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Do Consumer Confidence Indexes Help Forecast Consumer Spending in Real Time?

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Abstract:

Could a researcher or policy analyst use data reported from surveys of consumer confidence to improve forecasts of consumer spending? This issue has been examined in the literature previously, which reached the conclusion that consumer confidence helped improve the forecasts slightly. But that research was based on final, revised data and thus did not use the data that would have been available to forecasters in real time. This paper remedies that shortcoming, using the Real-Time Data Set for Macroeconomists to analyze the quality of forecasts made with indexes of consumer confidence. The main finding is that the indexes of consumer confidence are not of significant value in forecasting consumer spending. In fact, in some cases, they make the forecasts significantly worse.

Keywords:

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Non Technical Summary

Could a researcher or policy analyst use data reported from surveys of consumer confidence to improve forecasts of consumer spending? This issue has been examined in the literature previously, which reached the conclusion that consumer confidence helped improve the forecasts slightly. But that research was based on final, revised data and thus did not use the data that would have been available to forecasters in real time. This paper remedies that shortcoming, using the Real-Time Data Set for Macroeconomists to analyze the quality of forecasts made with indexes of consumer confidence. We test forecasts to see if including the confidence indexes reduces the root-mean-square-forecasts error significantly. We begin with a forecasting equation that does not include a consumer confidence index as a right-hand-side variable. We made a set of forecasts in a rolling fashion and then calculate the forecast errors. Then, we modify the forecasting equation by adding an index of consumer confidence and repeat the forecast exercise. The main finding is that the indexes of consumer confidence are not of significant value in forecasting consumer spending. In fact, in some cases, they make the forecasts significantly worse.

Nicht technische Zusammenfassung

Können sich Forscher oder Analysten Umfragedaten zum Verbrauchervertrauen zunutze machen, um die Prognosen der Konsumausgaben zu verbessern? Diese Frage ist in der Fachliteratur schon früher untersucht worden, wobei gefolgert wurde, dass Angaben über das Verbrauchervertrauen geringfügig zu einer Verbesserung der Vorhersagen beigetragen haben. Aber diese Forschungen beruhten auf endgültigen, revidierten Daten und ignorierten damit die Daten, die die Prognostiker in Echtzeit zur Verfügung gehabt haben. Dieses Diskussionspapier behebt diesen Mangel, indem es sich des Echtzeitdatensatzes für Makroökonomen der Fed Philadelphia bedient, um die Qualität von Prognosen zu analysieren, die mithilfe von Indizes des Verbrauchervertrauens erstellt wurden. Wir unterziehen die Prognosen einer Prüfung, um herauszufinden, ob die Berücksichtigung des Vertrauensindexes den mittleren quadratischen Fehler der

Vorhersage signifikant verringert. Wir beginnen mit einer Prognosegleichung, die keinen Verbrauchervertrauensindex als Rechthandvariable mit einbezieht. Anhand einer von uns zuvor erstellten Reihe rollierender Prognosen berechnen wir die Prognosefehler. Anschließend modifizieren wir die Prognosegleichung durch Hinzufügen eines Verbrauchervertrauensindex und wiederholen den Prognosevorgang. Die wichtigste Erkenntnis ist, dass die Indizes des Verbrauchervertrauens für die Vorhersage des Konsumverhaltens keinen signifikanten Nutzen besitzen. In einigen Fällen führen sie gar zu einer deutlichen Verschlechterung der Prognosen.

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Do Consumer Confidence Indexes Help Forecast consumer spending in real Time*

1 Introduction

A recent symposium held at Princeton University, "How Confident Can We Be in Consumer Confidence?" (May 10, 2002) examined the ways in which indexes of consumer confidence were gathered and used. The *New York Times* reported that "whatever the shortcomings of the consumer confidence indexes, nearly all the researchers agree that when combined with other data, they provide some additional information in forecasting consumption." (Uchitelle, 2002)

The idea that indexes of consumer confidence may be useful in forecasting consumption was first proposed by Eva Mueller (1963), who used ten years of data from the Michigan survey of consumers. She found that consumer confidence was a significant explanatory variable for consumption spending in a regression that included lagged consumption in the equation. Frederic Mishkin (1978) found that the significance of the Michigan consumer confidence measure depended on what else was included on the right-hand-side of the equation for prediction spending on durable consumer goods—adding financial variables to the equation greatly reduces the explanatory power of consumer confidence. Christopher Carroll, Jeffrey Fuhrer, and David Wilcox (1994) confirmed Mishkin's finding for overall personal consumption expenditures, noting that the explanatory power of the confidence index declined after 1978. Jason Bram and Sydney Ludvigson (1998) tested the Michigan index against the Conference Board index and found greater explanatory power in the Conference Board's index. They also ran out-of-sample forecasting exercises, finding that the Conference Board's index reduced the root-mean-squared forecast error (RMSFE) relative to a baseline forecasting equation in which consumption spending growth is forecast with its own lags, and lags of income growth, growth in real stock

* Thanks to Lucrezia Reichlin, Peter Kugler, Todd Clark, and other participants at the Bundesbank Conference on Real-Time Data and Monetary Policy. Margaret Shea (Philadelphia Fed) deserves credit for collecting several of the real-time data series, while Clay Evans (Philadelphia Fed) and Amanda Smith (University of Richmond) provided valuable research assistance. Please send comments to the author at: University of Richmond, Robins School of Business, 1 Gateway Road, Richmond, VA 23173, or e-mail: dcrousho@richmond.edu.

prices, and the change in the interest rate, while the Michigan survey increased the RMSFE. However, neither change in RMSFE was statistically significant.

Several papers have examined the ability of the confidence indexes to influence variables other than consumption spending. For example, Eric Leeper (1992) shows that the Michigan index helps explain movements in industrial production and unemployment, but the explanatory power disappears when real stock prices and the interest rate are added to the system of equations. Forecasts are not improved by using the Michigan index. He concludes that the Michigan index does not include information not already available to financial markets.

More recently, Philip Howrey (2001) tests whether the Michigan survey helps predict business cycle turning points and consumption spending. He finds that the monthly information in the confidence index helps improve quarterly forecasts, so the high-frequency information in the Michigan index appears useful. The last paragraph of his paper indicates directions for further research: "Most of these conclusions are based on models that were estimated over the entire sample period. It would be interesting to see whether these results also hold for recursive estimates of the forecasting equations. In addition, no attempt has been made to deal with issues of measurement error and data revision that accompany real-time forecasts." (p. 205) This is the point of departure for the current paper.

All of the research that examines whether indexes of consumer confidence help to forecast consumer spending are based on final, revised data, rather than data that were available to forecasters in real time. As a result, the regression exercises and forecasts that are contained in this research are not indicative of the value of the consumer confidence indexes in actual forecasting. A conjecture that arose at the Princeton symposium was that the confidence indexes might prove to be even more useful in real time than they were with final, revised data, because the data revisions are based on information not known to government data collectors until after the fact, but people know about their own incomes and their own spending plans when they respond to the surveys of consumer confidence. So, the question to be answered is: are indexes of consumer confidence valuable for forecasting consumer spending in real time? And are they more valuable when combined with real-time data than if combined with final, revised data?

2 Data on Consumer Confidence and Real-Time Macroeconomic Data

To examine whether indexes of consumer confidence have any value in real time, we need data on consumer confidence and real-time macroeconomic data. This section describes the available data.

3 The Confidence Indexes

We examine two different indexes of consumer confidence: the Surveys of Consumers taken at the University of Michigan (hereafter called the Michigan survey), and the Conference Board survey of consumer attitudes.

The Michigan survey began in 1946. Currently, each monthly survey asks approximately 500 telephone respondents about 50 questions, covering many different aspects of consumer attitudes and expectations. Economists have focused on a subset of questions relating to current and future economic conditions. The responses to three questions concerning future economic conditions (on national business conditions in the next year, on national business conditions in the next five years, and on family financial conditions in the next year) are added together to obtain an Index of Consumer Expectations (which we will call M-future). The responses to two questions concerning current economic conditions (on whether it is a good time for people to buy major consumer goods and on the family's financial condition relative to one year ago) are averaged to arrive at a Current Conditions Index (M-current). The responses to all five of those questions are combined to calculate an Index of Consumer Sentiment (M-overall).[1] The M-future index is one of the components of the Conference Board's index of leading indicators and the M-overall index is widely reported in the financial media on its release its month.

The Conference Board survey began in 1967 on a bi-monthly basis and has been conducted monthly since June 1977. Questionnaires are mailed to 5,000 households, with a response rate of about 70 percent. The consumer confidence index comes from the answers to five questions, which are similar to the Michigan survey. The

[1] For more information on the Michigan survey, see their web site at: www.sca.isr.umich.edu/main.php. Economists have investigated some of the other questions in the survey as well, such as the expectations of inflation; see Croushore (2004), for an analysis of inflation forecasts from the Michigan survey compared with other forecast surveys. The Appendix contains additional details on all three surveys, including the wording of the questions and answers.

responses to three questions concerning future economic conditions (on business conditions six months ahead, on employment conditions six months ahead, and on family income six months ahead) are added together to obtain an Expectations Index (which we will call CB-future). The responses to two questions concerning current economic conditions (on current business conditions and on current employment conditions) are averaged to arrive at a Present Situation Index (CB-current). The responses to all five of those questions are combined to calculate a Consumer Confidence Index (CB-overall).[2]

Although the number and types of questions in the Michigan and Conference Board surveys are similar, the indexes are constructed differently. The Michigan survey indexes are calculated in the following way:

1. Subtract the proportion of respondents with an unfavorable reply (e.g., those saying we will have bad times financially in the next six months) from the proportion of respondents with a favorable reply (e.g., those saying we will have good times) for each of the five questions.
2. Add 100 to each number in part 1.
3. Add the numbers from part 2 for the relevant index together (2 values for M-current, 3 for M-future, 5 for M-overall), divide by their value in the first quarter survey of 1966, multiply by 100, and add 2 (to reflect changes in methodology since the 1950s).

The Conference Board indexes are calculated more simply:

1. Calculate the net proportion of respondents with a positive reply, as in the Michigan survey's step 1 above, for each of the five questions.
2. Divide the value in step 1 by the value for 1985 for each of the five questions.
3. Average the relevant numbers from part 2 together.

Figure 1 shows the two overall indexes, plotted over time from January 1978 to January 2004. In the graph, the gray shaded bars indicate recessions. Prior to the 1980 recession, the Michigan and Conference Board indexes had been declining steadily, then fell sharply before the recession began. Consumer confidence rebounded a bit

[2] For more information on the Conference Board survey, see their web site at: www.consumerresearchcenter.org/consumer_confidence/methodology.htm

when that recession ended, then fell during the 1981–1982 recession. In the remainder of the 1980s, the consumer confidence indexes remained fairly high, with a few twists and turns. In 1987, the stock-market crash in October caused consumer confidence to fall, but it rebounded shortly thereafter. Other than that, the Michigan index was fairly stable over most of 1984–1990, though with a slight downward trend. However, the Conference Board index, after declining slightly from 1984 to 1987, jumped up to a higher level in 1987, where it remained until about 1990. In the recession of 1990–1991, both indexes fell sharply. With slow economic growth after the recession, the indexes remained fairly low for some time. Both the Michigan and Conference Board indexes were more erratic in the period from 1991 to 1993 than they had been earlier. Consumers fared well in the remainder of the 1990s, and the confidence indexes rose to their highest levels ever. Confidence remained at a high level until 2000. The indexes all fell in late 2000 and early 2001, even before the recession began in March 2001.

From Figure 1, it is difficult to ascertain whether the consumer confidence indexes are likely to be helpful in forecasting recessions. In some cases, the indexes declined steadily well before a recession began. Mostly, the indexes fell after recessions began, except for the recession that began in March 2001.

However, even if indexes of consumer confidence are not too useful in predicting recessions, they may help in forecasting consumption spending. To illustrate this possibility, Figure 2 plots the Michigan overall index against the growth rate of consumption spending each month relative to one year earlier. The general movements of the two series correspond fairly closely. They declined together from 1978 to 1980, rose sharply together after the recession ended in 1982, drifted slowly downward together in the 1980s. In the 1990s, the Michigan index rose earlier than the growth rate of consumption spending, but both were very high in the late 1990s and fell together in the early 2000s. Similar patterns hold for the other indexes of consumer confidence.

4 Real-Time Macroeconomic Data

Our empirical procedure will be to test forecasts to see if including the confidence indexes reduces the root-mean-square-forecast error (RMSFE) significantly. We begin with a forecasting equation that does not include a consumer confidence index as a right-hand-side variable. Using the baseline equation, we generate a series of forecasts, just as if we were making those forecasts in real time. To do so, we must have, at each date for which we make a forecast, the exact data set available to a forecaster in real time. Such data are available in the Croushore-Stark (2001) real-time data set for macroeconomists, which is available on the web at: http://www.phil.frb.org/econ/forecast/reaindex.html. We make a set of forecasts in a rolling fashion and then calculate the forecast errors. Then, we modify the forecasting equation by adding an index of consumer confidence and repeat the forecast exercise. Finally, we examine whether the RMSFE has increased or decreased significantly from the addition of the confidence index in the regression. Significance is determined using the Harvey-Leybourne-Newbold modification of the Diebold-Mariano procedure.

Why do we need real-time macroeconomic data, as opposed to the data available in today's data bank? We need such data because we wish to investigate whether consumer confidence would help us forecast. If data revisions were small and inconsequential, we would not worry about using real-time data, but instead could rely on data that have been revised many times. However, data revisions may be large and may be systematic, so our empirical results could be biased if we did not use real-time data.

Research by Stark and Croushore (2002) illustrates how much the use of real-time data affects forecasts, especially short-term forecasts, which have been the focus of the literature on forecasting using consumer-confidence indexes. To get a feel for how much difference it makes to use real-time data as opposed to final, revised data, the next section compares the two.

The forecasting equation that we will use in our empirical work is based on research by Carroll-Fuhrer-Wilcox and Bram-Ludvigson. The baseline equation is:

$$\Delta c_t = \alpha_0 + \sum_{i=1}^{4} \alpha_1^i \Delta c_{t-i} + \sum_{i=1}^{4} \alpha_2^i \Delta y_{t-i} + \sum_{i=1}^{4} \alpha_3^i \Delta r_{t-i} + \sum_{i=1}^{4} \alpha_4^i \Delta s_{t-i}, \quad (1)$$

where c is the logarithm of real consumption spending, y is the log of real personal income, r is the interest rate on three-month Treasury bills, s is the log of real stock prices (measured by the S&P 500 index). Real values are obtained from nominal values by deflating by the personal consumption expenditures price index.

We test forecasts made using equation (1) against forecasts that add to equation (1) the values of one or several measures of consumer confidence:

$$\Delta c_t = \alpha_0 + \sum_{i=1}^{4} \alpha_1^i \Delta c_{t-i} + \sum_{i=1}^{4} \alpha_2^i \Delta y_{t-i} + \sum_{i=1}^{4} \alpha_3^i \Delta r_{t-i} + \sum_{i=1}^{4} \alpha_4^i \Delta s_{t-i}$$

$$+ \sum_{j=1}^{J} \sum_{i=1}^{4} \beta_j^i C_{t-i}^j, \quad (2)$$

where we include J measures of consumer confidence, each of which is denoted C^j.

Previous researchers estimating this equation used final, revised data, which is easily obtained from a standard data base. However, consumption spending and personal income are revised over time, as is the deflator used to construct real values of the variables. So, we need real-time data on real consumption spending, personal income, and the deflator. Only real consumption spending currently exists in the Croushore-Stark (2001) real-time data set for macroeconomists, so we collected real-time data on nominal personal income and nominal consumption spending. From the real-time data on nominal and real consumption spending, we created a series for the personal consumption expenditures price deflator.

5 Comparing Real-Time Results with Results from Final, Revised Data

We begin our analysis by comparing our estimates of the forecasting equation (1) to those achieved by Bram-Ludvigson. Because their estimation sample was 1968Q1 to 1996Q3, we guess that they used data from vintage November 1996. Using that vintage of data, we estimate equation (1) both with ordinary least squares and with non-linear least squares, the latter to reflect the idea that the error term in equation (1) follows a first-order moving-average process because of time

aggregation. In Table 1, we compare those two estimation equations to that of Bram-Ludvigson.

Table 1 shows that we were fairly successful in replicating the Bram-Ludvigson results. Our NLS regression is similar to that of Bram-Ludvigson for most variables, though the OLS regression is very different because of the absence of an MA(1) term.

When we add measures of consumer confidence to the regression, to see if they are significant in sample, we see in Table 2 that the Michigan-overall index is not significant in the regression, but the Conference Board overall index is significant, just as Bram-Ludvigson found. The Michigan-future index is also not significant, which our results confirm. For the Conference Board-future index, Bram-Ludvigson find significant results, confirmed by our OLS regression, but we could not get the NLS regression to converge.

Table 3a compares Bram and Ludvigson's out-of-sample forecasting results with latest-available data to our replication of those results, using data vintage November 1996. In this exercise, we use equation (1) or (2) to forecast consumption growth one quarter ahead. We first do this for an equation that uses no measure of consumer confidence, then rerun the equation using each of the different indexes of consumer confidence. We can then test to see if the use of each consumer confidence index reduces the root mean squared forecast error (RMSFE) significantly, using the Harvey et al. modification of the Diebold-Mariano test.[3]

First note that we are unable to replicate the Bram-Ludvigson results closely, as shown in Table 3. That may not be surprising, because these non-linear estimation methods may be quite sensitive to the precise data set being used and we are looking at differences in RMSFEs that are not statistically significant. But we do concur with Bram-Ludvigson that in out-of-sample forecasting, neither the Michigan overall index nor the Conference Board overall index provides marginally significant explanatory power.

Our main set of experiments differs from that of Bram-Ludvigson by extending the sample period (hoping for greater ability to test the hypothesis that the confidence indexes matter), we use real-time data to estimate the model for each forecast date

(beginning with the same sample starting date), and we use several alternative choices for the actual value of consumption growth.

In real time, the data look different than the latest available data. Researchers in the forecasting literature must always make a choice about what they think forecasters are attempting to forecast. Such choices include data released shortly after the period in question, data available just prior to a benchmark revision, and the latest available data. Generally, we think that forecasters using real-time data do not forecast methodological changes by the government in constructing the data, so the data available just prior to a benchmark revision make sense to use as actuals. However, the "best" measure of data is probably the latest available data, so we will also consider that possibility. Figure 3 highlights the differences in the quarterly growth of consumption spending in each of the forecast periods. The latest-available data show somewhat higher growth rates in the 1980s than the last-benchmark data and are a bit smoother in the 1990s than the last-benchmark data.

Figure 4 shows that the use of the different indexes leads to somewhat different forecasts for consumption growth. This is especially true in the 1980s, where the use of each of the indexes leads to persistent forecast differences compared with not using either index.

Figure 5 illustrates how a typical forecast compares with the actual value, as measured by the last-benchmark data. In this figure, we use the forecast made using the CB-current data, which is the only one significantly different from the last-benchmark data, as well as the forecast made without using a consumer confidence index.

Table 4 reports the results of formal tests for differences in RMSFEs, in which we extend the sample to the period from the first quarter of 1982 to the last quarter of 2002, and do the forecasting each period using real-time data. We see that none of the consumer confidence indexes reduce the RMSFE significantly, and in many cases the RMSFE is significantly worse. Although the in-sample results showed that the Conference Board indexes entered the regression equation significantly, using those measures in real time would have significantly worsened the forecasts made using the

[3] Note that the models tested here are nested, so this test may not be appropriate and the critical values are likely to be lower than we use. However, the problem of testing nested models with real-time data has not been fully solved. Some ideas are contained in Clark and West (2004).

CB-current index and latest-available data as actuals, or using M-current, CB-current, or CB-future and last-benchmark data as actuals. Only the M-future index reduces the RMSFE relative to using an equation without confidence indexes, but does not do so enough that the difference is statistically significant.

6 Sensitivity Analysis: Improving the Forecasts with Alternative Specifications

How sensitive are the results of this study to alternative choices of the model we used? One way that we could modify the model to test for robustness is to use a linear estimation procedure instead of a non-linear one. A second way is to look at changes in the confidence indexes instead of their levels.

Experienced forecasters know that in practice a simpler procedure for forecasting often leads to more robust results than a more complicated procedure, especially one that is non-linear. In our case, this suggests trying to estimate the model using OLS instead of NLS. The results of doing so are reported in Table 5. First, note that every reported RMSFE is lower in the OLS case than the NLS case, except for M-future with last-benchmark actuals. Under the linear estimation procedure, only the CB-current forecast has an RMSFE that is significantly higher than the RMSFE from not using consumer-confidence indexes in the equation.

Studying the pattern of coefficients in the estimates suggests that another alternative is to use changes in the consumer-confidence indexes instead of their levels, because in the level model, the coefficients sometimes have a pattern with alternating signs. Doing so yields the results in Table 6. In this table, every RMSFE is lower than the corresponding entry in Table 5, with the exception of CB-future compared with latest-available data as actuals. The results in Table 6, however, show no significant improvement in the forecasts from using any of the consumer-confidence measures.

Because the results of Table 6 have lower RMSFEs for the most part than other models, and we wish to investigate the sensitivity of the results, we extend the tests to include some additional alternatives as actuals: using data available one quarter. two quarters, and four quarters after the period in question. The results of those tests are shown in Table 7. The table shows that there are more cases in which the forecasts are improved by the use of consumer confidence indexes, but never significantly.

Finally, one final idea of forecasters is that often a model with many parameters to estimate leads to worse forecasts than a model with fewer parameters. With that idea in mind, one might argue that the baseline model should be simplified by eliminating variables.[4] Tests suggest that both the interest rate and personal income may be dropped from the model, leaving lagged consumption spending and the change in real stock prices as the only explanatory variables. Doing so lowers the RMSE (using last benchmark actuals) significantly from 0.005894 to 0.004976, which proves that in this case a more parsimonious model is superior.

Now, beginning from the model with only consumption and stock prices on the right-hand side of the forecasting model, we can add the consumer confidence variables into the model. The results of doing so are shown in Table 8. Adding any of the consumer confidence measures makes the forecasts worse, though only for M-overall and M-current are the forecasts significantly worse.

7 Summary and Conclusions

In this paper, we have used existing methods to investigate whether or not indexes of consumer confidence are helpful in improving forecasts of consumption spending. Though consumer confidence indexes in some specifications are significant in sample using latest-available data, we find no evidence in any specification that the use of such indexes improves forecasts significantly.

These results suggest that forecasters can ignore consumer-confidence indexes in forecasting consumption spending. But the results are not definitive because they depend on the quality of the forecasting model being used. In our exercises, we have used only models that other researchers in the literature have used. It may be that using better forecasting methods could show that consumer confidence indexes do indeed have marginal significant explanatory power, if any such methods can be found.

In addition, there may yet be a role for consumer confidence indexes to add value in forecasting. The indexes are released monthly and the monthly data could be used to help predict current-quarter consumption growth. Testing this hypothesis will

[4] I thank Lucrezia Reichlin for this suggestion.

require the use of quite different methods and models, however. A good current-quarter forecasting model would look like that of Stark (2000) or Trehan (1989).

Table 1: Replication of Bram-Ludvigson Results

Estimated Equation: $\Delta c_t = \alpha_0 + \sum_{i=1}^{4} \alpha_1^i \Delta c_{t-i} + \sum_{i=1}^{4} \alpha_2^i \Delta y_{t-i} + \sum_{i=1}^{4} \alpha_3^i \Delta r_{t-i} + \sum_{i=1}^{4} \alpha_4^i \Delta s_{t-i}$

	Bram-Ludvigson	OLS	NLS
α_0	NA	0.00309 (0.008)	0.00124 (0.058)
MA(1)	-0.8 (0.000)	-----	-0.728 (0.000)
$\sum_{i=1}^{4} \alpha_1^i$	0.83 (0.000)	0.235 (0.273)	0.781 (0.000)
$\sum_{i=1}^{4} \alpha_2^i$	0.04 (0.263)	0.359 (0.111)	0.0576 (0.683)
$\sum_{i=1}^{4} \alpha_3^i$	-0.002 (0.006)	-0.00731 (0.000)	-0.00295 (0.0333)
$\sum_{i=1}^{4} \alpha_4^i$	-0.01 (0.056)	0.0117 (0.435)	-0.0131 (0.132)
$\bar{R}^2$	NA	0.255	0.266
D.W.	NA	1.96	1.98

Test statistics shown in parenthesis are for OLS the p-value of the t-test on the coefficient or sum of the coefficients; for NLS the p-value of the t-test on the constant term and the moving-average term, and F-tests for the sums of coefficients.

Table 2: Replication of Bram-Ludvigson Results

Estimated Equation: $$\Delta c_t = \alpha_0 + \sum_{i=1}^{4} \alpha_1^i \Delta c_{t-i} + \sum_{i=1}^{4} \alpha_2^i \Delta y_{t-i} + \sum_{i=1}^{4} \alpha_3^i \Delta r_{t-i} + \sum_{i=1}^{4} \alpha_4^i \Delta s_{t-i}$$

$$+ \sum_{j=1}^{J} \sum_{i=1}^{4} \beta_j^i C_{t-i}^j ,$$

Marginal Significance of Consumer Confidence Indexes

	Bram-Ludvigson	OLS	NLS
M-overall	0.715	0.074	0.517
CB-overall	0.001	0.000	0.003
M-future	0.557	0.057	0.281
CB-future	0.000	0.008	NC

Test statistics shown are the p-values of the test that all coefficients on the consumer confidence index terms are zero. NC means the program failed to converge.

Table 3: RMSEs for Various Forecasts Model: With Level of Consumer Confidence Indexes. Replicating Bram-Ludvigson's Results. Actuals = latest available

	Bram-Ludvigson Results			Replication Results		
Forecast	RMSFE	Relative RMSE	p-value	RMSFE	Relative RMSE	p-value
No confidence measure	NA	1.000	NA	0.006023	1.000	NA
M-overall	NA	1.014	0.68	0.006519	1.082	0.49
CB-overall	NA	0.900	0.70	0.006612	1.098	0.43

Table 4: RMSEs for Various Forecasts Model: With Levels of Consumer Confidence Indexes. Estimation by Non-linear Least Squares. Full Sample: 1982Q1 to 2002Q4

	Actuals = last benchmark			Actuals = latest available		
Forecast	RMSFE	Relative RMSE	p-value	RMSFE	Relative RMSE	p-value
No confidence measure	0.006082	1.000	NA	0.005635	1.000	NA
M-overall	0.006249	1.027	0.61	0.005815	1.032	0.52
CB-overall	0.006578	1.082	0.15	0.006002	1.065	0.25
M-current	0.006834	1.124	0.07	0.006496	1.153	0.04
CB-current	0.006913	1.137	0.02	0.006320	1.122	0.05
M-future	0.005920	0.973	0.59	0.005578	0.990	0.80
CB-future	0.006736	1.108	0.10	0.006482	1.150	0.02

Table 5: RMSEs for Various Forecasts Model: With Levels of Consumer Confidence. Indexes Estimation by OLS Full Sample: 1982Q1 to 2002Q4

	Actuals = last benchmark			Actuals = latest available		
Forecast	RMSFE	Relative RMSE	p-value	RMSFE	Relative RMSE	p-value
No confidence measure	0.005894	1.000	NA	0.005507	1.000	NA
M-overall	0.006142	1.042	0.39	0.005764	1.047	0.32
CB-overall	0.006332	1.074	0.17	0.005789	1.004	0.94
M-current	0.006258	1.062	0.29	0.006062	1.101	0.11
CB-current	0.006427	1.090	0.05	0.005931	1.077	0.10
M-future	0.005986	1.016	0.70	0.005567	1.011	0.76
CB-future	0.006141	1.042	0.46	0.005631	1.023	0.69

Table 6: RMSEs for Various Forecasts Model: With Changes in Consumer Confidence Indexes. Estimation by OLS Full Sample: 1982Q1 to 2002Q4

	Actuals = last benchmark			Actuals = latest available		
Forecast	RMSFE	Relative RMSE	p-value	RMSFE	Relative RMSE	p-value
No confidence measure	0.005894	1.000	NA	0.005507	1.000	NA
M-overall	0.005961	1.011	0.77	0.005546	1.007	0.85
CB-overall	0.006122	1.039	0.37	0.005597	1.016	0.72
M-current	0.005910	1.003	0.95	0.005654	1.027	0.49
CB-current	0.006218	1.055	0.18	0.005752	1.045	0.30
M-future	0.005896	1.000	1.00	0.005451	0.990	0.79
CB-future	0.006083	1.032	0.43	0.005671	1.030	0.54

Table 7: RMSEs for Various Forecasts Model: With Changes in Consumer Confidence Indexes. Estimation by OLS Full Sample: 1982Q1 to 2002Q4

	Actuals = one quarter later			Actuals = two-quarters later		
Forecast	RMSFE	Relative RMSE	p-value	RMSFE	Relative RMSE	p-value
No confidence measure	0.006712	1.000	NA	0.006806	1.000	NA
M-overall	0.006665	0.993	0.82	0.006742	0.991	0.76
CB-overall	0.006975	1.039	0.32	0.006991	1.027	0.50
M-current	0.006719	1.001	0.98	0.006787	0.997	0.93
CB-current	0.007034	1.048	0.19	0.007103	1.043	0.23
M-future	0.006606	0.984	0.62	0.006684	0.982	0.56
CB-future	0.006857	1.021	0.58	0.006882	1.011	0.77

	Actuals = four-quarters later		
Forecast	RMSFE	Relative RMSE	p-value
No confidence measure	0.006517	1.000	NA
M-overall	0.006517	0.992	0.80
CB-overall	0.006676	1.016	0.70
M-current	0.006665	1.014	0.69
CB-current	0.006791	1.033	0.36
M-future	0.006403	0.974	0.43
CB-future	0.006518	0.992	0.83

Table 8: RMSEs for Various ForecastsModel: With Changes in Consumer Confidence Indexes. Forecasting Model Includes Only Consumption and Stock Prices Estimation by OLS Full Sample: 1982Q1 to 2002Q4

	Actuals = last benchmark			Actuals = latest available		
Forecast	RMSFE	Relative RMSE	p-value	RMSFE	Relative RMSE	p-value
No confidence measure	0.004976	1.000	NA	0.004835	1.000	NA
M-overall	0.005594	1.124	0.04	0.005402	1.117	0.03
CB-overall	0.005300	1.065	0.14	0.004958	1.025	0.55
M-current	0.005719	1.149	0.01	0.005579	1.154	0.01
CB-current	0.005505	1.106	0.06	0.005326	1.102	0.06
M-future	0.005384	1.082	0.12	0.005198	1.075	0.14
CB-future	0.005392	1.083	0.14	0.005154	1.066	0.28

Figure 1
Consumer Confidence Indexes, January 1978 to January 2004

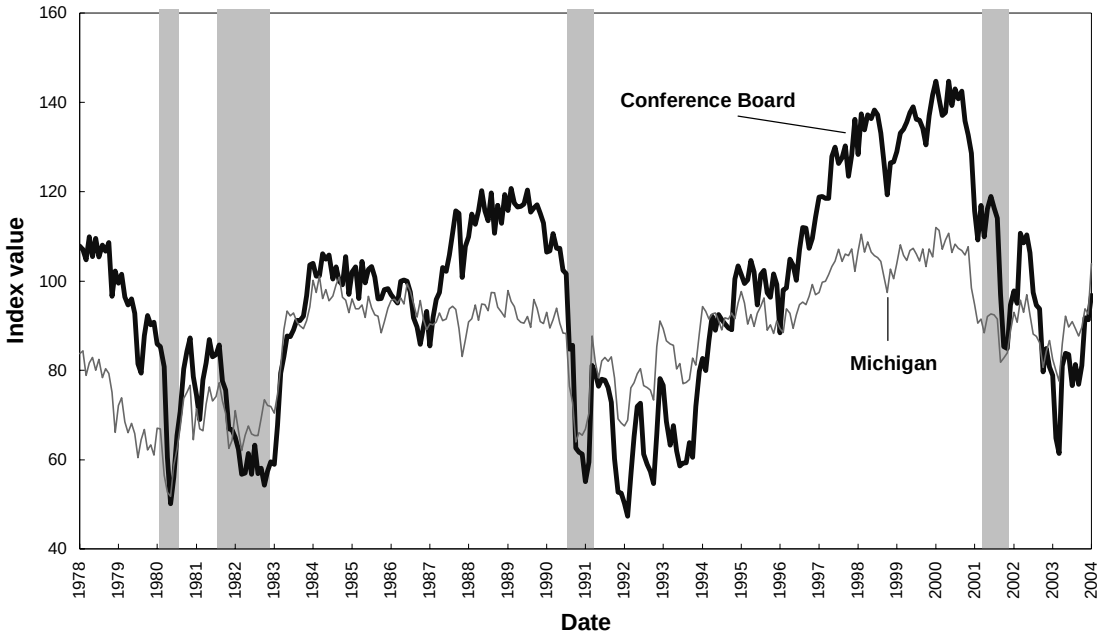


Figure 2
Michigan Overall Index and Consumption Spending
January 1978 to January 2004

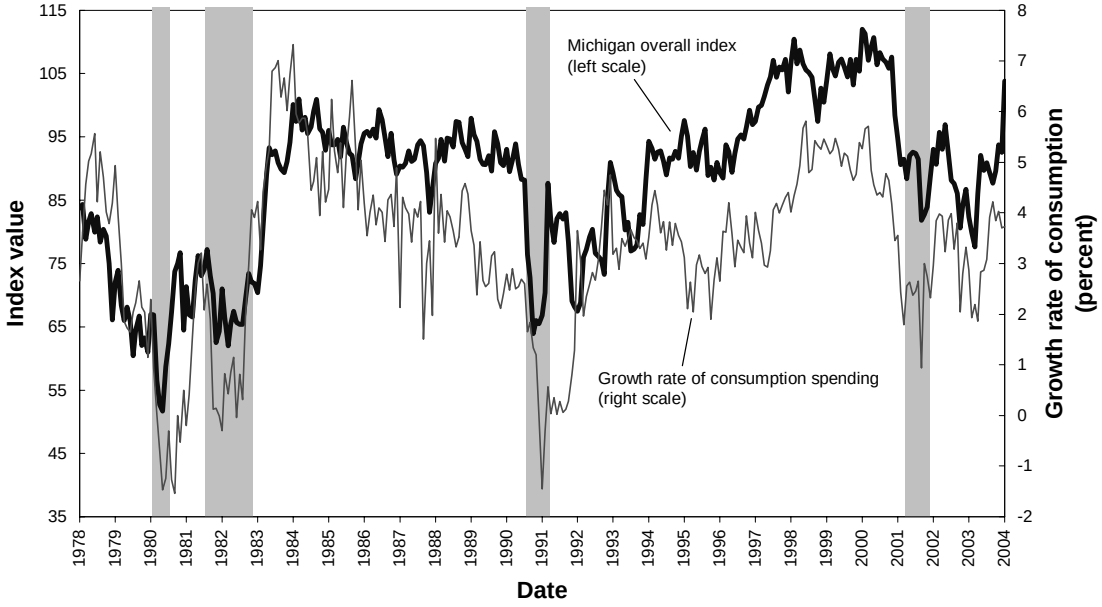


Figure 3
Alternative Actuals

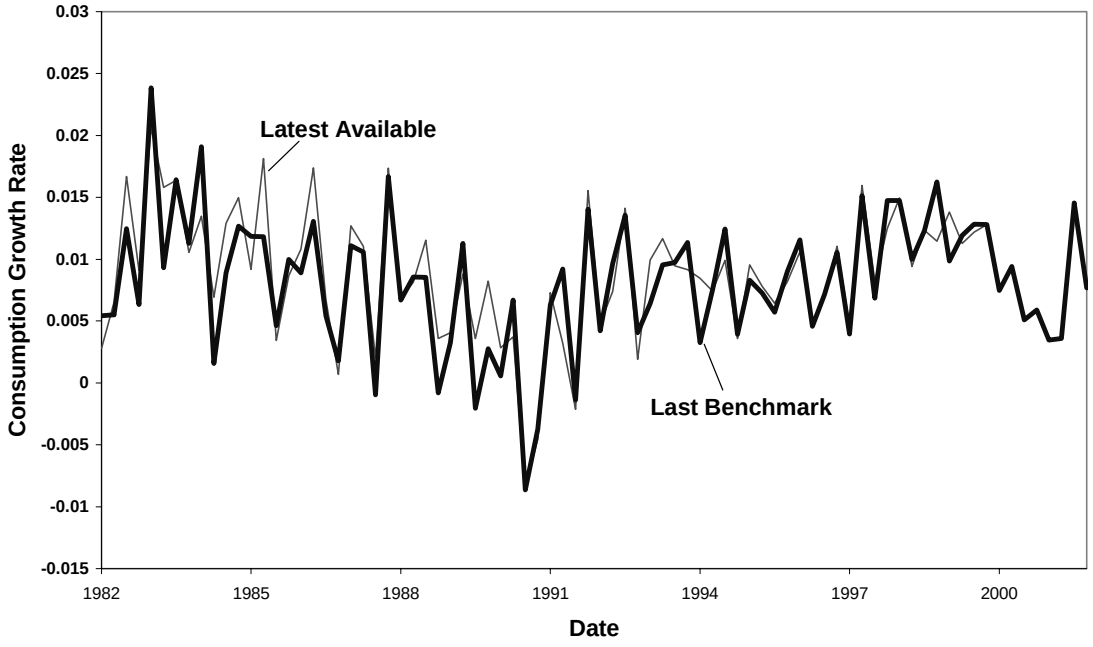


Figure 4
Comparing Forecasts Over Time

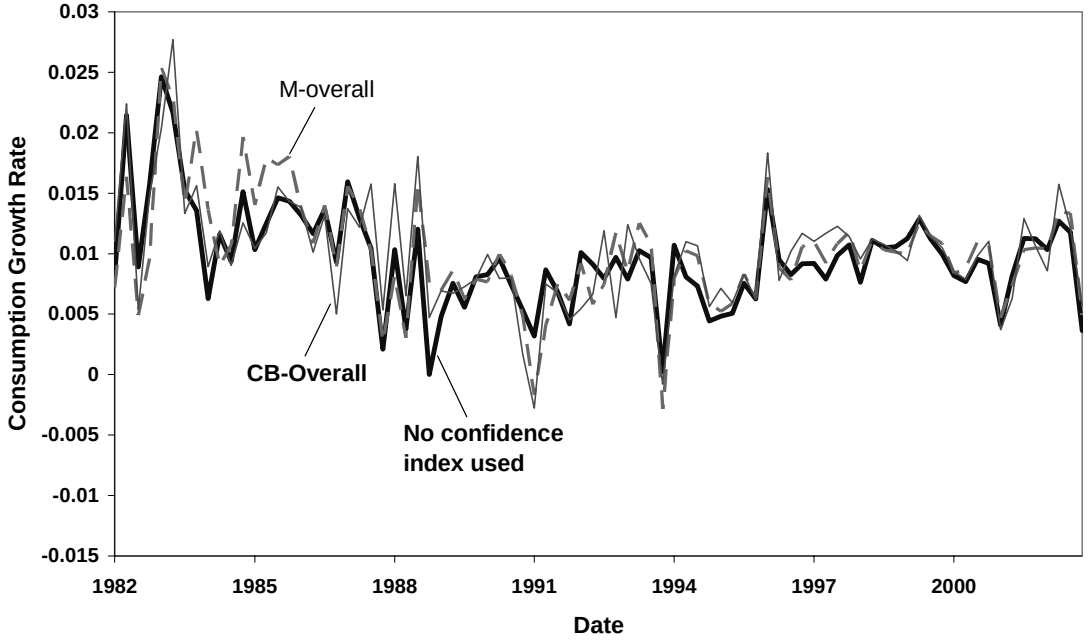
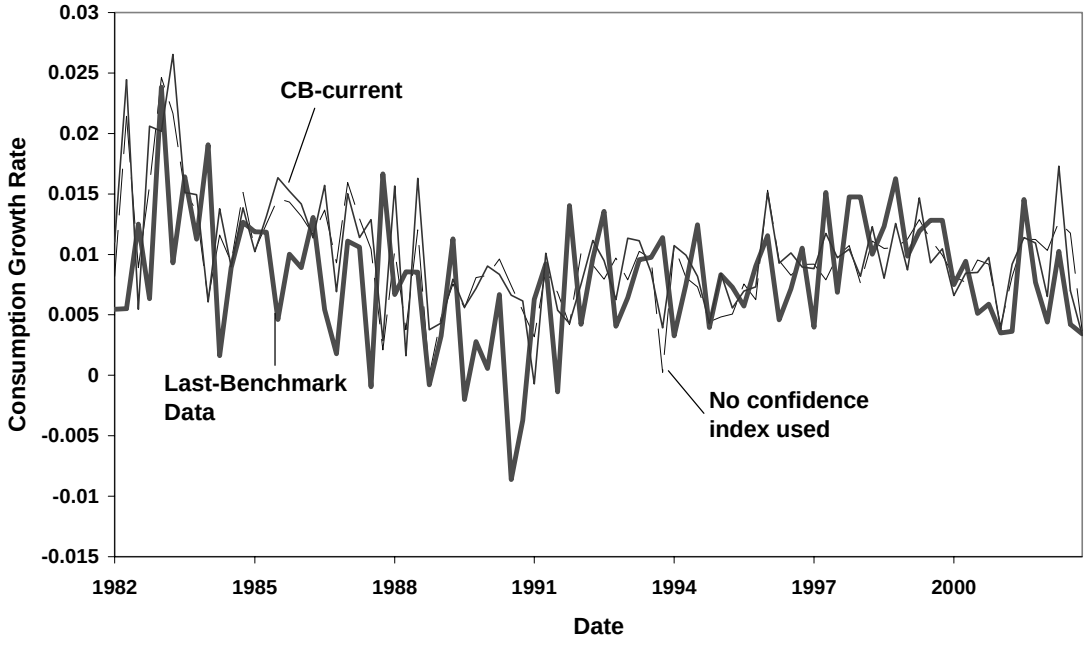


Figure 5
Comparing Forecasts Over Time



APPENDIX: The survey questions

University of Michigan, Index of Consumer Sentiment

Questions concerning present conditions:

1. We are interested in 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?

   Answers: better now, same, worse, don't know

   Score = percent saying "better now" minus percent saying "worse" = M_1

2. About the big things people buy for their homes — such as furniture, a refrigerator, stove, television, and things like that. Generally speaking, do you think now is a good or bad time for people to buy major household items?

   Answers: good, pro–con, bad, don't know

   Score = percent saying "good" minus percent saying "bad" = M_2

Questions concerning future conditions:

3. Now 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?

   Answers: will be better off, same, will be worse off, don't know

   Score = percent saying "will be better off" minus percent saying "will be worse off" = M_3

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

   Answers: good, good with qualifications, pro–con, bad with qualifications, bad times, don't know

   Score = percent saying "good" or "good with qualifications" minus percent saying "bad with qualifications" or "bad times" = M_4

5. 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?

   Answers: open ended, but interviewer looks for good versus bad

Score = percent saying “good” minus percent saying “bad” = M_5

Definitions of indexes:

Index of Consumer Sentiment:

$$ICS = \frac{M_1 + M_2 + M_3 + M_4 + M_5}{6.7558} + 2.0 = \text{M-overall}$$

The divisor 6.7558 is the base period (1966) average value, so the index is relative to a 1966 value of 100. The 2.0 added onto the fraction reflects a sample design change.

Index of Current Economic Conditions:

$$ICC = \frac{M_1 + M_2}{2.6424} + 2.0 = \text{M-current}$$

Index of Consumer Expectations:

$$ICE = \frac{M_3 + M_4 + M_5}{4.1134} + 2.0 = \text{M-future}$$

The Conference Board - Consumer Confidence Index

The index is made up of five questions: two on present conditions and three on pectations. The two component indexes are reported in addition to the overall index.

Questions concerning present conditions:

1. How would you rate the present general business conditions in your area?

   Answers: good, normal, or bad

   Score = percent saying “good” minus percent saying “bad” = CB_1
2. What would you say about available jobs in your area right now?

   Answers: plenty, not so many, or hard to get

   Score = percent saying “plenty” minus percent saying “hard to get” = CB_2

Questions concerning future conditions:

3. Six months from now, do you think general business conditions will be better, the same, or worse?

   Score = percent saying “better” minus percent saying “worse” = CB_3
4. Six months from now, do you think there will be more, the same, or fewer jobs available in your area?

   Score = percent saying “more” minus percent saying “fewer” = CB_4
5. How would you guess your total family income to be six months from now?

   Answers: higher, the same, or lower?

   Score = percent saying “higher” minus percent saying “lower” = CB_5

Conference Board consumer confidence index:

CCI = average of all 5 questions, relative to 1985 average = CB-overall

Present situation index = average of 1st two questions, relative to 1985 average = CB-present

Expectations index = average of last three questions, relative to 1985 average = CB-future

References

Acemoglu, Daron, and Scott, Andrew. "Consumer Confidence and Rational Expectations: Are Agents' Beliefs Consistent with the Theory?" *Economic Journal* 104 (January 1994), pp. 1–19.

Bram, Jason and Ludvigson, Sydney. "Does Consumer Confidence Forecast Household Expenditure? A Sentiment Index Horse Race." Federal Reserve Bank of New York *Economic Policy Review* (June 1998), pp. 59–78.

Carroll, Christopher D.; Fuhrer, Jeffrey C. and Wilcox, David W. "Does Consumer Sentiment Forecast Household Spending? If So, Why?" *American Economic Review* 84 (December 1994), pp. 1397–1408.

Clark, Todd E., and West, Kenneth D. "Using Out-of-Sample Mean Squared Prediction Errors to Test the Martingale Difference Hypothesis," manuscript, 2004.

Croushore, Dean. "Evaluating Inflation Forecasts," manuscript, 2004.

Croushore, Dean, and Tom Stark. "A Real-Time Data Set for Macroeconomists." *Journal of Econometrics* 105 (November 2001), pp. 111-130.

Friend, Irwin, and Adams, F. Gerard. "The Predictive Ability of Consumer Attitudes, Stock Prices, and Non-Attitudinal Variables." *Journal of the American Statistical Association* 59 (December 1964), pp. 987–1005.

Fuhrer, Jeffrey C. "What Role Does Consumer Sentiment Play in the U.S. Macroeconomy?" *New England Economic Review*, Federal Reserve Bank of Boston (Jan./Feb. 1993), pp. 30–44.

Howrey, E. Philip. "The Predictive Power of the Index of Consumer Sentiment." *Brookings Papers on Economic Activity*, 1:2001, pp. 175–207.

Leeper, Eric M. "Consumer Attitudes: King for a Day." *Economic Review*, Federal Reserve Bank of Atlanta (July/August 1992), pp. 1–15.

Matsusaka, John G., and Sbordone, Argia M. "Consumer Confidence and Economic Fluctuations." *Economic Inquiry* 33 (April 1995), pp. 296–318.

Mishkin, Frederic S. "Consumer Sentiment and Spending on Durable Goods." *Brookings Papers on Economic Activity* 1:1978, pp. 217–232.

Mueller, Eva. "Ten Years of Consumer Attitude Surveys: Their Forecasting Record." *Journal of the American Statistical Association* 58 (December 1963), pp. 899–917.

Souleles, Nicholas S. "Consumer Sentiment: Its Rationality and Usefulness in Forecasting Expenditure—Evidence from the Michigan Micro Data." *Journal of Money, Credit, and Banking* (forthcoming, 2003).

Stark, Tom. "Does Current-Quarter Information Improve Quarterly Forecasts for the U.S. Economy?" Federal Reserve Bank of Philadelphia working paper 00-2, January 2000.

Stark, Tom, and Croushore, Dean. "Forecasting with a Real-Time Data Set for Macroeconomists", *Journal of Macroeconomics* 24 (December 2002), pp. 507–31.

Trehan, Bharat. "Forecasting Growth in Current Quarter Real GDP." Federal Reserve Bank of San Francisco *Economic Review* (1989), pp. 39–52.

Uchitelle, Louis. "Doubts on Economic Index Create Doubts on Recovery." *New York Times* (June 8, 2002).

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