DCPI + 0.15\ DIRT + 0.09\ DSP \\ & (4.11)\quad (-3.51)\quad (3.32)\quad (2.50) \\ & + 0.65\ ICS_{-1} \\ & (7.81) \end{aligned} \tag{4}$$

$$R^2 = 0.90 \qquad h = -1.30 \qquad SE = 3.48$$

where

$$DIRT = DDI/(\tfrac{1}{8}\sum_{0}^{7} DDI_{-i}),$$

DDI = 100 (DI/DI_{-4} − 1), annual percentage change in DI, and
DI = real per-capita disposable personal income.

Objective economic variables explain ninety percent of the sample variation in ICS. The coefficient of ICS_{-1} is statistically significant, and its magnitude implies a reasonable adjustment speed. Mishkin found that estimation by the Cochrane–Orcutt procedure to correct for first-order

Table 1: Regression Estimates

Sample Period: 1962-I to 1978-I[a]

$$\begin{aligned} \text{ICS} = {} & 36.97 - 1.21\ \text{DCPI} + 0.15\ \text{DIRT} + 0.09\ \text{DSP} \\ & (3.95)\ (-2.65)\ \ (3.32)\ \ (2.35) \\ & + 76.49\ \text{DEBT} - 37.50\ \text{FIN} + 0.65\ \text{ICS}_{-1} \\ & (0.33)\ \ (-0.62)\ \ (7.45) \end{aligned} \tag{5}$$

$R^2 = 0.91 \quad h = -1.46 \quad \text{SE} = 3.53$

$$\begin{aligned} \text{ICS} = {} & 39.12 - 1.21\ \text{DCPI} + 0.15\ \text{DIRT} - 2.13\ \text{DUE} \\ & (4.33)\ (-3.68)\ \ (3.31)\ \ (-1.30) \\ & + 0.07\ \text{DSP} + 0.61\ \text{ICS}_{-1} \\ & (1.70)\ \ (6.85) \end{aligned} \tag{6}$$

$R^2 = 0.91 \quad h = -0.86 \quad \text{SE} = 3.46$

Sample Period: 1962-I to 1968-IV

$$\begin{aligned} \text{ICS} = {} & 38.10 - 0.90\ \text{DCPI} + 0.005\ \text{DIRT} + 0.09\ \text{DSP} \\ & (3.05)\ (-1.97)\ \ (0.007)\ \ (1.99) \\ & + 0.62\ \text{ICS}_{-1} \\ & (4.88) \end{aligned} \tag{7}$$

$R^2 = 0.71 \quad h = -0.39 \quad \text{SE} = 2.32$

Sample Period: 1969-I to 1978-I

$$\begin{aligned} \text{ICS} = {} & 36.27 - 0.94\ \text{DCPI} + 0.14\ \text{DIRT} + 0.11\ \text{DSP} \\ & (2.85)\ (-1.70)\ \ (2.47)\ \ (1.95) \\ & + 0.61\ \text{ICS}_{-1} \\ & (4.96) \end{aligned} \tag{8}$$

$R^2 = 0.81 \quad h = -1.00 \quad \text{SE} = 4.24$

[a] $\text{DUE} = \text{UE} - \text{UE}_{-1}$.

serial correlation rendered ICS_{-1} statistically insignificant. Here that never happened; the empirical results regularly favored the partial-adjustment model.

Some further regression estimates are presented in Table 1. Equation (5) shows DEBT and FIN remain insignificant when added to the

preferred model. In Eq. (6), the first-difference of the unemployment rate, DUE, which Lovell found significant, has the anticipated sign, but $t = -1.3$. To test the stability of the preferred model, the sample is divided between 1968-IV and 1969-I. Equations (7) and (8) are estimates of the basic specification over the two subsamples. One cannot reject the null hypothesis of stable coefficients; the test statistic is $F = 0.44$, whereas $F_{.05}(5,55) = 2.43$. For alternative splits of the sample after 1966-IV and 1971-IV, the F statistics are 0.12 and 0.93, respectively. Inspection of Eqs. (7) and (8) suggests the possibility that DIRT should enter the model only for the second subsample, perhaps as a result of rising expectations during the long expansion of the 1960s. However, interacting DIRT with a dummy variable (equal to zero up to 1968-IV; one thereafter) gives little evidence of such a shift. The stability of the relationship over the period 1962-I to 1978-I does not support Katona's opposition to statistical methods.

The residuals of Eq. (4), plotted in Figure 1, might reveal non-economic variables and unique events that influence ICS. There is little indication of omitted systematic determinants. Using the Durbin h statistic, one cannot reject the null hypothesis of zero first-order serial correlation. Sample autocorrelations of the residuals for six lags are -0.1175, 0.2632, -0.1461, 0.0479, -0.0414, and -0.0013; only the second approaches statistical significance. A nonparametric test for randomness considers runs of positive and negative residuals. Bradley [1] and Hollander and Wolfe [4] describe the nonparametric tests used in this paper. The residuals of Eq. (4) include 37 runs. The test statistic has an asymptotic $N(0, 1)$ distribution under the null hypothesis of randomness, and here its value is 0.875.

If events such as President Kennedy's assassination, Watergate, and the Arab oil embargo affected consumer sentiment, a regression model featuring systematic economic variables should, at these times, exhibit large residuals. Figure 1 discloses one interval of unexpectedly large errors, the Watergate–OPEC period. The residuals were divided into two parts to permit formal testing. I have defined the Watergate–OPEC epoch as 1973-I to 1974-III. This period began with sudden declines of President Nixon's popularity in the Gallup Poll and early Watergate revelations. Nixon resigned on 9 August 1974. The Arab oil embargo started in October, 1973, and continued until March, 1974. Nonparametric tests were applied to determine if the two sets of residuals may be treated as samples from a single population. The Wilcoxon test finds no shift of location during 1973–1974. The large-sample approximation to the Wilcoxon statistic is $W^* = -1.57$, and W^* has an asymptotic $N(0, 1)$ distribution. A broader test that the underlying

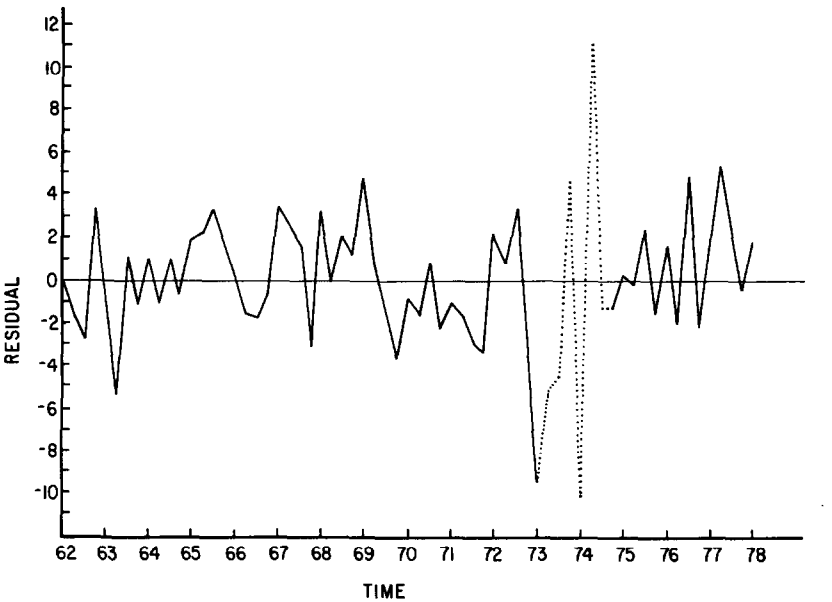

FIGURE 1: Residuals of Eq. (4).

distributions are identical is the Kolmogorov–Smirnov test. The statistics for one- and two-sided tests are, respectively, $J_2' = 1.384$ and $J_3' = 1.384$; in both cases, the hypothesis of identicalness is rejected at the .05 significance level. The events of the Watergate–OPEC period apparently did affect consumer sentiment, but Eq. (4) appears to be back on track in the final quarters of the sample.

Finally, the model of consumer sentiment can be judged by its out-of-sample prediction performance. To avoid possible omitted-variable bias, Eq. (9) includes a dummy variable representing the OPEC–Watergate period:

$$\begin{aligned} \text{ICS} &= 35.76 - 1.04\ \text{DCPI} + 0.14\ \text{DIRT} \\ &\quad (4.29) \quad (-3.21) \qquad (3.09) \\ &\quad + 0.08\ \text{DSP} - 3.20\ \text{DUM} + 0.64\ \text{ICS}_{-1} \\ &\quad (2.31) \qquad (-2.09) \qquad (7.91) \qquad (9) \\ R^2 &= 0.91 \qquad h = -1.91 \qquad \text{SE} = 3.39 \end{aligned}$$

where DUM = dummy variable equal to one from 1973-I to 1974-III; zero otherwise. The Watergate–OPEC variable is barely significant at

the .05 level and insignificant at the .01 level. Table 2 presents postsample simulation errors for Eqs. (4) and (9) over the period 1978-II to 1979-I, and, for comparison, error statistics are also included for Eq. (6), which contains DUE. Root-mean-square and mean-absolute errors summarize the four-quarter results. The static simulations use actual values for ICS_{-1}, whereas the dynamic simulations employ fitted values of ICS_{-1} for predictions after 1978-II. Equation (4), which excludes the Watergate–OPEC dummy, actually does the better job of tracking recent declines in the Index of Consumer Sentiment.

In summary, a small set of objective economic variables explains most fluctuations in the Index of Consumer Sentiment. These variables are the inflation rate, the annual percentage change in stock prices, and the rate of real income growth divided by an average of recent growth rates. Because social learning is gradual, a lagged dependent variable is also important. The relationship is stable over the sample period, and it predicts satisfactorily outside the sample. Contrary to Katona's assertions, the psychological relationship is stable enough for econometric study. Given ICS contains little information not found in readily available objective data, its general usefulness to forecasters is suspect. However, residual analysis demonstrates ICS contained additional information during the Watergate–OPEC period. This suggests forecasters should not forsake ICS altogether, but the forecasting role of ICS will probably remain limited.

Tests of Exogeneity

Granger [3] proposed testable definitions of causality and feedback between two variables. We say that Y causes X if we can predict X better using all available information rather than using all information except Y. Feedback exists if both X causes Y and Y causes X. Let X_t and Y_t be stationary time series with zero means. A bivariate version of the Granger test begins with the estimated linear regressions

$$\begin{aligned} X_t &= \sum_{1}^{m} a_i X_{t-i} + \sum_{1}^{n} b_i Y_{t-i} + v_t; \\ Y_t &= \sum_{1}^{r} c_i Y_{t-i} + \sum_{1}^{s} d_i X_{t-i} + w_t. \end{aligned} \tag{10}$$

If Y causes X, then an F test should reject the null hypothesis that the b_i's are all zero. Similarly, if X causes Y, an F test should reject the null

Table 2: Postsample Simulation Errors[a]

	Static			Dynamic		
	(4)	(6)	(9)	(4)	(6)	(9)
1978-II	1.27	0.48	0.55	1.27	0.48	0.55
1978-III	1.18	0.98	0.40	2.00	1.23	0.75
1978-IV	−3.83	−4.44	−4.73	−2.53	−3.79	−4.26
1979-I	−1.09	−2.05	−2.08	−2.73	−4.04	−4.80
RMSE	2.17	2.50	2.61	2.21	2.85	3.24
MAE	1.84	1.99	1.94	2.14	2.39	2.59

[a] The error is defined as the actual value of ICS minus the prediction. RMSE is root-mean-squared error, and MAE is mean-absolute error.

hypothesis that the d_i's are all zero. Sims [13] offered an alternative test in which X_t is regressed on past, current, and future values of Y. If X causes Y, then coefficients of future Y's should differ significantly from zero. In this project, the Sims results were sometimes nonsensical, apparently because of severe multicollinearity. Moreover, a linear filter did not eliminate autocorrelation of the residuals. Therefore, this section concentrates on Granger causality tests.

Causality tests are susceptible to various empirical and methodological difficulties. First, the lag truncations in X and Y—the values of m, n, r, and s in Eqs. (10)—could affect the results. The Granger tests in Table 3 include three alternative lag truncations. Second, F tests are sensitive to autocorrelation of the residuals. Following Mehra [10], the variables are filtered by $(1 - kL)^2 \log X$, where L is the lag operator and k is chosen so that a fourth-order autoregression on the residuals indicates no serial correlation. Only in one instance was it necessary to choose k different from ¾, the value originally employed by Sims [13]. Finally, the tests could register erroneous causality because of anticipatory effects or omitted third variables. For this reason, finding no causality (which is interesting because it can support the exogeneity of an explanatory variable in regression models) is more convincing than finding a causal relationship. The following discussion thus emphasizes exogeneity. ICS clearly has expectational components, although Katona regards it as a measure of an attitudinal complex broader than expectations *per se*. Because of anticipatory elements, there is some ambiguity in the following results. However, failure to indicate causality would certainly challenge the explanatory role of ICS.

Table 3: Granger Tests of Causality

	Lag Truncation[a]		
	(4, 4)	(4, 6)	(6, 4)
DG Causes ICS	1.95	2.19	1.06
ICS Causes DG	3.90[e]	2.74[d]	4.50[e]
SALES Causes ICS	1.36	1.41	1.75
ICS Causes SALES	9.76[e]	6.82[e]	7.53[e]
SP Causes ICS	4.21[e]	3.11[d]	3.54[d]
ICS Causes SP[b]	–	–	–
FIN Causes ICS[c]	10.53[e]	8.05[e]	10.02[e]
ICS Causes FIN[b]	–	–	–
DEBT Causes ICS	5.14[e]	8.83[c]	4.12[e]
ICS Causes DEBT	1.27	0.81	0.73
Degrees of Freedom	(4, 49)	(6, 47)	(4, 47)

[a] (M, N) denotes M lagged values of the dependent variable and N lagged values of the other explanatory variable.

[b] These regressions produced no significant relationships, and therefore the significance of subsets of the explanatory variables was not tested.

[c] In the filter $(1 - kL)^2$, $k = \frac{1}{4}$. In all other cases, $k = 0.75$.

[d] Significant at 5% level.

[e] Significant at 1% level.

ICS = Index of Consumer Sentiment, DG = expenditure on durable goods in 1972 dollars, SALES = number of new cars sold (at annual rates), SP = index of 500 common stock prices, FIN = real per-capita financial assets of households, and DEBT = real per-capita debt of households.

Is consumer sentiment exogenous with respect to consumer expenditure? One might argue that ICS merely reflects a subjective state induced by consumer purchases—these purchases depending strictly on objective determinants. Table 3 presents F statistics for Granger tests of causality between ICS and two components of consumer spending. DG is expenditure on durable goods in 1972 dollars, and SALES is the number of new cars sold (at annual rates). These variables represent discretionary expenditures believed to be associated most directly with consumer sentiment. The results are consistent with the hypothesis that ICS influences consumer purchases of durable goods and automobiles without feedback.

The exogeneity of some explanatory variables from previous sections is also explored in Table 3. SP is an index of 500 common stock prices. The results are consistent with the hypothesis that stock market fluctuations directly affect consumer sentiment. However, a competing explanation cannot be refuted. Both ICS and SP have expectational elements and react to new information about the economy. Because the stock market processes information faster than the average household, SP might consistently move before ICS, appearing to cause ICS without a direct causal relationship. The absence of a significant prediction relationship from ICS to SP is consistent with the efficient markets hypothesis.

Finally, tests of causality between ICS and the household balance-sheet variables are reported in Table 3. Should research on the determinants of ICS treat DEBT and FIN as exogenous? In the discussion of Mishkin's paper [11, pp. 231–2], Hall and Shoven questioned this exogeneity:

> Shoven remarked that a relationship of reverse causation was equally plausible: the degree of optimism a consumer had about the economy might determine the composition of his portfolio. Hall saw no evidence of a causal relationsip in which fear of financial distress aroused by the balance-sheet variables led to a decline in consumer sentiment.

No evidence of feedback from ICS to DEBT or FIN is given, supporting the exogeneity of balance-sheet variables in Mishkin's study. However, these findings must be tempered by the multivariate results from previous sections. Household debt and financial assets did not help to explain ICS over the sample period 1962-I to 1978-I.

Conclusion

Mishkin's interpretation of ICS is dismissed because household balance-sheet variables performed poorly. A model of consumer sentiment predicted adequately out of sample, and no structural shift was detected during the sample period. Analysis of residuals disclosed no omitted systematic determinants, but Watergate and the Arab oil crisis did influence consumer sentiment. The causal relationships examined between ICS and selected economic variables were consistent with the hypothesis that ICS affects automobile sales and purchases of consumer durables without feedback. The tests supported treating SP, DEBT, and FIN as exogenous in regression models of ICS.

Because a small set of economic variables explains most fluctuations in ICS, it is not surprising that the Index of Consumer Sentiment plays a limited role in prediction. Nevertheless, forecasters should monitor ICS for information on consumer reactions to major political and economic

disturbances. The real promise, however, of consumer sentiment research may lie in another direction. ICS can be used to study what pleases and alarms consumers. One can hope for a welfare economics much different from the current abstract literature, broader in its conception of human behavior, and richer in empirical content.

On a more mundane level, several research opportunities are evident. Multivariate causality tests, which are beyond the scope of the present paper, might do a better job of disentangling the linkages between consumer sentiment, objective variables, and consumer spending. Researchers also might disaggregate consumer sentiment data in various ways. It would be interesting to examine responses to particular survey questions in addition to the overall Index. The Survey Research Center views ICS as a convenient summary, but it has always maintained that one must look at the detailed responses to understand consumer attitudes fully. Thomas [14] demonstrated that some components of ICS perform better in regression models of consumer spending than does the entire Index. One might also disaggregate by the income, occupation, or age of respondents. Research along these lines would provide better tests of hypotheses from psychological economics, and it could stimulate further theoretical development.

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