

Consumer Attitudes: King for a Day

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Every so often economic observers latch onto consumer attitudes as an explanation for economic events that seem otherwise inexplicable. The recession that started in the fall of 1990 is but the most recent example of this phenomenon. When Iraq invaded Kuwait in August 1990, leading surveys indicated that consumer sentiment had plummeted to its lowest level in a decade. Paralleling the decline in sentiment was a sharp drop in economic activity and the end of nearly eight years of American economic expansion. The minutes of the Federal Open Market Committee meeting in December 1990 list the depressed level of sentiment first among factors that contributed to weak consumer spending. By the summer of 1991 policymakers announced that the recession had likely bottomed out in the spring.¹ Coinciding with the announcements, sentiment had risen to well above its preinvasion level. When the level of consumer confidence fell again in October 1991, the decline made headlines, and analysts sought to determine if it portended a prolonged recession.

This article looks at the role that consumer sentiment plays in forecasting economic activity. Although the idea that sentiment is highly significant is intuitively appealing, it turns out that sentiment adds very little to such forecasts. Other easily available variables tend to dominate the information contained in sentiment, even when the changes in consumer attitudes are large and come as a surprise, so the changes are not merely reflecting past economic conditions. Careful statistical analysis strips away the casual associations typically made between sentiment and economic events to reveal that consumer attitudes are a “king-for-a-day” variable that was enthroned when all the usual variables failed to predict the recent recession. Attitudinal data have since fallen from grace after falsely forecasting both a strong recovery

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early last year and a double-dip recession late the same year. Empirical evidence suggests that the de-throning was well deserved.

From Animal Spirits to Impulse Responses

In their analyses of business cycle fluctuations, policymakers, economic forecasters, and macroeconomists ascribe one of at least three roles to consumer attitudes: a causal variable, a catalyst for other shocks, and a summary statistic that simply reflects information contained in other economic data. Rather than trying to distinguish which of these roles consumer sentiment surveys play, this article seeks to determine whether attitudinal data are informative, independently of other available information, about future economic conditions. If so, then survey results may be valuable to economic forecasters and policymakers. If, however, the information in attitudinal surveys is already contained in other variables regularly used to forecast economic conditions, the survey results are redundant and probably can be ignored.

Among economists who view attitudes as a causal variable is A.C. Pigou, who lists one "initiating impulse" of business cycles as "psychological causes . . . [which] are changes that occur in men's attitudes of mind, so that, on a constant basis of fact, they do not form a constant judgement" (1927, 30). John Maynard Keynes's "animal spirits," which induce "sudden and violent changes" in investment, are generated in part by changes in consumers' tastes and by expectations of the strength of future aggregate demand (1964, 315; also see 137-62). George Katona and Eva Mueller developed the survey that underlies the University of Michigan Index of Consumer Sentiment to measure "those factors which are capable of giving rise to independent variation in the rate of consumer spending and saving, namely, changes in people's perceptions, attitudes, motivations, and expectations" (1953, 1).²

The Michigan survey data are included in some econometric models. The Data Resources Inc./McGraw-Hill (DRI) model, for example, allows consumer sentiment to affect a wide variety of private decisions directly, and it "indirectly affects virtually all other sectors of the economy" (David Kelly 1990, 18). During the Persian Gulf War, DRI ran a variety of simulations that involved, among other things, assuming an "optimistic" path for consumer sentiment with the prediction that "consumer and business confidence recover quickly,

aborting the recession after only one quarter" (DRI/McGraw-Hill 1991, 4). These simulations amount to treating consumer attitudes as an exogenous variable that causes shifts in certain behavioral relations. Indeed, Roger Brinner, director of research at DRI/McGraw-Hill, was quoted as saying, "If consumers hadn't panicked [in August 1990] there wouldn't have been a recession" (Sylvia Nasar 1991a, D4).

A slight twist on the causal view is that consumer attitudes are a catalyst for shocks that generate business cycles. Gottfried von Haberler summarizes "psychological theories" of the business cycle, which include those of Pigou and Keynes: "Optimism and pessimism are regarded as causal factors which tend to induce *or intensify* the rise and fall of investment which are characteristic of the upswing and downswing . . ." (1938, 136) (emphasis added). In this view, increases in income that do not coincide with enhanced consumer optimism may not produce the expected increase in economic activity. The DRI model is specified so that consumer sentiment can be treated as a catalyst for economic activity.³ In the model, variables such as employment, interest rates, and oil prices influence spending through their effect on consumer sentiment, so fluctuations in these variables that do not coincide with changes in consumer sentiment will have a less pronounced effect on the economy (see Otto Eckstein 1983 or Kelly 1990).⁴

Finally, surveys of consumer attitudes are widely thought to predict economic conditions. Policymakers sometimes cite fluctuations in consumer confidence surveys as providing evidence of changes in future economic activity: "Consumer and business attitudes were seen as a critical factor bearing on the prospective performance of the economy" (Board of Governors 1991b, 7). In addition, the U.S. Department of Commerce includes the University of Michigan Index of Consumer Expectations in its Composite Index of 11 Leading Indicators. By this view, attitudinal surveys are useful because they summarize prevailing economic conditions, even though attitudes may have no independent causal effect on behavior.⁵

Whatever one's view of the role of consumer attitudes, the survey data are taken seriously by a wide range of economic observers.⁶ Each of the three roles ascribed to consumer attitudes suggests that measures of attitudes should help predict economic conditions. Moreover, if the predictive value is strong enough to warrant the prominent position that sentiment has occupied in recent discussions, the predictive value should not disappear when a small set of readily available data is taken into account.

Most empirical work adopts a Keynesian perspective by assuming that attitudes directly affect individuals' consumption behavior. In contrast, this article concentrates on how well attitudes forecast industrial production and unemployment. The Index of Consumer Expectations is based on questions about the respondents' expectations of general economic conditions rather than about their consumption expenditure plans *per se*, so there is not necessarily a direct connection between the index and consumption behavior. Moreover, even if attitudes work through consumption to influence output and employment, these variables will nonetheless be related to attitudes, so there is no harm in skipping the link to consumption.

This article adopts an agnostic view of how consumer attitudes may help to predict economic conditions. The empirical tests do not force consumer attitudes to influence economic conditions according to any particular theory of economic behavior. Although the purely statistical perspective of the empirical analysis is silent on exactly how attitudes influence economic behavior, the results can show whether changes in attitudes are associated with subsequent changes in economic variables.⁷

Practical policy and forecasting exercises use a wide variety of information to generate forecasts. For consumer attitudes to contribute to these exercises they must contain information about future economic conditions that is independent of the data regularly used. To some extent consumer attitudes will always reflect the state of the economy. When interest rates and unemployment have been high consumers are likely to feel dissatisfied; a recent history of low rates and strong economic growth is likely to leave consumers optimistic. Such swings in attitudes that are related to recent economic performance will be predictable. Some changes in attitudes, however, will not be predictable from past economic information. For example, the large drop in sentiment at the beginning of the Persian Gulf conflict was in response to noneconomic events. It is these unexpected changes in attitudes that potentially contain news that alters consumers' behavior and the subsequent course of the economy.⁸

The first task of the empirical evaluation of the Index of Consumer Expectations is to isolate its unanticipated changes. These surprises are defined as changes in the index that cannot be predicted using historical values of economic variables.

With the unanticipated changes identified, the evaluation next asks whether such changes actually are

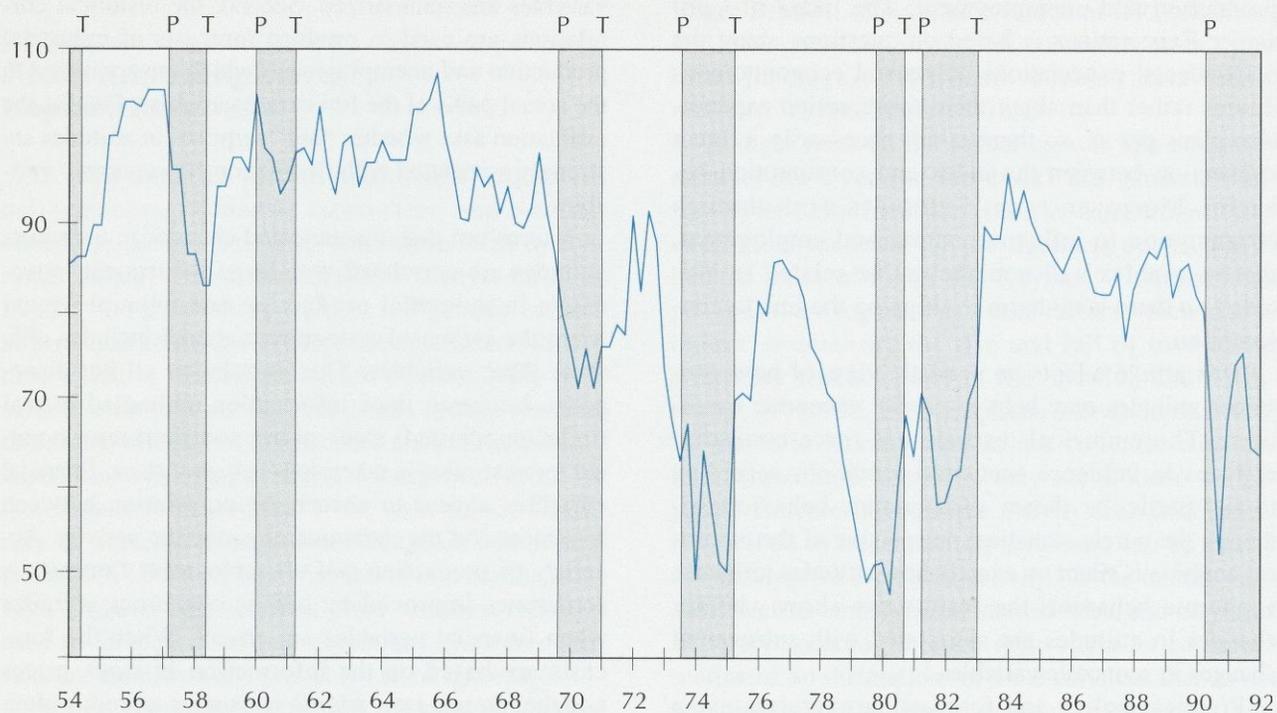
systematically related to industrial production and unemployment. There are three parts to the analysis. First, the historical correlations between surprises in sentiment and subsequent movements in economic variables are summarized. Second, the historical correlations are used to produce forecasts of industrial production and unemployment, which are compared to the actual paths of the forecasted variables. Finally, the evaluation asks whether "big" surprises in attitudes are strongly associated with fluctuations in economic variables.

It turns out that unanticipated changes in consumer attitudes are correlated with large subsequent movements in industrial production and unemployment when the estimated econometric model includes only these three variables. This correlation all but disappears, however, once information embodied in real (inflation-adjusted) stock prices and short-term nominal interest rates is taken into account; these financial variables appear to absorb the correlation between sentiment and the measures of economic activity. Accuracy of production and unemployment forecasts is sometimes improved by adding consumer attitudes when financial variables are absent. When the forecasts are based on the information in stock prices and the interest rate, adding consumer attitudes often increases the forecast errors. Finally, there is no systematic evidence that unanticipated "big" changes in consumer attitudes are associated with movements in industrial production and unemployment once the information contained in financial variables is factored into the analysis.

A Careful Look at the Evidence

The data set examined in this article includes quarterly observations from 1954:1 to 1992:1 of total industrial production, the civilian unemployment rate, the real Standard and Poor's (S&P) 500 stock price index, the three-month Treasury bill rate, and the Index of Consumer Expectations (hereafter referred to as "attitudes" or "sentiment").⁹ The index is plotted in Chart 1, which also marks the National Bureau of Economic Research's business cycle peaks and troughs. Many, but not all, economic downturns have been associated with declines in the index. More importantly from the perspective of a forecaster using consumer attitudes, there have been a number of declines in the index that did not coincide with the peak of a business cycle.

Chart 1
The Index of Consumer Expectations: 1954:1 to 1992:1^a



^a Shaded areas mark business cycle peaks (P) to troughs (T).

Historical Correlations. Informal discussions of attitude surveys' forecasting ability frequently graph consumer attitudes along with some economic variable to illustrate that the two series are correlated (see Richard T. Curtin [1990] or Alan C. Garner 1991). One way to formalize this procedure, which emphasizes the "news" aspects of changes in consumer attitudes, is to estimate a vector autoregression (VAR) that includes consumer attitudes, industrial production, and the unemployment rate. The VAR is a procedure that summarizes the average correlations among the variables at different points in time. Mechanically, the VAR consists of an equation for each variable in which the equations are estimated by regressing each of the three variables against lagged values of all three variables.¹⁰ By not imposing any particular theoretical connection among the variables, the VAR will capture any correlations that exist in the data.

Panel A of Table 1 reports the results of *F*-tests that coefficients on lagged values of each variable are jointly zero.¹¹ If, for example, all the coefficients on past

values of industrial production in the attitudes equation are not significantly different from zero, then industrial production may not help to predict attitudes. This result would be reported in Table 1 as a number greater than approximately .10 in the cell associated with the sentiment row and the industrial production column. According to the table, past consumer attitudes predict industrial production and unemployment, but past values of production and unemployment do not individually help to predict sentiment. Sentiment is not statistically exogenous, in the sense that it is predicted only by its own history, because past values of production and unemployment jointly predict sentiment.

A better way to evaluate the predictive power of consumer attitudes is to calculate the responses of all the variables to "typical" one-standard-deviation impulses (or innovations) in each variable.¹² These responses are a type of correlation between variables at different times. If surprises in sentiment are highly correlated with future industrial production and unemployment, then sentiment innovations will be followed

Table 1
F-Tests of Exclusion Restrictions for the VARs^a

A: VAR without Financial Variables^b

Equation	Coefficients on		
	Sentiment	Industrial Production	Unemployment
Sentiment	.000	.536	.319
Industrial Production	.040	.000	.021
Unemployment	.009	.002	.000

The null hypothesis that sentiment depends only on its own past values can be rejected at the .039 level of marginal significance.

B: VAR with Financial Variables^c

Equation	Coefficients on				
	Stock Prices	T-Bill	Sentiment	Industrial Production	Unemployment
Stock Prices	.000	.193	.534	.643	.614
T-Bill	.063	.000	.131	.657	.495
Sentiment	.506	.410	.000	.257	.621
Industrial Production	.006	.247	.692	.000	.020
Unemployment	.028	.105	.420	.004	.000

The null hypothesis that sentiment depends only on its own past values can be rejected at the .038 level of marginal significance.

^a The table reports the marginal significance levels at which the null hypothesis that lagged coefficients on the specified variable are jointly zero can be rejected. Sentiment is the Index of Consumer Expectations, Stock Prices is the Standard and Poor's 500 index deflated by the previous month's consumer price index, and T-Bill is the three-month Treasury-bill rate.

^b Estimated with eight lags from 1956:1 to 1992:1.

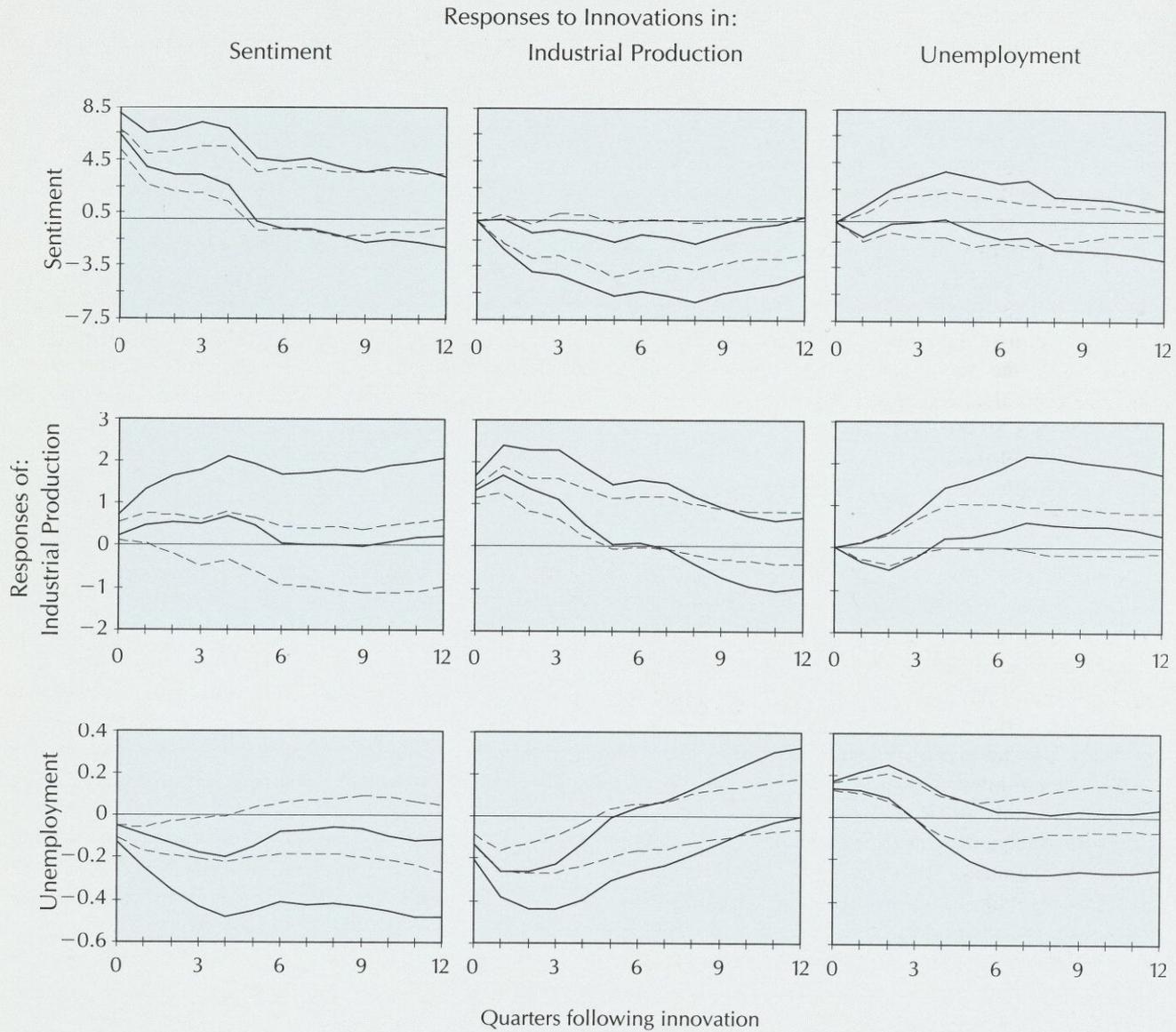
^c Estimated with six lags from 1955:3 to 1992:1.

by large movements in the two variables. The solid lines in Chart 2 are the 95th percentile probability bands for the response functions for twelve quarters after the innovation.¹³ When the bands do not straddle the zero axis, there is a high probability the responses are nonzero. Each row in the chart shows the response of that row's variable to an unanticipated increase in each of the variables listed in the columns.

In the impulse response functions sentiment is allowed to influence production and unemployment contemporaneously, but production and unemploy-

ment influence sentiment with a one-quarter lag. Treating consumer sentiment as predetermined in this way is consistent with the fact that survey results are known before output and employment data are released. Positive innovations in sentiment are associated with substantially higher production and lower unemployment, as shown in the first column of the chart. Comparing the responses across rows, the production and unemployment responses to sentiment innovations are at least as large as the responses to their own innovations. This result indicates that, given the

Chart 2
Historical Correlations: Impulse Responses from VARs^a



^a The rows graph the responses of sentiment, industrial production, and unemployment to a one-standard-deviation innovation in each of the three variables for twelve quarters following the innovation. The solid lines show bands for the VAR without financial variables; the dashed lines show bands for the VAR with financial variables. The bands are 95th percentile probability bands based on 1,000 draws of a Monte Carlo experiment. Sentiment is allowed to influence industrial production and unemployment within the quarter, and, in the five-variable system, real stock prices and the Treasury-bill rate are allowed to influence sentiment, industrial production, and unemployment within the quarter. Sentiment and industrial production are measured in percentages; unemployment is measured in percentage points. The three-variable VAR is estimated from 1956:1 to 1992:1, and the five-variable VAR is estimated from 1955:3 to 1992:1. The responses of sentiment and industrial production are multiplied by 100. (Responses of stock prices and the interest rate and the responses to innovation in these variables are not pictured.)

information embodied in the three-variable VAR, unanticipated changes in sentiment systematically signal strong subsequent movements in industrial production and unemployment. Sentiment responds strongly to production innovations and less strongly to unemployment innovations, as shown in the first row of the chart. This chart is consistent with the casual view that sentiment is correlated with economic conditions, with the strongest correlations arising a year or more after a surprise change in sentiment.

One argument for why attitudes are a useful variable for forecasting is that survey results are available with minimal delay.¹⁴ Of course, a wide variety of financial variables are also readily available, and for forecasting purposes one would like to know what the marginal contribution of attitudes is, given other available data. To answer this, a real stock price index and the three-month Treasury-bill rate are added to the VAR.

Panel B of Table 1 reports that lagged values of consumer sentiment no longer help predict industrial production and unemployment.¹⁵ Real stock prices and, to a lesser extent, interest rates appear to have absorbed the predictive power of attitudes.

The predictive power of unanticipated changes in sentiment also diminishes in the expanded VAR with financial variables, indicating that there is little information in consumer attitudes about economic conditions that is independent of financial information. The dashed lines in Chart 2 are the 95th percentile probability bands for the impulse response functions from the five-variable system. (The chart reports only the response functions for the three variables of interest.) The results do not take a position on whether financial variables reflect consumer sentiment. Instead, the responses to sentiment innovations report the correlations of sentiment with production and unemployment, given information on current stock prices and interest rates and past values of all the variables. Looking down the first column of the chart, sentiment innovations are associated with small increases in industrial production for only one quarter following the innovation. Unemployment falls for three quarters but by only one-third as much as it does in the VAR without financial variables. As seen in the second row of the chart, relatively more of the variability of unanticipated changes in industrial production is now associated with production innovations than with sentiment innovations.

If consumer sentiment is a summary statistic for other variables, its predictive power would be expected to diminish as we control for other available information. The marked decline in predictive power shown in Chart 2, which occurs after controlling for only two more variables, is surprising.

Forecasts Using Sentiment. To be a useful addition to a forecaster's arsenal, consumer sentiment should improve forecasts. The contribution of attitudes is evaluated by first generating forecasts with the two VARs without the attitudes variable. The VARs with consumer sentiment are then reestimated and reforecasted, using actual future values of sentiment in the forecast. This technique adds information to the forecasts that is not embedded in the estimated VAR and ensures that the errors in forecasting industrial production and unemployment do not arise from the model's poor forecasts of sentiment. The forecasts are calculated from four different stages of the business cycle: a peak, a trough, a mid-expansion, and shortly before a peak.¹⁶

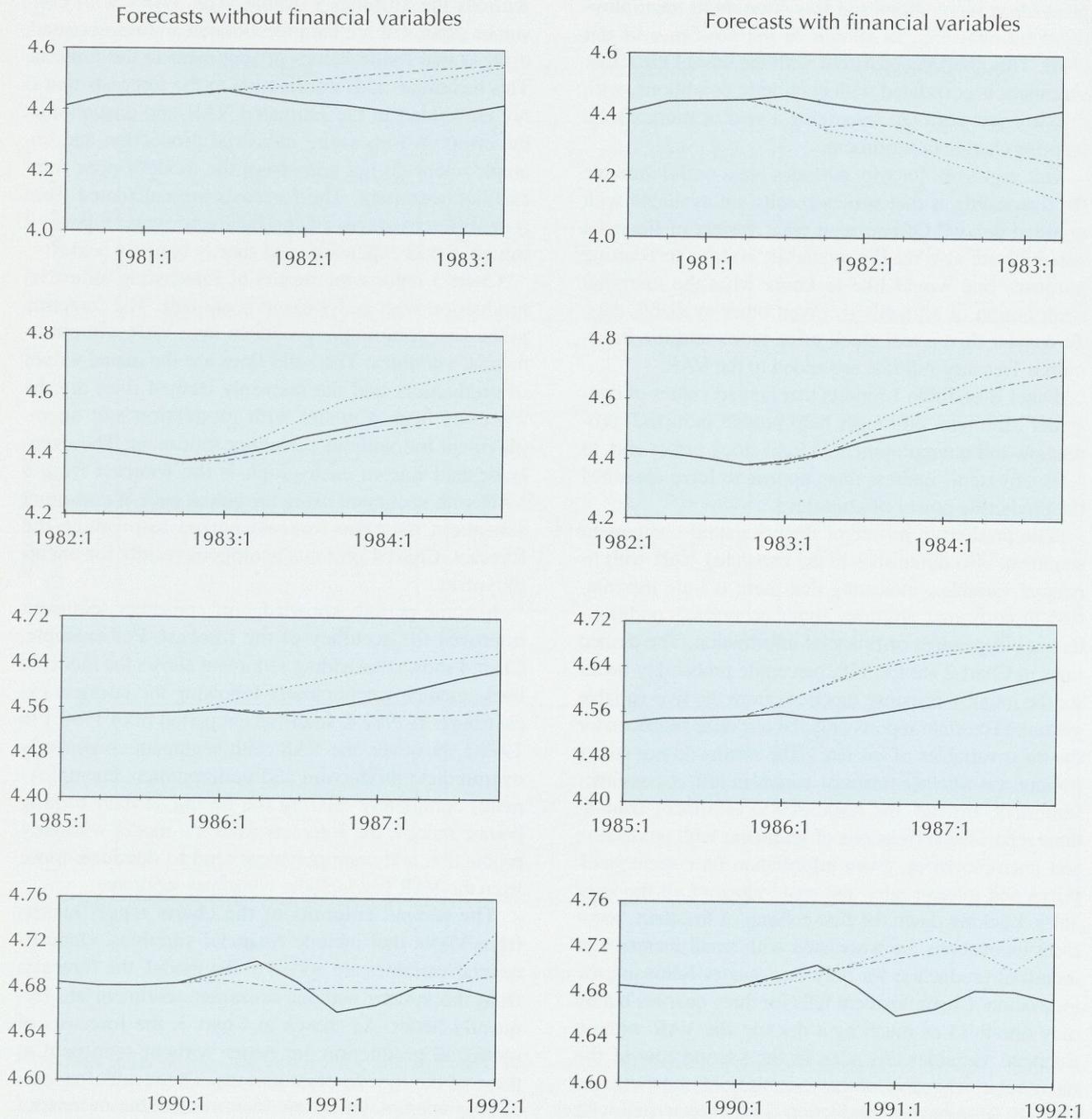
Chart 3 reports the results of forecasting industrial production with and without sentiment. The forecasts in the first column are produced by a VAR without financial variables. The solid lines are the actual values of production, and the unevenly dashed lines are the forecasts from a model with production and unemployment but without consumer sentiment. The evenly dashed line in each graph is the forecast from a VAR with sentiment using the actual path of consumer sentiment over the forecast period to produce the forecast. Chart 4 presents analogous results for unemployment.

In some periods knowledge of consumer sentiment improves the accuracy of the forecast. For example, Chart 4 shows that adding sentiment allows the model to track unemployment closely following the business cycle trough in 1982:4. In the recent period from 1990:1 to 1992:1, however, the VAR with sentiment consistently overpredicts production and underpredicts unemployment, completely missing the timing of their turning points; indeed, the forecasts from the model with only production and unemployment tend to dominate those from the VAR that includes consumer sentiment.

The second columns of the charts report results from VARs that include financial variables. Once financial variables are added to the model, the forecasts from the system without consumer sentiment are frequently better. As shown in Chart 3, the forecasts of industrial production are better without sentiment in three of the four forecast periods. The results for forecasting unemployment are more mixed, but in none of the forecast periods does knowledge of sentiment lead to superior forecasts at all horizons. Of course, the financial variables also do not help to predict the business cycle turning point in late 1990.¹⁷

"Big" Changes in Consumer Attitudes. The historical correlations reported by the impulse responses in Chart 2 use the average correlations estimated over the

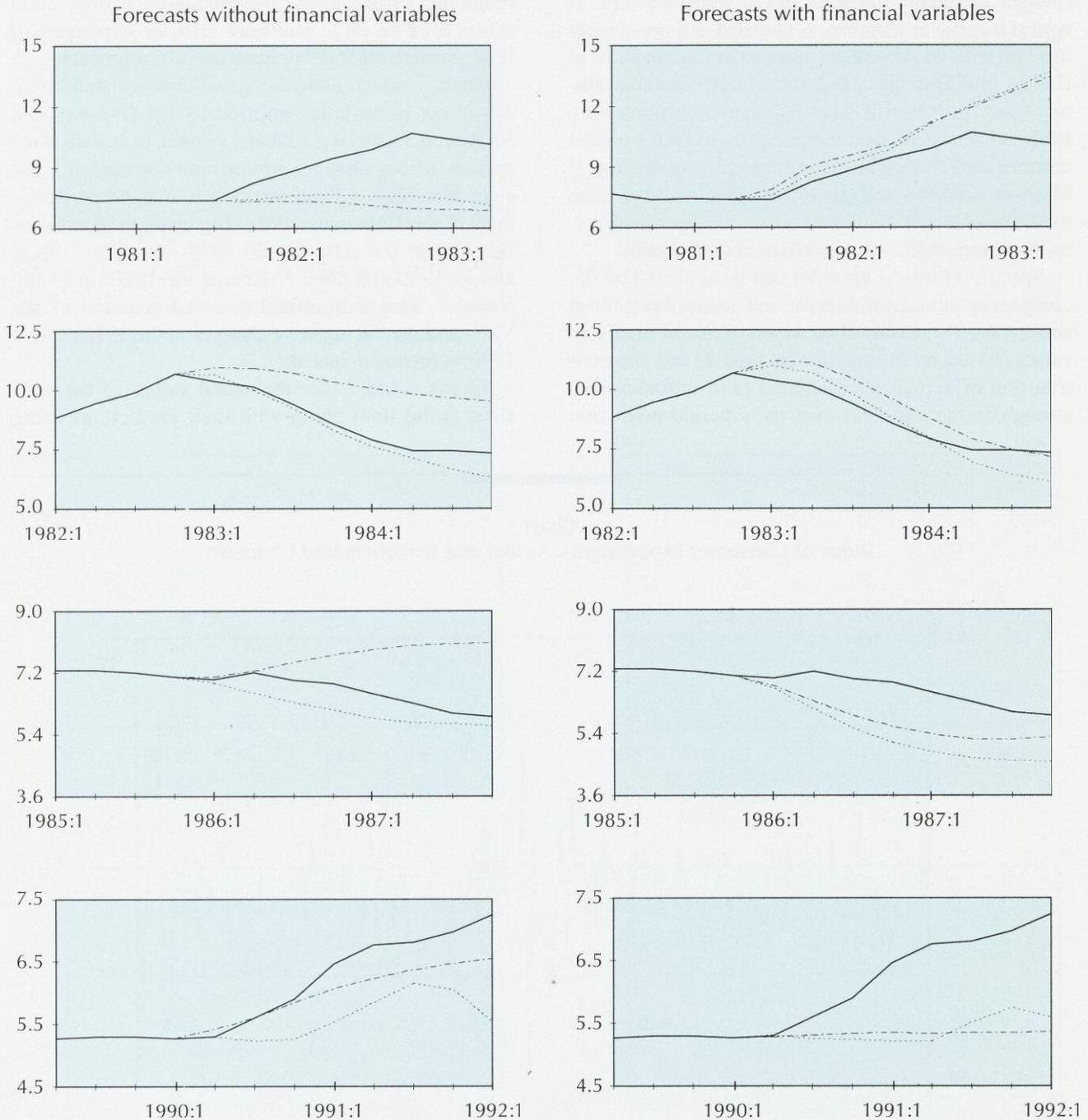
Chart 3
Forecasts of Industrial Production^a



The solid lines show actual data, the unevenly dashed lines show forecasts without sentiment, and the evenly dashed lines show forecasts with sentiment.

^a Industrial production is measured in logarithms. Each set of four graphs is from VARs estimated using data through 1981:2 (business cycle peak), 1982:4 (business cycle trough), 1985:4 (mid-expansion), and 1990:1 (near a business cycle peak). Forecasts without sentiment are produced by VARs with industrial production and unemployment (and possibly real stock prices and the three-month Treasury-bill rate). Forecasts with sentiment add sentiment to the VAR and are conditioned on actual future values of consumer sentiment.

Chart 4
Forecasts of Unemployment^a



The solid lines show actual data, the unevenly dashed lines show forecasts without sentiment, and the evenly dashed lines show forecasts with sentiment.

^a Unemployment is measured in percentage points. Each set of four graphs is from VARs estimated using data through 1981:2 (business cycle peak), 1982:4 (business cycle trough), 1985:4 (mid-expansion), and 1990:1 (near a business cycle peak). Forecasts without sentiment are produced by VARs with industrial production and unemployment (and possibly real stock prices and the three-month Treasury-bill rate). Forecasts with sentiment add sentiment to the VAR and are conditioned on actual future values of consumer sentiment.

full sample to calculate the new time paths of industrial production and unemployment following a "typical" (or average) unanticipated increase in consumer sentiment. The VAR is constructed so that the unanticipated changes in variables average out to zero over time. A typical surprise in sentiment is modeled as a one-quarter increase with no subsequent surprise in sentiment. If, as Katona (1975) emphasizes, surveys of consumer attitudes are most useful when changes in attitudes are large and persistent, then the responses to such a typical unanticipated change in sentiment may be misleading.¹⁸ Much of Katona's analysis of attitudinal surveys takes the form of event studies of particular historical episodes during which attitudes changed dramatically.

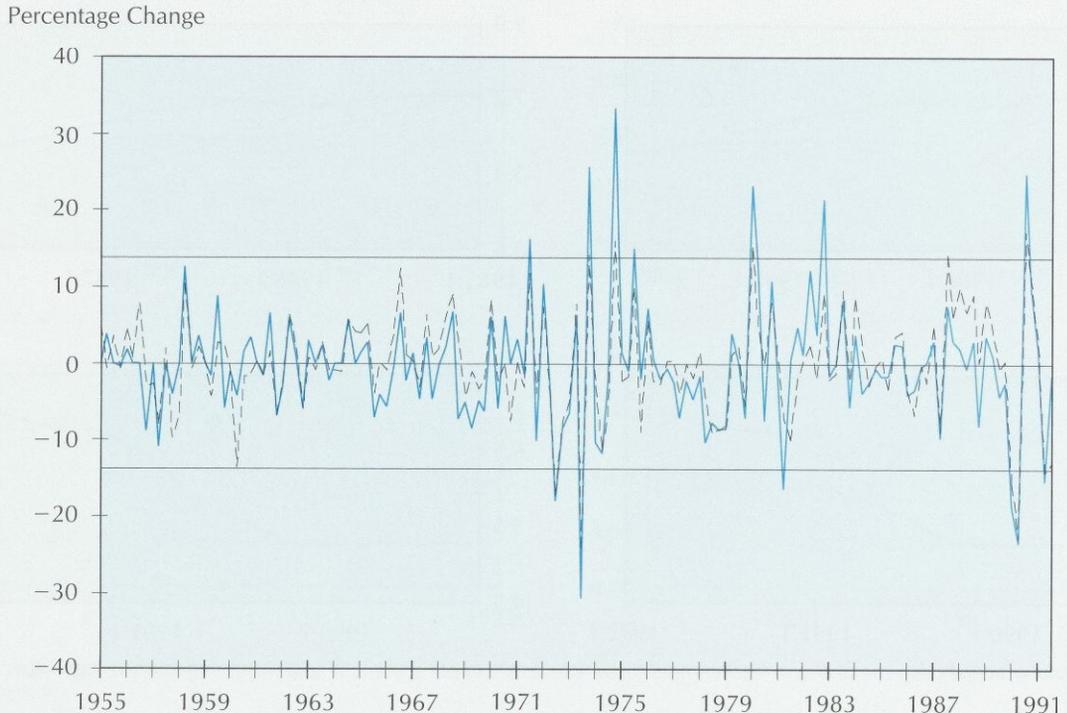
Specific historical episodes can be analyzed by decomposing actual production and unemployment at some date, $T + k$, into their k -period-ahead predicted values, based on information at time T , and the contribution of actual unanticipated (and unforecasted) changes in the variables over the k -period prediction

horizon. Because the VAR coefficients are estimated over the full sample period, they are estimates of the average correlations between the variables.¹⁹ The innovations during the historical period are the actual prediction errors during the prediction period; these errors may be large and may arise in sequences of large positive numbers or large negative numbers.

Chart 5, which plots the actual changes and the innovations in attitudes implied by the five-variable VAR with financial variables, is used to isolate three periods of big changes in consumer sentiment. The chart also plots a band marking two standard deviations of the VAR innovations. Big changes in attitudes occurred in the early to mid-1970s, the early 1980s, and in 1990 and 1991.²⁰ Except for 1990, most big positive changes in attitudes were forecasted by the VAR, and the big negative changes in the 1970s and in 1990 were unanticipated.

Charts 6 and 7 plot the actual values of the variables (solid line) along with their predictions using

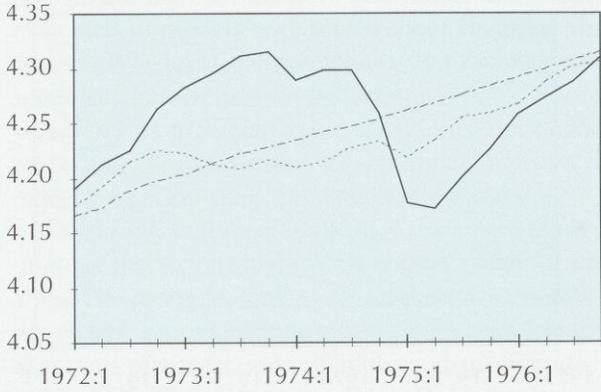
Chart 5
Index of Consumer Expectations: Actual and Unanticipated Changes^a



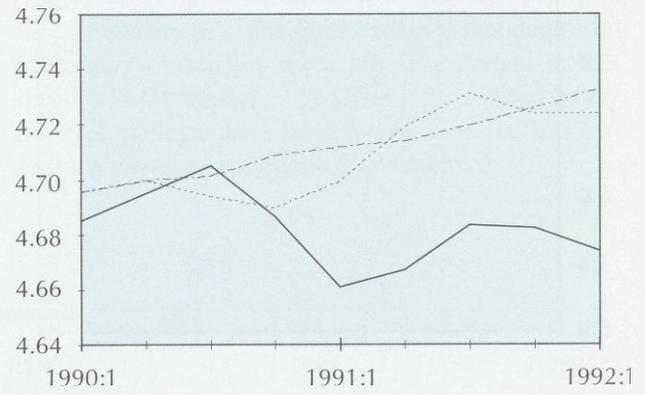
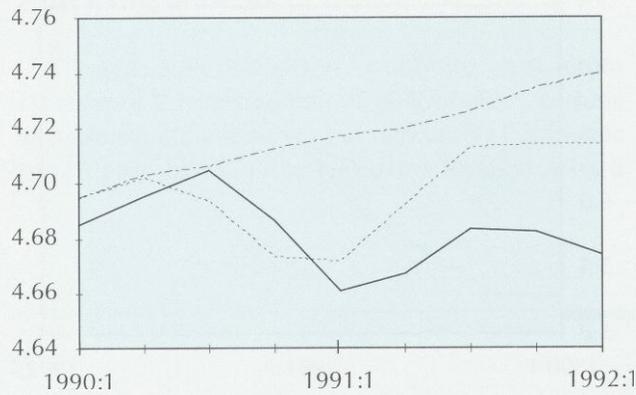
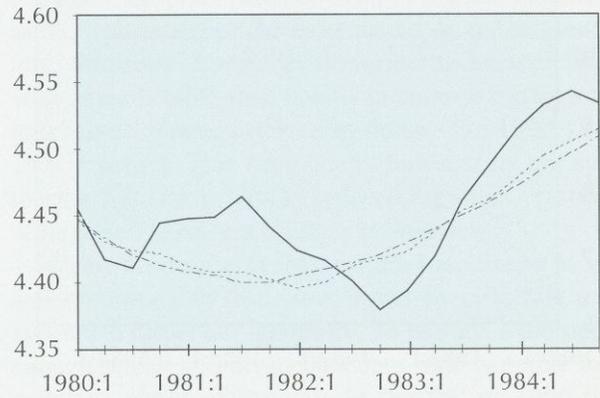
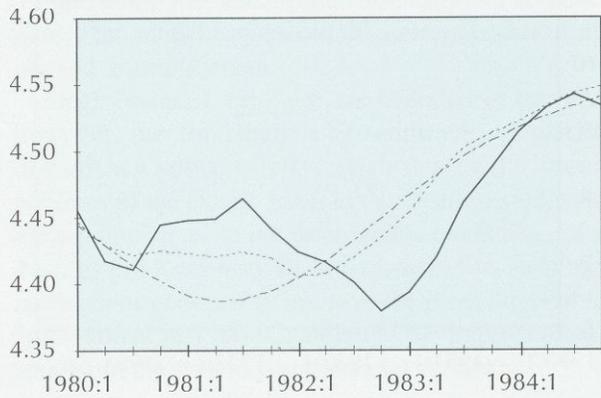
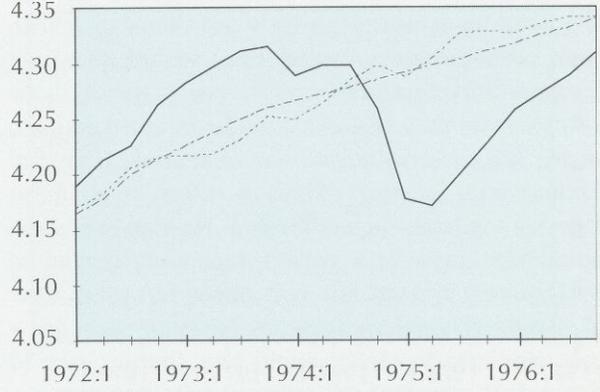
^a The solid line shows actual changes, and the dashed line shows unanticipated changes. The horizontal lines are two standard deviations of unanticipated changes. Unanticipated changes are calculated from a five-variable VAR estimated with six lags from 1955:3 to 1992:1.

Chart 6
Predictions of Industrial Production during "Big" Changes in Sentiment^a

Without financial variables

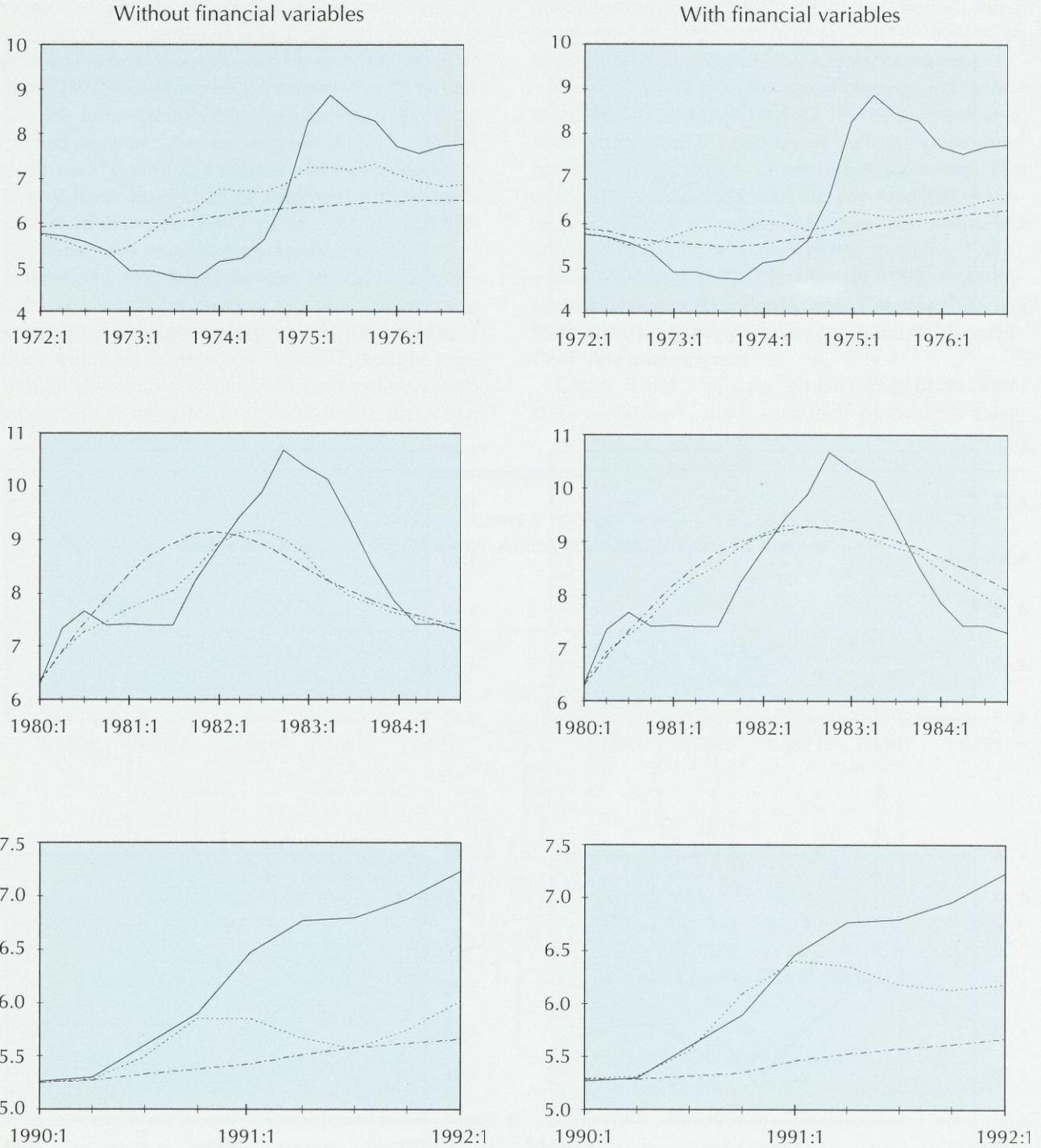


With financial variables



^a The solid lines show actual industrial production. The evenly dashed lines show predicted industrial production plus the contribution of actual sentiment innovations during the prediction period to the predicted value of industrial production. The unevenly dashed lines show predicted industrial production, setting all future innovations to zero.

Chart 7
Predictions of Unemployment during "Big" Changes in Sentiment^a



^a The solid lines show actual unemployment. The evenly dashed lines show predicted unemployment plus the contribution of actual sentiment innovations during the prediction period to the predicted value of unemployment. The unevenly dashed lines show predicted unemployment, setting all future innovations to zero.

only past information (unevenly dashed line) and their predictions plus the contribution of future unanticipated changes in consumer sentiment (evenly dashed line). The plots for industrial production are presented in Chart 6; the plots for unemployment, in Chart 7. In both cases, the contribution of consumer sentiment is evaluated in models with and without financial variables.²¹ Whenever the predictions that include actual sentiment innovations lie between a variable's actual value and its predicted value using only information up to date T , innovations in sentiment improve the model's k -period-ahead prediction of the variable.

In general, sentiment innovations are more likely to improve predictions in the VAR without financial variables. For example, looking down the first columns of the charts, sentiment innovations somewhat improve accuracy of predictions of industrial production in 1972, 1975-76, 1981, and in 1990-92. Unemployment predictions are improved in 1972, 1975-76, 1981, and throughout the 1990-92 period. In fact, during 1990-92, including the actual prediction errors in sentiment allows the model to pick out the turning points of output and unemployment.²²

Once financial variables are included in the VAR, however, the contribution of sentiment innovations diminishes substantially, as shown in the second columns of the charts. Even in the recent period, sentiment innovations do not improve the predictions of industrial production at all horizons. Actual sentiment innovations continue to improve the predictions of unemployment in 1990-92, although the improvement is smaller in the system with financial variables.

The King Is Dead

The recession of 1990-91 is only the most recent example of a long tradition of policymakers' turning to consumer attitude surveys as indicators of economic conditions. In 1971 then-Federal Reserve Board

Chairman Arthur F. Burns cited weak consumer confidence as one of the "grounds for concern . . . with regard to some features of the recovery" (Burns 1978, 120).

Although there is ample informal theoretical precedent for taking consumer attitudes seriously, the empirical grounds for viewing attitudes as having an important independent influence appear to be somewhat barren. Used alone, unanticipated changes in consumer sentiment are correlated with movements in industrial production and unemployment. But when a small set of readily available financial information is taken into account, innovations in sentiment appear to be largely redundant, having very weak correlations with industrial production and unemployment. Even when these financial variables are ignored, knowledge of past, current, and future values of sentiment does not systematically improve the forecasts of industrial production and unemployment.

Finally, the empirical work suggests a reason that economic observers latched onto consumer sentiment as an explanation of the most recent economic downturn. Surprises in attitudes do appear to be associated with unpredictable fluctuations in unemployment and, to a lesser extent, production during the 1990:1-to-1992:1 period. This association, however, is not systematic because it fails to hold during other episodes of large and persistent changes in attitudes.

When economic events are confounding it is always tempting to find some event-specific fact that appears to dispel our ignorance. To be sure, a thorough enough search will always uncover some variable that suits the needs of the day. In the fall of 1990 the hoopla surrounding consumer attitudes swept aside careful analysis and pointed toward the obvious coincidence of the plunge in sentiment with the decline in activity as prima facie evidence that depressed consumers caused the recession. The danger in this king-for-a-day economic analysis is that it can easily sidetrack policymakers from focusing on the true underlying causes of economic fluctuations.

Notes

1. See, for example, statements by Michael J. Boskin, chairman of the Council of Economic Advisers, reported by Nasar (1991b, 1991c), and the testimony of Alan Greenspan (1991), chairman of the Federal Reserve Board.

2. Substantial effort has been devoted to estimating consumption functions that include consumer sentiment, with mixed results. A chronological list of some studies is Tobin (1959), Mueller (1963), Friend and Adams (1964), Adams

- and Green (1965), Hymans (1970), Fair (1971), Juster and Wachtel (1972), Mishkin (1978), Carroll, Fuhrer, and Wilcox (1991), and Throop (1991).
3. Whether sentiment is treated as an exogenous variable or as a catalyst depends on how the simulation is performed. When an "optimistic" path of sentiment is assumed, the equation that determines sentiment is thrown out and replaced with the assumed optimistic path. When the focus of the simulation is not on attitudes per se, then the time path of sentiment evolves endogenously according to some estimated relationship.
 4. The minutes of the Federal Open Market Committee meeting on December 18, 1990, seem to reflect the view of consumer attitudes as a catalyst: "Even under the assumption that the Persian Gulf situation would be more settled and oil prices lower, restoration of the degree of confidence needed to induce substantial upturn in spending was not assured" (Board of Governors 1991a, 7-8).
 5. Katona and Mueller deny this summary statistic view: "The economic attitudes of consumers originate in a variety of political and economic developments. It is inadequate to assume that consumer attitudes are merely a reflection of recent trends in, say, incomes or prices and that these can serve as substitutes for data on attitudes . . ." (1953, 2).
 6. The Organisation for Economic Cooperation and Development publishes surveys of businesses in *Main Economic Indicators*, and the European Community publishes surveys of businesses and consumers in *European Economy, Supplement B*.
 7. Of course, a statistical finding that consumer attitudes strongly predict economic conditions after controlling for other available information would cry out for a coherent economic explanation.
 8. If, based on historical data, this month's change in consumer attitudes were fully anticipated, then decisionmakers who are basing their decisions on the historical data would have already incorporated this data, and, therefore, this month's consumer attitudes, into their decision processes. The announced change in attitudes contains no news that will change decisionmakers' perceptions of current or expected future economic conditions, so there is no reason for decisionmakers to alter their behavior.
 9. All quarterly data are averages of the monthly series. Survey data from 1954 to 1965 are not available for every quarter, so missing quarters are assigned the previous quarter's value. For 1978 on, quarterly observations of the survey are averages of their monthly values. The monthly real stock price index is the nominal S&P 500 index deflated by the previous month's consumer price index for all urban wage earners. Industrial production, unemployment, and consumer prices are seasonally adjusted at the source.
 10. Letting s be sentiment, y be industrial production, and u be unemployment, the three-variable VAR estimated with one lag would be written as

$$\begin{aligned} s_t &= a_{11}s_{t-1} + a_{12}y_{t-1} + a_{13}u_{t-1} + \epsilon_{st} \\ y_t &= a_{21}s_{t-1} + a_{22}y_{t-1} + a_{23}u_{t-1} + \epsilon_{yt} \\ u_t &= a_{31}s_{t-1} + a_{32}y_{t-1} + a_{33}u_{t-1} + \epsilon_{ut} \end{aligned}$$
 - The t and $t-1$ subscripts represent the dates at which the variables are measured. The error terms in the VAR—the ϵ 's—are called "innovations." Innovations represent changes in the left-hand-side variables that are unanticipated based on past information, so they are one-step-ahead forecast errors.
 11. Likelihood ratio tests unambiguously called for estimating the three-variable VAR with eight lags of each variable. The VAR is estimated over the full sample with a constant term using logarithms of the attitudinal survey data and industrial production and the level of the unemployment rate.
 12. The impulse response analysis is a better way to evaluate the predictive value of sentiment because the analysis takes account of how all three equations interact, whereas the F -tests reported in Table 1 hold only equation-by-equation. It is quite possible, for example, for the F -tests to indicate that the coefficients on lagged sentiment in the industrial production equation are zero, yet innovations in sentiment can be correlated with future production indirectly through their influence on unemployment. It is also possible, though less likely, for the F -tests to indicate that sentiment predicts production, even though sentiment innovations are not followed by changes in industrial production. This result can occur if the indirect influence of sentiment on production through unemployment offsets the direct influence of sentiment on industrial production. The likelihood that F -tests will give misleading results increases as the number of variables in the VAR increases.
 13. The probability bands are generated by the Bayesian Monte Carlo procedure described in Doan (1991). The procedure takes draws from the posterior distribution of the VAR coefficients. After taking 1,000 random draws, the impulse response functions are ordered and the 95th percentile bands are extracted. When a band lies entirely above (below) the zero axis of the chart there is a 95 percent likelihood that the response is positive (negative).
 14. Survey results are released one week after the end of the survey month.
 15. The five-variable VAR was estimated with six lags, as suggested by likelihood ratio tests. The VAR is estimated with a constant term using logarithms of consumer attitudes, industrial production, and real stock prices and the levels of the interest rate and the unemployment rate.
 16. The VARs are estimated using data through 1981:2 (a business cycle peak), 1982:4 (a business cycle trough), 1985:4 (mid-expansion), and 1990:1 (near a business cycle peak).
 17. Robert E. Hall, professor of economics at Stanford University, was quoted in early April as saying, "None of the usual financial predecessors of recession have appeared to this day" (Nasar 1991a).
 18. Keynes emphasizes this point about periods of extreme uncertainty: "In abnormal times . . . the market will be subject to waves of optimistic and pessimistic sentiment, which are unreasoning and yet in a sense legitimate when no solid basis exists for a reasonable calculation" (1964, 154).
 19. This approach does not allow the correlations between sentiment and industrial production and unemployment to be different between periods of large changes in consumer attitudes and periods of small changes in attitudes.

20. The three periods are 1972:1 to 1976:4, 1980:1 to 1984:4, and 1990:1 to 1992:1. Each of these—the oil embargo, the change in Federal Reserve operating procedures, and the Persian Gulf War, respectively—coincides with Keynes's notion of extreme uncertainty.
21. As with the impulse responses, the results with financial variables report the marginal contribution of sentiment in-

novations to predictions of industrial production and unemployment, given current stock prices and interest rates and past values of all the variables.

22. As shown in Charts 3 and 4, however, this result does not carry over to the forecasts.

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