

Consumer Confidence Surveys: Can They Help Us Forecast Consumer Spending in Real Time?

BY DEAN CROUSHORE

In 1993, the Philadelphia Fed undertook a project to develop a real-time data set for macroeconomists, who can use these data in many ways — for example, when analyzing indexes of consumer confidence. Existing research indicates that consumer-confidence measures, though highly correlated with future spending, do not improve forecasts of future spending. But these studies used revised data that were not available to forecasters at the time they made their forecasts. In this article, Dean Croushore uses the real-time data set to investigate an important question: Does using data available to forecasters at the time — that is, real-time data — make measures of consumer confidence more valuable for forecasting?

The Federal Reserve Bank of Philadelphia's real-time data set for macroeconomists contains information on the data that a researcher or forecaster would have known at a date in the past. This data set, which



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is available on the Philadelphia Fed's website at www.philadelphiafed.org/econ/forecast/realindex.html, allows us to investigate a number of interesting economic and policy questions — one of which is the subject of this article. We will use the data set to investigate whether measures of consumer confidence help improve forecasts of consumer spending.

For many reasons, people want to know how the economy is doing. They would like to answer questions such as: Are we in an economic expansion? Will the economic expansion continue? Are interest rates likely to rise or fall? To find answers to these questions, people read the newspapers, which often report on the forecasts of

professional economists. The government and private-sector firms also report on a variety of economic data, which may include such items as a survey of consumer confidence.

Several organizations take surveys of consumers to investigate what they say about the economy and their families' finances. The survey responses are compiled and used to form an index of consumer confidence, which is reported in the news media. The consumer-confidence measures are correlated with changes in consumer spending, so they appear to capture useful information about consumers' spending plans. But do they really help us forecast consumer spending in real time?

In theory, the indexes should enable us to predict what consumers will spend in the future, and a glance at the data tells us that the consumer-confidence measures are, indeed, strongly correlated with consumer spending. But we are interested in seeing whether the consumer-confidence measures pass a tougher test: Do they tell us more than we already know from other economic data? If we look at the existing research, we see that the consumer-confidence measures, though highly correlated with future spending, do not improve forecasts of future spending made on the basis of knowing consumers' incomes, past consumer spending, the interest rate, and the value of the stock market.

However, that previous research (which we will discuss in more detail later) is flawed in one important aspect. The data used in those studies were not available to forecasters in real time, that is, at the time their forecasts

were made. Thoughtful researchers have long known that using such flawed data is not ideal, but they did not have a data set such as the real-time data set for macroeconomists until recently.

The failure to use real-time data may be important because data are revised. For example, the Bureau of Economic Analysis (BEA), the government agency that releases data on consumer spending, revises the data many years after the fact. For example, when the BEA revises the data on consumer spending and income, it uses data from tax returns and Social Security records that no forecaster could have known earlier. These data are much more accurate than the government's initial data on spending and income, which come from a very incomplete survey. If the revisions to the data on consumer spending and income are correlated with measures of consumer confidence, a forecaster in real time using measures of consumer confidence could make better forecasts than a forecaster who did not use measures of consumer confidence. So when previous researchers found that consumer-confidence indexes did not improve forecasts of consumer spending, they were not using the right data — no forecaster would have had the data they used. We will investigate the following question: If we used the data a forecaster would have had available in real time, would the measures of consumer confidence prove to be more valuable?

Fortunately, the Philadelphia Fed's real-time data set for macroeconomists allows us to undertake this exercise. That data set contains information on the data a researcher or forecaster would have known at a date in the past. As such, it contains exactly the data we need to investigate the real-time predictive power of consumer-confidence indexes.

DATA ON CONSUMER CONFIDENCE AND REAL-TIME DATA

Consumer Confidence Surveys.

The two most widely known surveys of consumer confidence are produced by the University of Michigan and the Conference Board. Both are similar in concept but implemented in different ways, and their use in forecasting models leads to somewhat different results.

The University of Michigan's survey contains about 50 questions, only five of which are part of its index of consumer sentiment. The survey, which began in 1946 on an occasional basis and has been taken monthly since 1978, is conducted with about 500 people via telephone. Consumers are asked five questions that reflect their sentiments about the economy and their family finances. Two questions reflect current economic conditions. The first question asks how people are getting along financially these days: Would you say that you (and your family living there) are better off or worse off financially than you were a year ago? The second question asks about the large items people buy, for example, furniture, appliances, or cars: Generally speaking, do you think now is a good or bad time for people to buy major household items?

Three questions reflect future conditions: (1) Looking ahead, do you think that a year from now you (and your family living there) will be better off financially, or worse off, or just about the same as now? (2) Turning to business conditions in the country as a whole, do you think that during the next 12 months, we'll have good times financially or bad times, or what? (3) Looking ahead, which would you say is more likely: that in the country as a whole we'll have continuous good times during the next five years or so or that we will have periods of widespread unemployment or depression, or what?

From the answers to these questions, the Michigan researchers create an index. For example, from question 1, they subtract the percentage of people who say they are worse off from the percentage of people who say they are better off. They calculate percentages in the same way for each of the other four questions. These percentages are averaged across all five questions then compared with the value in a base year (1966) that has been normalized to 100, and the result is the index of consumer sentiment. For our purposes in this article, we will call that index Michigan–overall. A separate index is created from the two questions about current conditions, which we will call Michigan–current, and an index is created from the three questions about future conditions, which we will call Michigan–future.

The Conference Board creates its index of consumer confidence in a similar manner except the survey is mailed to 5,000 households, of which about 3,500 are returned. The survey has been conducted monthly since June 1977. As with the Michigan survey, the Conference Board's survey asks five questions: two about current conditions and three about future conditions. Questions about current conditions are: (1) How would you rate the present general business conditions in your area? (2) What would you say about available jobs in your area right now? Questions about future conditions are: (1) Six months from now, do you think general business conditions will be better, the same, or worse? (2) Six months from now, do you think there will be more, the same, or fewer jobs available in your area? (3) How would you guess your total family income will be six months from now (higher, the same, or lower)?

Again, similar to the University of Michigan, the Conference Board creates indexes, which we will call

CB—overall, from all five questions; CB—current, from the two questions on current conditions; and CB—future, from the three questions about future conditions. Although the Conference Board creates its index using a process similar to that used by Michigan, the base year for the Conference Board's index is 1985, not 1966.

Using Consumer Confidence to Forecast Consumer Spending. Figure 1 shows the values of the Michigan—overall and CB—overall indexes, plotted from January 1978 to December 2005.¹ Gray bars indicate periods in which the economy was in a recession. As the figure indicates, the confidence indexes decline sharply at the start of

¹ Similar plots could be shown for the current and future indexes, but they are not included here to conserve space. For the same reason, Figures 2, 4, and 6 show only the CB—overall index.

recessions. Only for the 2001 recession did the confidence indexes decline several months before the recession began; that was the only time the indexes would have served as a leading indicator of a recession.² Because the consumer confidence indexes do not appear to forecast recessions well, we examine their ability to forecast consumer spending instead.

If measures of consumer confidence are able to forecast consumer spending, measures of consumer confidence should change before consumer spending does. The relevant data series for measuring consumer spending is known as personal consumption expenditures, which is collected by the Bureau of Economic Analysis as part

² The same is true for the future indexes, which are not shown, since they follow the same pattern as the overall indexes.

of the National Income and Product Accounts. The data we use are quarterly. Figure 2 plots the growth rate of consumption spending each quarter, measured as the amount of consumer spending within the quarter compared with the amount of spending in the same quarter of the previous year, along with the quarterly level of the CB—overall measure of consumer confidence.

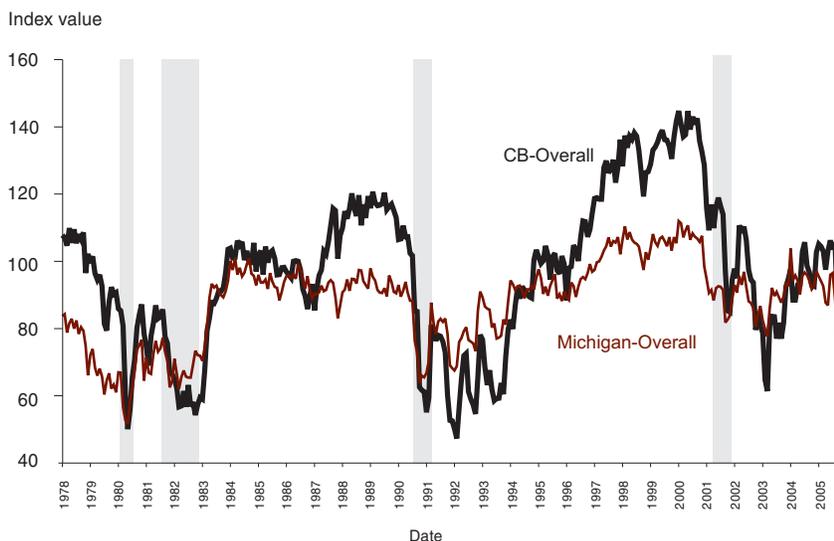
The graph indicates a fairly strong correlation between the growth rate of consumer spending and the measure of consumer confidence. Broadly speaking, consumer spending growth rises when consumer confidence rises, and vice versa. However, there are periods, such as 1987 to 1989, when the two variables appear to move in opposite directions. Nonetheless, it appears that the correlation is strong enough that we might be able to use consumer confidence to forecast consumer spending.

Forecasting Model. We will construct a state-of-the-art forecasting model that has been used in previous research, and it is one that a forecaster could have used to predict consumer spending. Economic researchers have used this model in studies that have attempted to test whether consumer confidence indexes are helpful in forecasting. These studies include the paper by Jason Bram and Sydney Ludvigson and the one by Christopher Carroll, Jeffrey Fuhrer, and David Wilcox.³ We copy their forecasting model, which models the growth rate of consumer spending today as dependent on the growth of consumer spending in each of the last four quarters, the growth in people's income in each of the last four quarters (because changes in income affect people's decisions about how much they can spend), the change in the

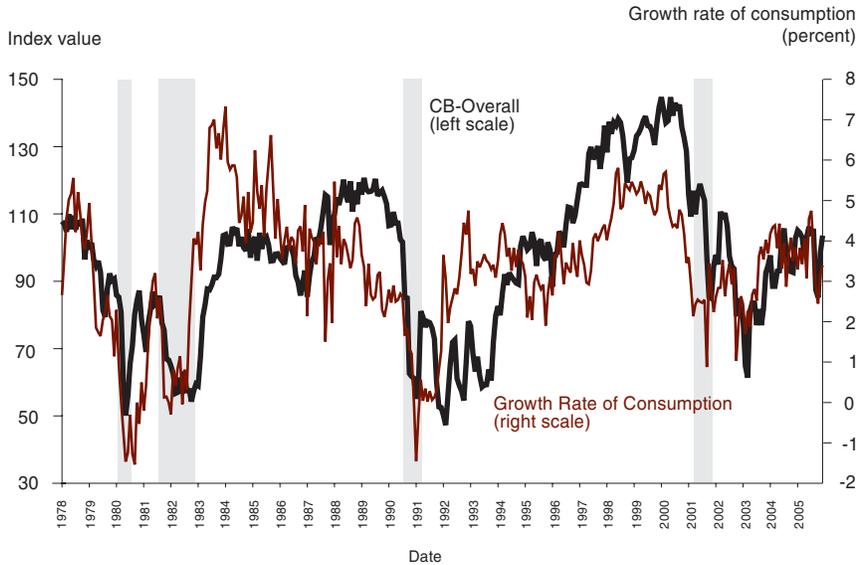
³ For a review of these and other studies, see Ludvigson's 2004 paper.

FIGURE 1

Consumer Confidence Indexes, Overall, January 1978 to December 2005



Source: The Conference Board and the University of Michigan

FIGURE 2**Conference Board Overall Index and Consumption Spending
January 1978 to December 2005**

Source: The Conference Board and Bureau of Economic Analysis

interest rate (on three-month Treasury bills) in each of the last four quarters (higher interest rates induce people to save more and consume less), and the change in the value of the stock market in each of the last four quarters (increases in wealth induce people to consume more). Data on consumer spending, income, and the value of the stock market are in real terms; that is, they are adjusted for inflation. We will use this forecasting model as our baseline and then add a measure of consumer confidence to the model to see if we get improved forecasts.⁴

Data Revisions. One problem that an economic forecaster faces in practice is that data are sometimes incomplete and may be revised over

⁴ For technical details on the forecasting models, see my 2005 paper, on which this article is based.

time. To compare the models properly, we need to know what data a forecaster would have in real time. That is, to forecast what consumer spending would be during the first quarter of 1982, we must go back and examine the data a forecaster would have had available at that time, which may be quite different from what the data prior to the first quarter of 1982 look like today because of data revisions. To accomplish this task, we use the real-time data set for macroeconomists.⁵

Why are data revised? Mostly because the government makes an esti-

⁵ The data set, available on the Federal Reserve Bank of Philadelphia's website at philadelphiafed.org/econ/forecast/reaindex.html, was first described in the *Business Review* article that I wrote with Tom Stark. See our other papers for further details on the data set and the implications of data revisions for economic research, forecasting, and monetary policy.

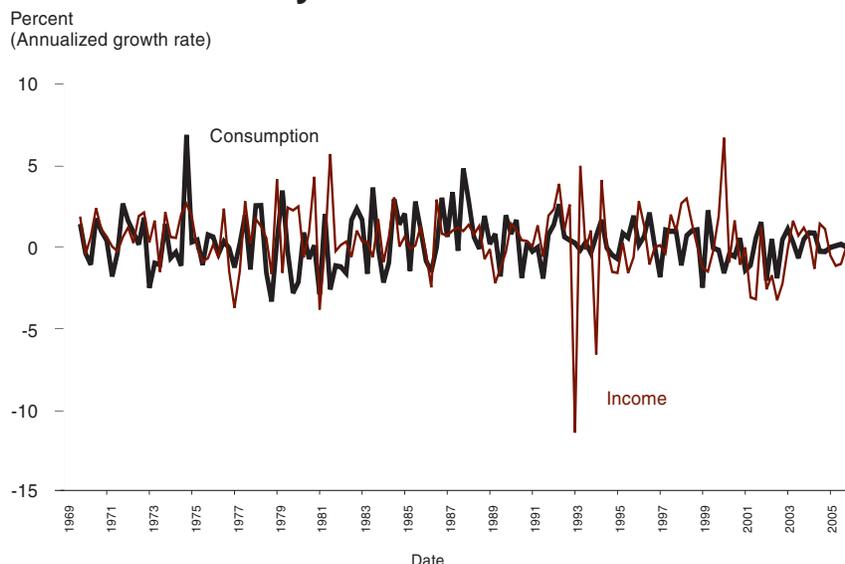
mate of the data before it has complete information. The government reports on many macroeconomic data series with a lag of just one month. For example, gross domestic product (GDP) for the first quarter of 2005 was first reported in April 2005. But the initial data release by the BEA is based on a very incomplete sample. Over time, the BEA gathers more information and revises the data, especially after people file their income tax returns. By July 2006, the BEA had a much clearer picture of what GDP was in the first quarter of 2005 than it did in April 2005. Thus, the revised data are significantly more accurate than the data that were initially released. But this poses a quandary for forecasters: Should they wait until the data have been revised, a process that takes over a year, or use what they have? The answer is clear for most situations: Forecasters need to forecast in the short run, and even the government's initial release of the data is better than no data at all.

Which variables do we need to worry about that might have data revisions? Consumer spending (more formally, real personal consumption expenditures) and income are revised over time by the government. In addition, we use the price index for personal consumption expenditures as our measure of inflation; so the real value of the stock market is revised when that price index is revised. The interest rate and the measure of consumer confidence are not revised. Thus, we need real-time data on consumer spending, income, and the price index, which are available in the real-time data set.

How large are the revisions to the data series? Both consumer spending and income are revised substantially; however, the real value of the stock market is not revised very much. Figure 3 shows the revisions to consumer spending and income from when the data for each date were initially

FIGURE 3

Revisions to Real Consumption Growth and Real Income Growth Initial to February 2006 Database



Source: Author's calculations from the real-time data set for macroeconomists

released to the values recorded in the government's database as of February 15, 2006. The numbers shown are the annualized growth rate⁶ for the quarter in the February 15, 2006, database minus the annualized growth rate for the quarter as reported by the government when the data were initially released. You can see that the data revisions can be large, reaching a magnitude of as much as 11.4 percentage points, and that revisions to income have generally been larger than revisions to consumption.

⁶ An annualized growth rate is the growth rate from one quarter to the next, expressed at an annual rate so that comparisons with annual data can be easily made. For example, if GDP grew 0.6 percent from one quarter to the next, the annualized growth rate would be 2.4 percent — four times as large — because if GDP kept growing at the same pace for the entire year, it would grow 2.4 percent for the year.

EVALUATING FORECASTS OF CONSUMER SPENDING

Our model for forecasting consumer spending, as described above, uses data on past consumer spending, past income, past changes in the interest rate, and past changes in the real value of the stock market. At each date, beginning with the first quarter of 1982, we will imagine we are forecasters using the data available to us at the time. We will estimate our baseline model and generate a forecast for consumption spending in the quarter. Then, we will include a measure of consumer confidence in the model and generate another forecast.

After following this procedure for the first quarter of 1982, we imagine stepping forward one quarter to the second quarter of 1982, with one additional quarter of data on which to base

our forecasts. We will make forecasts for that quarter and then keep repeating this process through the fourth quarter of 2005. After following this procedure, we can show the forecasts for consumer spending each quarter, based on the baseline forecast with no consumer-confidence measure and the CB—overall forecast (Figure 4).⁷ As we can see in the graph, the forecasts are similar, but they also differ systematically at times; that is, the forecasts using the CB—overall index are higher than the baseline forecasts for many consecutive periods, such as most of the quarters from 1987 to 1990, and are lower than the baseline forecasts for most of the quarters from 1990 to 1991.

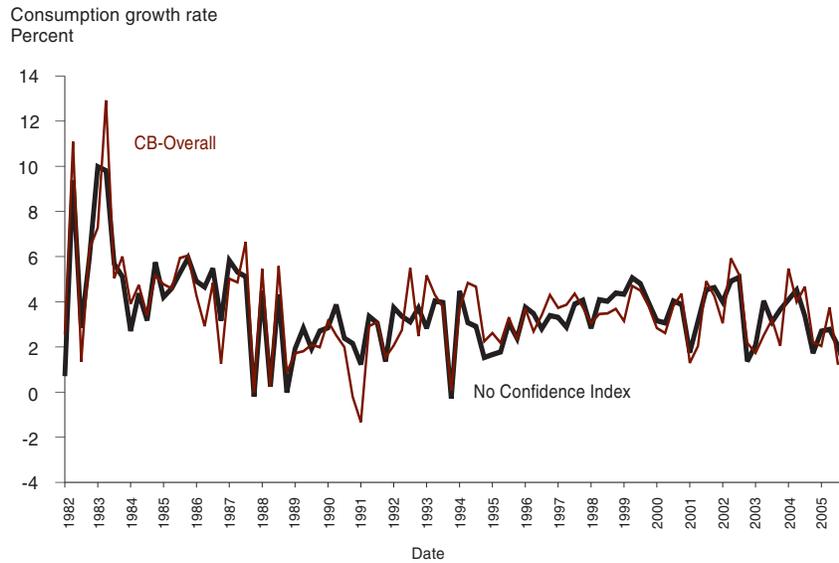
How do we evaluate which forecast is better? To evaluate the forecasts for consumer spending, we will subtract the forecast made using the baseline model from the actual value of consumer spending in each quarter to calculate the baseline model's *forecast error*. Next, we will do the same for the forecast made using the model that includes a measure of consumer confidence. Then, we will compare the forecast errors to see which model produces smaller errors.

However, this raises a problem: What is the actual value of consumer spending? If we use today's government database (in particular, the database as of February 15, 2006), we will probably find very large forecast errors in the earlier part of the sample period because of various changes to the definitions of the variables, changes in the base years for real variables, and so forth. This occurs because about every five years, the BEA modifies the methods it uses to construct the

⁷ Forecasts for the other five measures of consumer confidence were also generated but are not shown here.

FIGURE 4

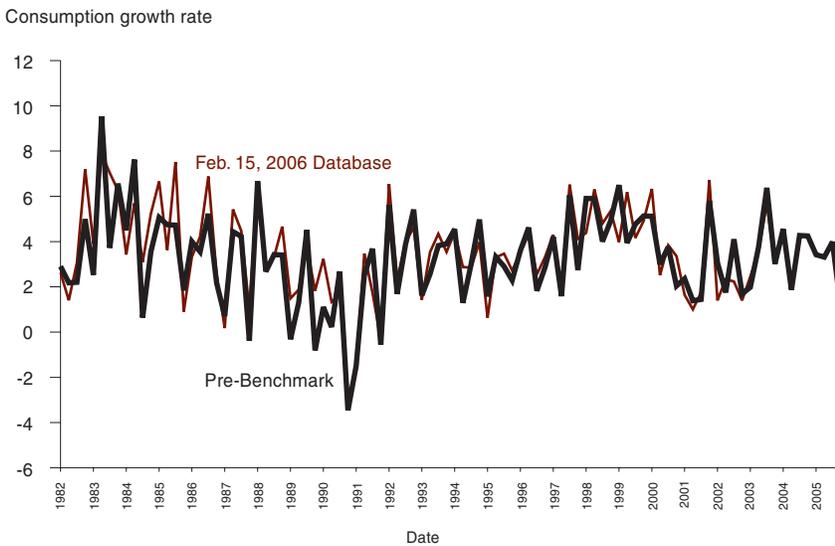
Comparing Forecasts Over Time 1982Q1 to 2005Q4



Source: Author's calculations

FIGURE 5

Alternative Actuals 1982Q1 to 2005Q4



Source: Author's calculations from the real-time data set for macroeconomists

data in a process known as *benchmark revision*. It is hard to imagine that a forecaster working in early 1982 and making a forecast for consumer spending for the first quarter of 1982 could have anticipated the methods used by the government to calculate data on consumer spending as of early 2006.

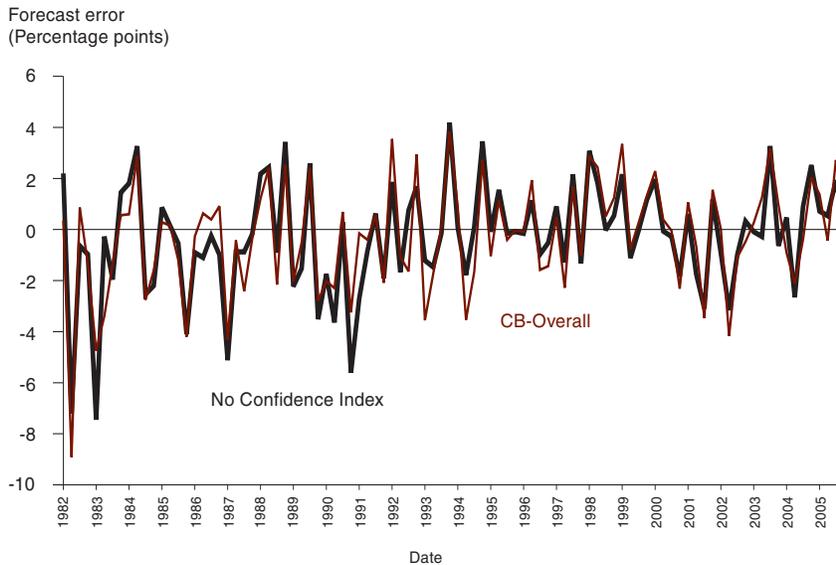
For that reason, we will not use the consumer spending data from the February 15, 2006, database as our measure of the actual value of the data. Instead, we will do the following: For each date for which a forecast is made, we will use as the actual value of the data the last value of the data before a benchmark revision. Benchmark revisions to the U.S. National Income and Product Accounts occurred in December 1980, December 1985, November 1991, January 1996, October 1999, and December 2003.

Using the data just before a benchmark revision gives a better view of how accurate the forecasts are. How much does this choice matter? Figure 5 shows the data from the February 15, 2006, database compared with the data just before each benchmark release. Though the pattern of the growth rates of consumption spending is roughly the same, from 1982 to 1990 the pre-benchmark growth rate is almost always lower than the February 15, 2006, data. We would think that the forecasting model was making systematic forecast errors if we based our analysis on the most recent data instead of the pre-benchmark data.

Figure 6 compares the forecast errors of the model that includes the CB-overall index with those of the baseline forecast. Since the graph shows there are times when each forecast error is higher or lower than the other, it is not obvious which forecast is worse. We need some way to compare the forecast errors over the entire period from 1982 to 2005.

FIGURE 6

Comparing Forecast Errors Over Time 1982Q1 to 2005Q4



Source: Author's calculations

Economic theory provides a way to compare the forecast errors. We begin with the assumption that bigger forecast errors are substantially worse than smaller ones. A commonly accepted method of comparing forecast errors is to calculate the root-mean-squared-forecast error (RMSFE). The RMSFE is found by squaring each forecast error (thus penalizing large errors more than small errors), adding the squared errors together, then taking the square root. The RMSFE is similar in concept to the standard deviation, which is commonly used in statistical analysis. The higher the RMSFE is, the worse the forecasts are. In addition, economists have developed tests for the statistical significance of differences in RMSFEs. For example, it could be that one forecasting model has a lower RMSFE than another, but

the difference between the two is so small that the result could have occurred by chance and, thus, does not mean that the one forecasting model is significantly better than the other. In each case, we will ask: Is the difference between the RMSFEs statistically significant?

We compare the RMSFEs of the different forecasts in Table 1. As you can see, all of the forecasts using a measure of consumer confidence have higher RMSFEs than the baseline except for the forecast using CB-future. For ease of comparison, the table shows the relative RMSFE for each model, which is its RMSFE divided by the RMSFE of the baseline with no consumer confidence measure. Thus, the baseline model has a relative RMSFE of 1, a model with a higher RMSFE than the baseline model has a

relative RMSFE greater than 1, and a model with a lower RMSFE than the baseline model has a relative RMSFE less than 1. If a measure of consumer confidence was helpful in forecasting, its RMSFE would be less than 1. Table 1 also indicates whether the difference between the RMSFEs is statistically significant. None of the models has an RMSFE that is statistically significantly different from the baseline model.

ALTERNATIVE FORECASTING MODELS

The results in Table 1 are discouraging. They suggest that none of the measures of consumer confidence help to significantly improve the forecasts, only one measure improves the forecasts at all, and the rest make the forecasts worse (though not significantly worse). However, our baseline model was based on models that other researchers in the literature had used. Those models were not necessarily designed to produce the *best* forecasts with real-time data. It might be possible to find a better forecasting model and then see if the measures of consumer confidence help improve the forecasts using that better model.

One principle of forecasting is KISS (for example, see the references in Frank Diebold's textbook on forecasting), which stands for Keep It Sophisticatedly Simple. In forecasting, this means that forecasters should use sophisticated models that capture the elements of the data that are essential to the process. But in comparing different sophisticated models, choose the simplest model that gets the job done. If a model is very complicated, it may suffer from data mining: Variables are included in the forecasting model because they help to explain a particular episode in the past, but they are of no value for forecasting the future and may, in fact, make such forecasts worse. Thus, we will try to simplify

TABLE 1**Root-Mean-Squared-Forecast Errors (RMSFE)
Original Model, 1982Q1 to 2005Q4**

Forecasting Model	RMSFE	Relative RMSFE	Significant Difference?
No confidence measure	2.16	1.000	---
M-overall	2.28	1.055	no
CB-overall	2.17	1.004	no
M-future	2.28	1.055	no
CB-future	2.13	0.988	no
M-current	2.40	1.114	no
CB-current	2.26	1.048	no

TABLE 2**Root-Mean-Squared-Forecast Errors (RMSFE)
Alternative Model, 1982Q1 to 2005Q4***

Forecasting Model	RMSFE	Relative RMSFE	Significant Difference?
No confidence measure	2.11	1.000	---
M-overall	2.18	1.033	no
CB-overall	2.19	1.035	no
M-future	2.22	1.051	no
CB-future	2.18	1.033	no
M-current	2.23	1.053	no
CB-current	2.25	1.065	yes

*Model uses changes in confidence indexes and fewer variables.

the baseline model to see if we can make our forecasts better.

One way to simplify the model is to eliminate some variables from the

forecasting model. The only way to figure out the right variables to eliminate is by trial and error, and doing so results in slightly lower forecast errors.

Essentially, all the information from the data on past income is already reflected in past consumption data, and the change in interest rates is simply not a very large factor affecting consumption. Therefore, we eliminate those two variables, and our forecasting model performs somewhat better.

A second change that might help is to consider how the measures of consumer confidence should enter into our forecasting model. Following the previous researchers, we had initially used the level of consumer confidence in the forecasting model. But some people have suggested that what might be more helpful for forecasting is to note when there is a large change in consumer confidence, regardless of its level. A large increase in consumer confidence means people are likely to spend more, while a large decrease in consumer confidence means people are likely to spend less. We use only the change in a measure of consumer confidence in our model, not its level.

We have simplified our forecasting model somewhat. The result, as shown in Table 2, is that our forecasts are slightly better — that is, the models generally have lower RMSFEs than those in Table 1 — except for CB—overall and CB—future. But the simplification of the model made the baseline model with no consumer confidence index slightly better. The result is that all of the measures of consumer confidence make the forecast worse, and one measure (CB—current) makes the forecasts significantly worse.

The conjecture in the introduction suggested that by using real-time data, the measures of consumer confidence were more likely to be of help in forecasting than if we had used the revised data, for example, if we had pulled all the data out of the February 15, 2006, database. In fact, the use of real-time data did not make an appreciable difference in the forecasts

that used a consumer confidence index compared with the baseline model that did not. It appears that the use of real-time data did not rescue the consumer-confidence measures.

SUMMARY

The conjecture that began this article seemed sensible: The use of real-time data might have a better

chance of showing that measures of consumer confidence could prove useful in forecasting. After all, the measures of consumer confidence could reflect what people know that has not yet been captured by government statistical agencies. However, in trying to predict consumer spending, evidently the measures of consumer confidence reflect other events affecting the

economy and do not sufficiently tell us what people know that government statistical agencies do not know.

The bottom line: If you are forecasting consumer spending for the next quarter, you should use data on past consumer spending and stock prices and ignore data on consumer confidence. 

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