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# The Michigan Surveys of Consumers and Consumer Spending

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**Abstract:**
We provide summary measures for a broad set of questions from the Michigan Surveys of Consumers. These measures summarize consumers' attitudes and expectations with respect to income, wealth, prices, and interest rates. They contain information that goes beyond the information captured by the Michigan Index of Consumer Sentiment, which is constructed from five questions in the same survey. We show that the summary measures have some explanatory power for aggregate consumption behavior over the period from 1987 to the present, even when controlling for economic fundamentals. The explanatory power is statistically significant, but, although greater than the explanatory power of consumer sentiment, still relatively modest from an economic standpoint. We discuss the information in these summary measures, which may be useful in forecasting consumption behavior at the current juncture, as some of the signals from the survey are not entirely reflected in standard economic fundamentals.

**JEL codes: E21, E27, E52, E66**

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## 1. Introduction

Surveys of consumer sentiment receive widespread attention and their role in consumer spending has been the subject of numerous studies. Consumer sentiment is typically measured by survey questions to households about current and expected economic conditions, both household-specific and economy-wide. The Michigan Index of Consumer Sentiment, a representative measure of survey-based assessments of sentiment, is constructed from answers to five survey questions.[1] These questions are part of a much broader survey of consumers' attitudes and expectations, the Michigan Surveys of Consumers. There is a widespread consensus in the literature that the role of consumer sentiment in explaining consumption is typically small from an economic standpoint, even if often statistically significant. This is especially true when controlling for economic fundamentals. In this case, the independent information from sentiment is limited and arises (at least in part) from sentiment's ability to forecast subsequent developments in income and, more generally, in aggregate demand.[2]

While consumer sentiment has been widely analyzed in the literature, much less attention has been devoted to assessing the role in consumption behavior of consumer attitudes and expectations from the broader Michigan Surveys of Consumers.[3] One challenge in doing so is devising a way to summarize the information contained in the survey in a manner that is economically meaningful. In this brief we propose a limited set of summary measures of

[1] The five equally weighted questions that compose the sentiment index are the following:
(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?"
(2) "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?"
(3) "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?"
(4) "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?"
(5) "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?"

[2] See Carroll, Fuhrer, and Wilcox (1994) and Fuhrer (1993). For a survey of the literature, see Ludvigson (2004).

[3] One exception is Slacalek (2005), who uses the same principal components approach we employ here to summarize the questions in the Surveys of Consumers. However, his exercise is more statistical in nature, as the principal components are not constructed with reference to broad underlying fundamentals. Too, the forecasting power of the survey for consumption is analyzed in isolation, without controlling for underlying fundamentals.

various aspects of the economic environment covered by the survey. These measures are constructed from subsets of the survey questions, with each subset corresponding to a broad economic determinant of consumption—income, wealth, prices, and interest rates.

With these summary measures, we can assess the survey's explanatory power for consumption behavior in light of consumers' understanding of the economic fundamentals to which the survey broadly refers. Our main finding is that even when controlling for actual economic fundamentals, the survey measures provide modest additional information that can be useful for understanding consumption behavior. The informational content of the survey provides explanatory power for consumer spending beyond that contributed by the consumer sentiment information.

Survey questions pertaining to income and wealth are highly correlated with the index of consumer sentiment and—similar to previous findings in the literature—our results show that survey responses to questions about income and wealth have a role to play in explaining consumption behavior. Furthermore, two other summary components from the survey questions—those concerning prices and interest rates—provide additional explanatory power. In particular, the informational content of responses concerning the interest rate appears to be robust across various specifications and sample periods.

The rest of this brief proceeds as follows. In Section 2, we briefly describe the Michigan Surveys of Consumers. Section 3 covers the construction of the summary measures from the survey and their relationship with the Michigan Index of Consumer Sentiment. Section 4 analyzes the forecasting power of the survey measures for consumption, both in isolation and when controlling for fundamentals. Section 5 investigates the role of the survey measures in consumer spending, using a reduced-form framework for consumption, and interprets some of the findings in light of current developments in consumer spending. Section 6 provides concluding remarks.

## 2. The Michigan Surveys of Consumers

We consider a broad range of questions from the Michigan Surveys of Consumers. The surveys are based on a representative sample of households in the contiguous United States. The questions range from households' own current and expected financial situation to households' assessment of the broader economic environment in terms of unemployment, inflation, buying conditions for a variety of products, and other topics. We select 42 questions from the survey that pertain to income, wealth, prices, and interest rates. For these variables, the questions may refer to current or expected developments and to developments that are household-specific or economy-wide. The list of questions we draw from the survey is described in the appendix. We use quarterly data, which are averaged from the monthly responses. Our sample runs from 1987:Q1 to 2013:Q2. For some of the questions, the data go back further in time. However, we consider a relatively recent and short sample, as our analysis is reduced-form in nature and stability is a potential concern. The concern arises because financial innovation in the mid-1980s has often been mentioned as generating a structural break in the availability of credit to consumers,[4] thus justifying the focus on the more recent years. However, it is important to keep in mind the relatively small sample size when interpreting the results.

We consider the survey questions jointly or in separate groups, according to the economic determinants (income, wealth, prices, interest rates) to which the questions refer. The questions we selected from the survey typically elicit a qualitative response. Consequently, the responses can be used as the basis for a diffusion measure of how favorably respondents view a certain economic development. For example, with respect to buying conditions for cars, the selection, "Good Times to Buy: Interest Rates are Low," to the question about why this is a good time to buy a car indicates the percentage of respondents who chose this particular answer from several potential selections. For this type of question, the survey also contains a mirroring question about why this is a bad time to buy a car, including the possible response, "Bad Times to Buy: Interest Rates are High." Thus, it is possible to construct a diffusion index for how

[4] See, for example, Gerardi, Rosen, and Willen (2010), and Duca, Muellbauer, and Murphy (2012).

important low interest rates are in households' assessment of buying conditions for cars by subtracting the percentage of respondents who chose the "Good Times to Buy: Interest Rates Are Low" response to the first question from the percentage of respondents who chose the "Bad Times to Buy: Interest Rates Are High," response to the second question.[5] Given the qualitative nature of the data, we do not apply any transformation to achieve stationarity. The one exception is for the expectation of inflation over the next 12 months, which we transform by subtracting 10-year inflation expectations from the median value. The long-run measure of inflation expectations is taken from the Blue Chip Economic Indicators and the Survey of Professional Forecasters.

## 3. Consumer Sentiment and the Surveys of Consumers

As mentioned, the Michigan Index of Consumer Sentiment is constructed from five questions in the broader set of questions contained in the Surveys of Consumers. The issue we address first is to what extent the Index of Consumer Sentiment is related to the broader set of questions in the survey. For this purpose, we summarize the information in the 42 questions selected from the survey using a principal components approach. From the original variables, this method generates a new set of variables—called principal components—in which each principal component is a linear combination of the original variables. The main feature of the principal components is that they are orthogonal to one another, meaning that there is no systematic relationship among the components, so that each principal component contains no redundant information and measures a different driving force in the original data. There are as many principal components as original variables, and each successive component summarizes a decreasing portion of the total variance of the original data. This method usefully summarizes the information contained in the original variables whenever a large fraction of the original variables' total variance is captured by the first few principal components.

Figure 1 depicts the standardized measure of the Michigan Index of Consumer Sentiment against the first principal component, using the 42 selected questions from the

[5] To index the measure to 100, one simply adds 100 to the difference. This transformation is immaterial for the analysis in the text.

Surveys of Consumers over the period 1987:Q1 to 2013:Q2. It is evident that the two measures track each other well. In particular, the first principal component from the survey questions explains about 94 percent of the variance in consumer sentiment over this period of time. However, it is important to note that the first principal component from the 42 questions selected from the survey explains roughly 45 percent of the variance in the survey data. From this perspective, it appears that consumer sentiment captures a nontrivial portion of the information in the survey, but not all. Given the high correlation between the first principal component and consumer sentiment, it is no surprise that the principal components ordered second to sixth, which explain roughly another 40 percent of the variation in the survey questions, are essentially uncorrelated with consumer sentiment.[6]

Since sentiment fails to capture all of the information in the survey, the issue arises of how best to summarize the portion of information in the survey that is orthogonal to sentiment. One drawback of summarizing the data with principal components is that the economic interpretation of these components is not always transparent. In the present case, there is a tight correspondence between the first principal component from the survey and consumer sentiment, but it is not obvious what economic factors the principal components are capturing. To address the need to maintain an economic interpretation while using a principal components approach to summarize the information in the survey, we compute principal components for various subsets of questions in the survey, partitioned according to the economic dimension—income, wealth, prices, interest rates—to which the questions in the survey refer. Preliminary analysis reveals that the first principal component for the survey questions referring to income and the first principal component for the survey questions referring to wealth tend to be highly correlated with consumer sentiment. To preserve degrees of freedom in the analysis that follows, we consider together the questions in the survey referring to income and those referring to wealth. This comprises 25 survey questions, and the relationship between this first principal component,[7] which we refer to as the "income and wealth component," and consumer

[6] As mentioned in the text, the principal components are by construction orthogonal to one another.

[7] This first principal component explains almost 60 percent of the variation in the survey questions concerning income and wealth for the sample we consider.

sentiment is depicted in Figure 2. It is apparent from the figure that consumer sentiment captures the elements of the survey questions that broadly refer to income and wealth.

The first principal component for the eight questions in the survey concerning prices, which we label the "price component," is plotted in Figure 3 against the real price of oil.[8] This principal component captures developments in energy prices fairly well.[9] In addition, the price component exhibits some correlation with consumer sentiment, and it is well known that short-term fluctuations in sentiment can be driven by fluctuations in energy prices. Given the high correlation of sentiment with our income and wealth component, the effect of energy on sentiment is presumably working via a real income effect. However, a significant fraction of the variation in the price component is orthogonal to sentiment.[10] Whether the portion orthogonal to sentiment provides additional explanatory power for consumption behavior is evaluated in the next sections.

Figure 4 shows the first principal component from the survey questions that pertain to interest rates.[11] This "interest rate component" is plotted against the 5-year real Treasury yield.[12] The two series track each other well except during the most recent period, when the decline in the real interest rate is associated with relatively little response in the interest rate component. This development may well reflect the fact that some consumers were excluded from credit markets despite the low riskless interest rates. For example, risk premia for interest rates on certain types of consumer loans—such as auto loans—remained relatively high during the most recent recession and the recovery. Also, households with negative home equity have been unable to take advantage of low mortgage rates. The interest rate component is uncorrelated

[8] The real price of oil is defined as the domestic crude spot oil price (West Texas intermediate) divided by the core CPI price index.

[9] It can be shown that fluctuations in the real price of food provide marginal additional explanatory power to the component.

[10] When considering the 42 survey questions together, the fourth principal component explains slightly more than 50 percent of the variation in the price component. The first principal component (which closely tracks consumer sentiment) and the fourth together explain 95 percent of the variation in the price component.

[11] We compute the first principal component from nine questions pertaining to interest rates, and four questions concerning prices of vehicles and large appliances. We include price questions because the price and financing dimension are interrelated in the purchasing decision for autos and large appliances.

[12] This real interest rate measure is constructed by subtracting long-run inflation expectations from the nominal 5-year Treasury yield.

with consumer sentiment over the period we consider and therefore is a potential candidate for adding explanatory power to consumption behavior above and beyond sentiment.[13]

## 4. Forecasting Consumption Using the Surveys of Consumers

We now turn to examining the forecasting power of our three summary components from the survey for the dynamics of consumption growth. There is an extensive literature on the predictive power of sentiment for consumption growth, but there is little so far on the predictive power of the information available in the broader Surveys of Consumers. We consider the period 1987:Q1 to 2013:Q2, and also examine the subsample that ends in 2007:Q4, before the onset of the last recession. We predict the growth in consumption over the next quarter and over the next four quarters. For the regressions involving four-quarter consumption growth, it is important to keep in mind that the number of independent observations is limited.

We begin by assessing the explanatory power of our summary measures from the survey in isolation and compare their performance with consumer sentiment. Table 1 shows the adjusted $R^2$ in regressions forecasting one-quarter personal consumption expenditures growth with two lags of each of the survey-based measures we consider. The first column in the table reports the regression fit when consumption is predicted by consumer sentiment alone, replicating and updating findings in the extant literature. The second column shows the forecasting power of the three summary measures from the survey—the income and wealth component, the price component, and the interest rate component. The third column provides regression results, including as predictors both consumer sentiment and the three summary measures from the survey. The table reports results for the whole sample and for the pre-2008 sample. Table 2 performs the same exercise as in Table 1, but the dependent variable is now growth in real private consumption expenditures measured over the next four quarters. The main message from the two tables is that there is information in the broader survey to forecast consumption above and beyond the information captured by consumer sentiment. The adjusted

[13] When considering the 42 survey questions together, it can be shown that the second principal component explains about 80 percent of the variation in the interest rate component. Therefore, it is not unreasonable to interpret fluctuations in the second principal component computed on the entire set of 42 questions as capturing consumers' perceptions about interest rates.

$R^2$ in the regressions where the three summary measures of the surveys are included (second column) rises noticeably compared with the benchmark regressions where consumer sentiment is the only predictor for consumption (first column). It is also the case that when the three summary measures of the survey are used as predictors, inclusion of consumer sentiment as an additional predictor (third column) does not improve the predictability of consumption when growth is measured on a one-quarter basis. There is some improvement in fit when consumption growth is measured on a four-quarter basis in the shorter sample period, but these results could be affected by the small sample. As already shown, the income and wealth component and consumer sentiment are highly correlated, and thus the lack of a consistent improvement in fit when sentiment is added to the three summary measures as a predictor is not surprising. What is important in the present context is that the price and the interest rate components both add significant explanatory power when predicting consumption growth, regardless of the horizon over which consumption growth is being measured.

While the analysis has been carried out on total consumption, the results in the previous tables also hold when considering the decomposition of consumption into durables, nondurables, and services expenditures. Table 3 reports results for these consumption categories over the full sample with the dependent variables expressed in terms of one-quarter growth rates. Table 4 reports the same exercise with the dependent variables expressed in terms of four-quarter growth rates. It is apparent that there is some improvement in fit when considering the summary measures of the survey relative to the forecasts generated with the information contained in consumer sentiment alone. Similar findings (not reported) hold for the pre-2008 sample.

Having established that the summary measures from the survey have information content for forecasting consumption, we now turn to assess how much of the predictive content is preserved when controlling for standard consumption fundamentals. This is especially important in the current context, as we constructed the summary measures from the survey with reference to broad economic categories representing drivers of consumption behavior. It is possible that once controlling explicitly for these predictors, our summary measures become

redundant. On the other hand, the summary measures could still capture features such as expectations, uncertainty, and subjective perceptions of economic outcomes that help to explain consumers' behavior above and beyond observed economic fundamentals.

Table 5 reports the adjusted $R^2$ in regressions forecasting growth in total consumption expenditures with fundamentals, with and without the three summary components from the survey. The fundamentals we include are two lags of the quarterly growth rate in consumption, real disposable income, households' real net worth, real oil price inflation, and two lags of the level of the real interest rate (measured as the 5-year nominal Treasury yield less long-run inflation expectations), and banks' willingness to make consumer installment loans from the Senior Loan Officer Opinion Survey. Controlling for the discrepancy between the level of consumption and the level predicted from income and net worth—a cointegrating error that captures deviations from the long-run relationship between consumption and fundamentals—does not alter the results. The first column in the table shows the adjusted $R^2$ without controlling for the survey information. The second column reports the goodness of fit when fundamentals are augmented by the inclusion of two lags of consumer sentiment. The third column reports results when fundamentals are augmented with the three summary components from the survey, where each component is entered with two lags. When controlling for these components, we do not include sentiment as an additional explanatory variable, as sentiment and the income and wealth component essentially convey the same information. The exercise is also repeated for the pre-2008 sample.

Comparison of fit between the first and second columns shows, similar to previous results in the literature, that once controlling for fundamentals, the role of consumer sentiment in predicting consumption is marginal at best. There is instead a significant improvement in fit when the components of the survey are added to the fundamentals. As shown in Table 6, these findings also hold when consumption growth is measured over a four-quarter horizon. The same pattern of findings (not reported) emerges when evaluating the different components of consumption. Overall, there appears to be explanatory power in the components from the survey that goes beyond observed fundamentals. The relative statistical significance of the three

summary components from the survey can vary according to the set of fundamentals included in the forecasting regressions. However, the interest rate component is typically an important contributor to the improvement in fit.

## 5. Consumption Behavior and the Surveys of Consumers

So far we have analyzed the forecasting power of the information in the components extracted from the Surveys of Consumers. Another important question is to what extent this information remains relevant when evaluating consumption from a somewhat more behavioral (but still reduced-form) standpoint, using contemporaneous information. For this purpose, we consider the following relationship for private consumption expenditures' quarterly real growth rate:

$$\Delta \ln C_t = \alpha_0 + \alpha_1 \Delta \ln YP_t + \alpha_2 ICC_t + \alpha_3 rr_{t-1} + \alpha_4 oil_{t-1} + \delta \ln C_{t-1}^{GAP} + \beta' S_t + \varepsilon_t .$$

In the above relationship consumption growth depends on the change in households' real personal income, $\Delta \ln YP$, an index of credit conditions, $ICC$, the real interest rate, $rr$, a measure of changes in the relative price of oil, $oil$, an error-correction term consisting of the difference between the log-level of consumption and the level predicted by consumption fundamentals, $\ln C^{GAP}$, and survey variables from the Surveys of Consumers, $S$. As previously, the survey measures are given by consumer sentiment and by the three summary component measures from the broader survey. The relationship also includes a constant and an error term, $\varepsilon$.

In terms of the choice of variables in the above reduced-form equation for consumption, we maintain a fairly close correspondence with the fundamentals used in the previous section when forecasting consumption. The index of credit conditions is constructed from the Senior Loan Officer Opinion Survey question concerning banks' willingness to make consumer installment loans. To proxy for the level of credit conditions, the scores from the survey—which capture the change in willingness to lend over the previous three months—are cumulated over

time.[14] The real rate of interest is still measured by the difference between the 5-year nominal Treasury yield and long-run inflation expectations. The *oil* variable is computed in a similar vein as in Hamilton (2003), in that *oil* measures the amount by which the real price of oil exceeds its average over the preceding three years if the real price of oil is trending higher, and is zero otherwise.[15] This nonlinear way of measuring the effect of oil shocks assumes that oil price increases have a larger impact on consumption than oil price declines, with the effect of oil price declines here approximated to zero. The error-correction term captured by the variable $\ln C^{GAP}$ is computed as:

$$\ln C_t^{GAP} \equiv \ln C_t - \ln C_t^* = \ln C_t - \hat{\gamma} \ln Y_t - (1-\hat{\gamma}) \ln W_{t-1},$$

where $\ln Y$ is the log of real disposable income and $\ln W$ is the log of real households' net worth. The parameter $\hat{\gamma}$ is estimated from a constrained linear cointegrating relationship between consumption, disposable income, and net worth, by means of dynamic ordinary least squares, as in Stock and Watson (1993).

The modeling of the time-series behavior of the growth rate of consumption expenditures as a partial adjustment to the long-run desired level and as a function of short-run developments in income and credit conditions has been used extensively in the literature, although the details of the specification vary.[16] The contemporaneous change in personal income potentially captures the effect on consumption of liquidity-constrained consumers. The interest rate and banks' willingness to lend summarize cyclical movements in the availability and cost of credit, while the oil variable measures the transitory effects on consumption expenditures of supply shocks. The survey measures are correlated with these same

[14] Since the scores from the survey exhibit a positive mean—an indication that credit extension to consumers has been trending up over time—the cumulated scores are first demeaned in order to obtain a cyclical measure of credit conditions.

[15] In Hamilton (2003), the variable is such that if the oil price reaches a new high, the measure is given by the difference between the current value and the maximum reached over the past three years. The variable is equal to zero otherwise. Estimation results using this variable definition are qualitatively the same as the results described in the text.

[16] See, for example, Muellbauer (2007) and Duca, Muellbauer, and Murphy (2010). This is also the approach taken in the Federal Reserve Board's FRB/US model of the U.S. economy (see Brayton, Davis, and Tulip 2000). On the use of a credit conditions index for explaining trends in U.S. consumption and savings behavior similar to the one included here, see Muellbauer (2007) and Carroll, Slacalek, and Sommer (2012).

fundamentals, but there may be additional information for explaining short-run changes in consumption expenditures if such measures capture consumers' expectations, uncertainty, and perceptions about the economic environment.

Table 7 provides estimates of the consumption growth relationship over the sample period 1987:Q1 to 2013:Q2. Given that the presence of contemporaneous variables when explaining changes in consumption raises the issue of simultaneity, we instrument $\Delta \ln YP$ and $ICC$ with four lags each of the unemployment rate, the change in real households' net worth, long-run inflation expectations, and the scores from the Senior Loan Officer Opinion Survey on banks' willingness to make consumer installment loans. When the survey variables $S$ are included in the estimated relationship, we augment the set of instruments by adding one lag of each of the survey measures entering into the relationship simultaneously. While we report estimation results using instrumental variables, OLS estimation produces findings that are qualitatively very similar.

The first column in Table 7 shows estimates made excluding the survey measures, $S$. The coefficient signs are as expected and are significant at standard confidence levels. The second column shows results when consumer sentiment is introduced as an additional explanatory variable. At least for the sample period that we consider, there appears to be information in consumer sentiment that is not being captured by the fundamentals. The third column considers estimates when the survey measures consist of the three summary components from the broader Surveys of Consumers. Since we are assuming that oil supply shocks affect consumption with a lag and, as shown earlier, that the price component is correlated with fluctuations in oil prices, the price component enters into the relationship with a lag, too.[17] The results for this specification are worth noting, in that introducing the surveys' summary component greatly reduces the economic and statistical significance of some fundamentals. This is mostly the case for credit availability, the interest rate, and the change in

[17] As a result, we instrument only for the income and wealth and the interest rate components. Since the price component, depicted in Figure 3, appears to be highly persistent over the sample period we consider and related to the level, rather than the change, in oil prices, there are reasons to introduce this component in first differences into the consumption regressions. It can be shown that the results reported in this section are robust to first-differencing the price component.

oil prices. The fourth column in the table illustrates estimation results when, relative to the specification reported in the third column, we drop the fundamentals that are neither significant nor economically relevant, that is $ICC$, $rr$, and $oil$. The sum of squared residuals for this specification is essentially the same as for the specification reported in the third column.

Overall, the results in the table suggest that the Surveys of Consumers contain some information that may be useful for evaluating consumption behavior. The informational content of the surveys sometimes displaces the informational content of some of the economic fundamentals. Such a finding should be taken with caution, however, keeping in mind that our fundamentals are themselves a proxy for the relevant fundamentals faced by consumers. For example, to control for the effect of interest rates on consumption we have used the 5-year Treasury yield, which likely co-moves with the relevant rates faced by consumers but is not in itself a rate at which consumers can borrow. The additional explanatory power in the summary measures from the surveys is statistically significant, but still relatively modest from an economic standpoint. This can be seen in Figure 5, which shows the behavior of consumption growth averaged over four quarters since the beginning of 2008. The figure depicts the predicted value of consumption growth from fundamentals only, from fundamentals and consumer sentiment, and from fundamentals and the three summary component measures. These predicted values use regression estimates reported in the first, second, and fourth columns of Table 7, respectively. One immediate observation from the figure is that, despite the fact that we have described consumption behavior using several contemporaneous variables, a noticeable fraction of the actual variation in consumption growth remains unexplained. The predicted values for consumption growth using survey information—especially those generated with the three summary components—typically do a better job of tracking actual consumption growth. This is especially the case for the period spanning the recession and the early stages of the recovery.

Still, using information from the surveys is not without pitfalls. For example, over the course of the second half of 2011 and early 2012, consumption growth predictions without survey information were more accurate than predictions made with survey information. The

reason is that in the second half of 2011 consumer sentiment dropped significantly to levels seen earlier during the recession, but without an attendant significant slowdown in the growth of consumption. Not surprisingly then, the specification that omits the survey information better captures the evolution of consumption during that period.

An interesting feature of the figure concerns the most recent quarters. All three specifications that we have considered predict, on the heels of considerable monetary policy stimulus, waning fiscal restraint, and households' net worth appreciation, faster consumption growth than actually occurred. However, the specification that includes the three summary components from the survey forecasts a somewhat slower acceleration than the other two specifications. The difference is mainly a result of the fact that the interest rate component from the survey suggests less cyclical stimulus than the real interest rate measure does—as we mentioned earlier and as depicted in Figure 4. Such a difference could be due to the difficulty some households have faced in gaining access to credit markets despite the prevailing low levels of interest rates. In this regard, one potential channel operates through the housing market, where households with negative equity are unable to refinance their mortgages.

## 6. Conclusions

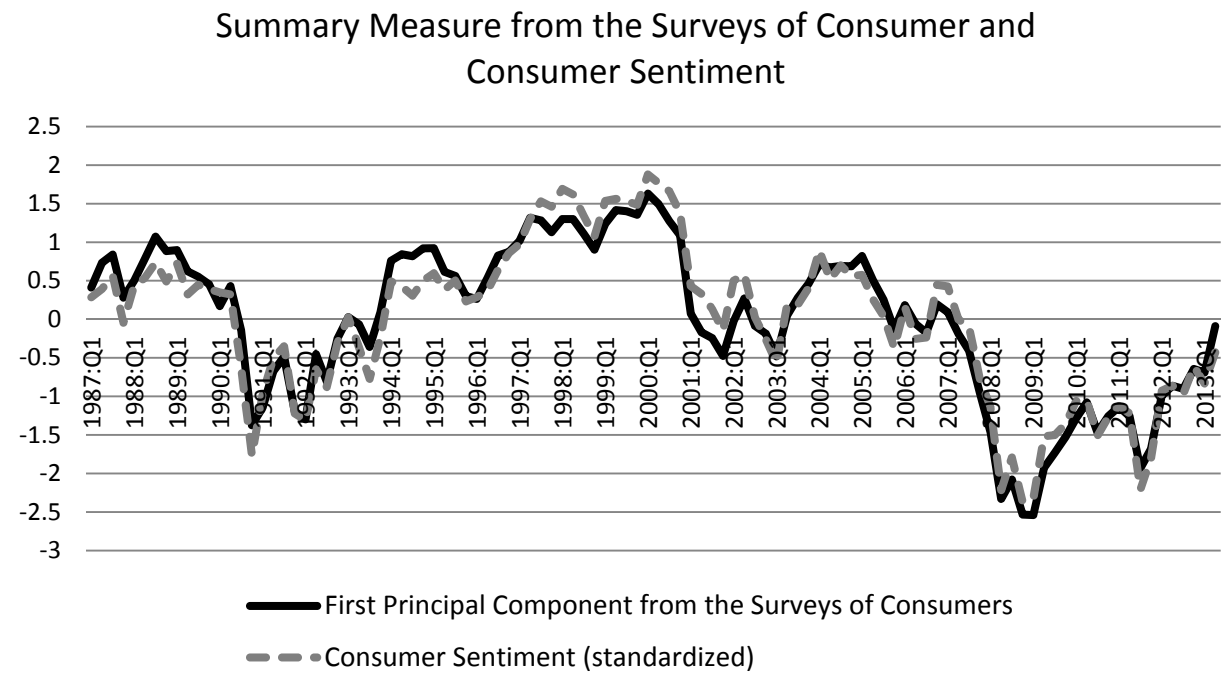
We have shown that the Michigan Surveys of Consumers contains information about aggregate consumption behavior that goes beyond the information from the survey captured by the consumer sentiment index. Typically, considering the survey information orthogonal to consumer sentiment provides additional explanatory power when forecasting aggregate consumption growth, even when controlling for standard consumption fundamentals. The explanatory power from the survey is still present when considering a reduced-form description of consumption behavior that allows for a simultaneous relationship between consumption and some of the explanatory variables.

While the information from the survey as summarized by our principal components is generally significant from a statistical standpoint, its economic relevance is modest. Even with the inclusion of these summary measures, a sizable portion of the variation in consumption growth remains unexplained. Still, consideration of some of these measures is interesting at the

current juncture. With the waning of the restraining effects of fiscal policy on households' income and a sizable appreciation in net worth, consumption growth is expected to accelerate at the end of this year and in 2014. The extent of such acceleration, however, can be affected by credit conditions. In this respect, the Surveys of Consumers provide a somewhat more pessimistic assessment of credit conditions than simple readings of the level of the real interest rate, which remain very low by historical standards.

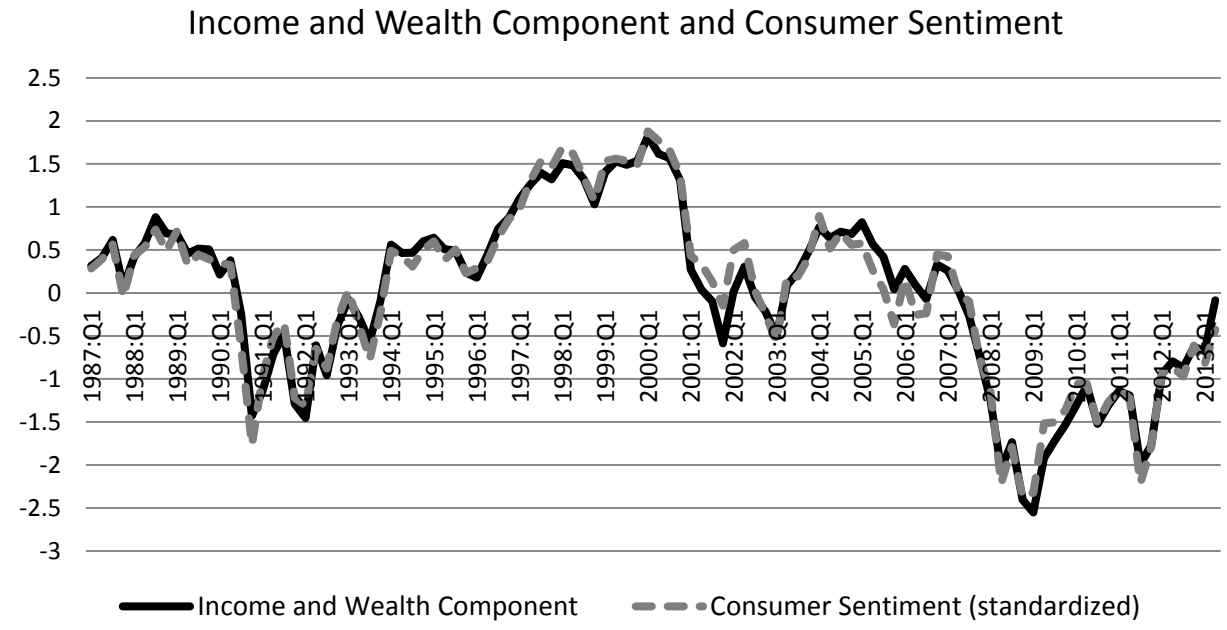
Why the survey measures considered in this empirical exercise provide additional explanatory power to the forecast of consumption beyond the contribution of fundamentals is outside the scope of this brief. The measures are explicitly constructed with reference to fundamental determinants of consumption. As a result, their persistent significance in explaining consumption behavior after the fundamentals are controlled for is somewhat surprising. However, the economic determinants we consider are often only proxies of the true underlying fundamentals, and may not adequately capture expectations and uncertainty about the economic environment. These dimensions could find their way into how consumers answer the survey questions. Future work should thus consider the robustness of these findings to a broader conditioning set of economic determinants than the limited set we have explored here.

**Figure 1.**



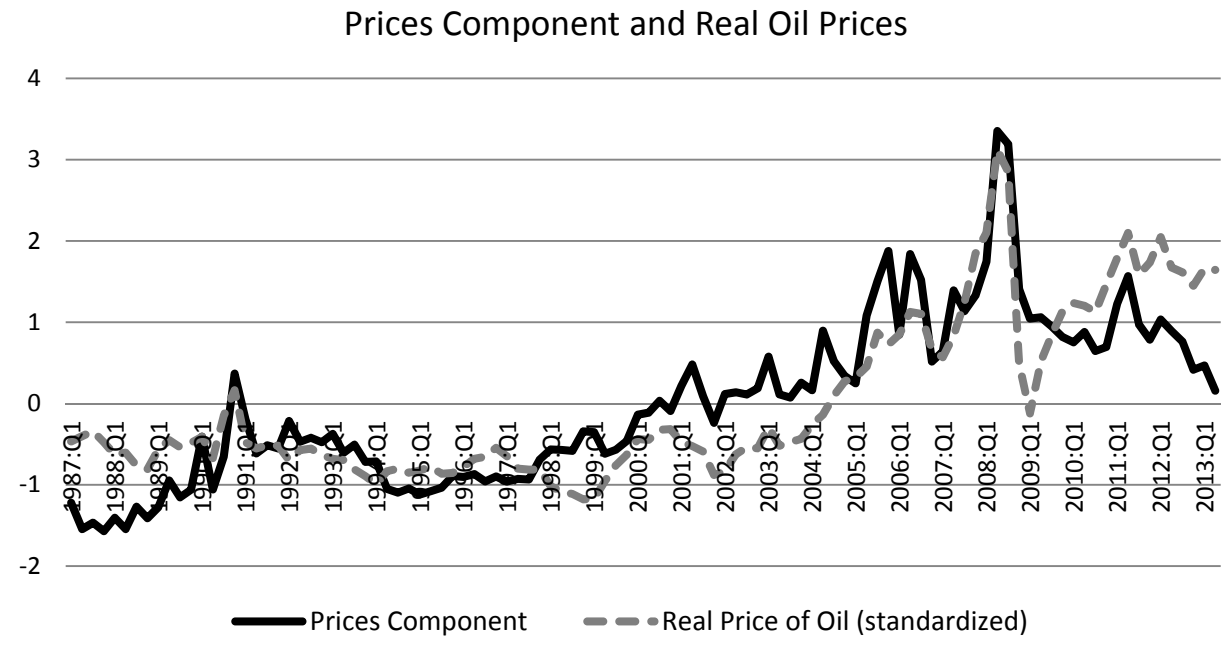

Sources: Thompson Reuters/University of Michigan Surveys of Consumers and authors' calculations.

**Figure 2.**



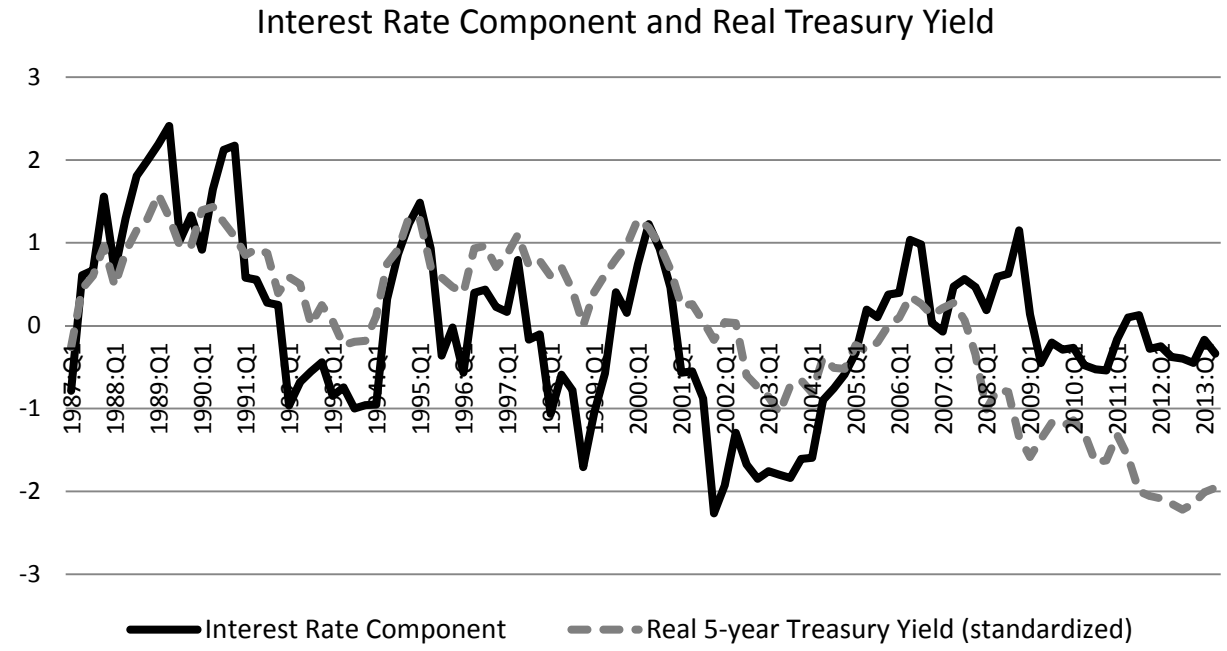

Sources: Thompson Reuters/University of Michigan Surveys of Consumers and authors' calculations.

**Figure 3**



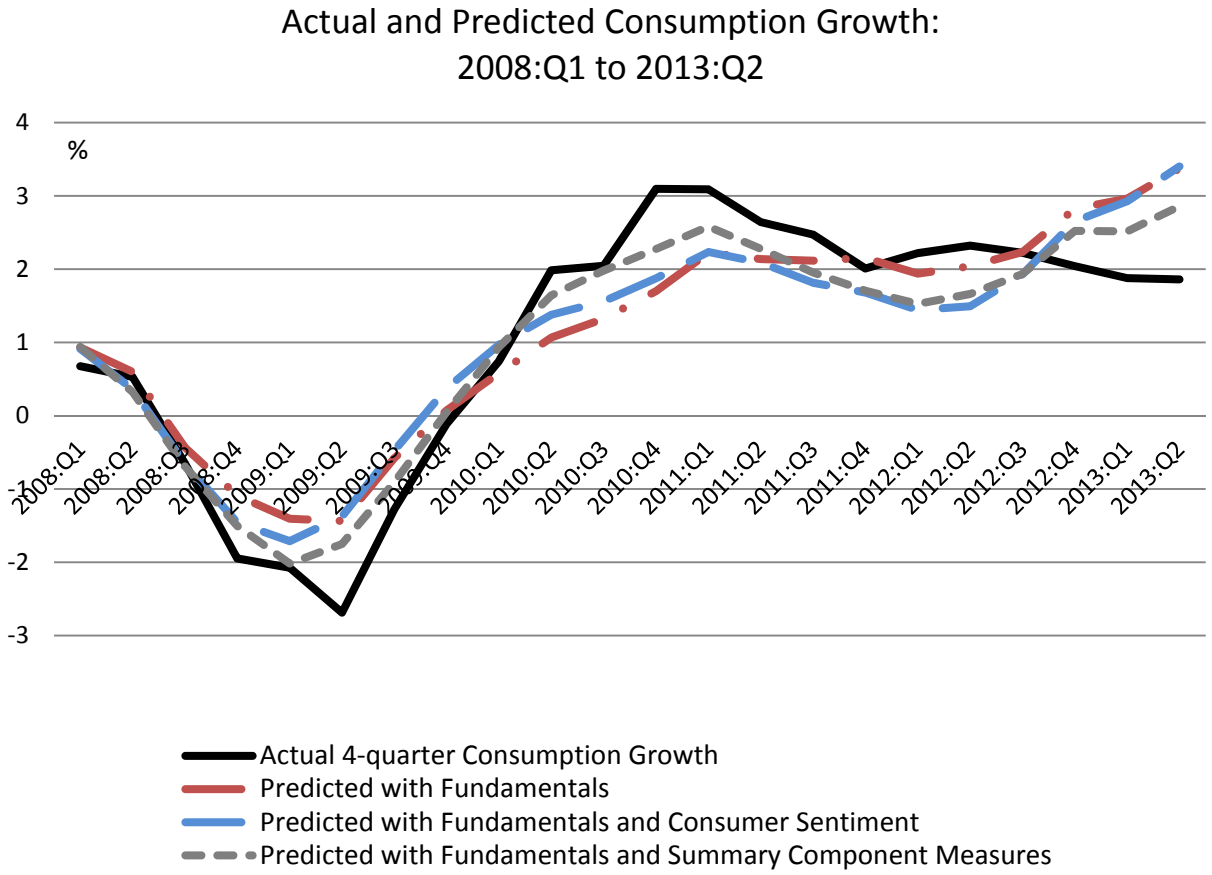

Sources: Thompson Reuters/University of Michigan Surveys of Consumers, Energy Information Administration, Bureau of Labor Statistics, and authors' calculations.

**Figure 4.**




Sources: Thompson Reuters/University of Michigan Surveys of Consumers, Board of Governors of the Federal Reserve System, and authors' calculations.

**Figure 5.**




Sources: Bureau of Economic Analysis, Thompson Reuters/University of Michigan Surveys of Consumers, and authors' calculations.

## Table 1

Consumption Growth Forecasts
Dependent Variable is 1-Quarter Private Consumption Expenditures Growth

| | | 1987:Q1 to 2013:Q2 | |
|---|---|---|---|
| | Sentiment | Summary Components | Summary Components and Sentiment |
| **Adjusted $R^2$** | **0.230** | **0.390** | **0.394** |
| | | 1987:Q1 to 2007:Q4 | |
| | Sentiment | Summary Components | Summary Components and Sentiment |
| **Adjusted $R^2$** | **0.109** | **0.207** | **0.213** |

Note: Sentiment is the University of Michigan's Consumer Sentiment Index. The three summary components from the Surveys of Consumers are the income and wealth component, the prices component, and the interest rate components.

## Table 2

Consumption Growth Forecasts
Dependent Variable is 4-Quarter Private Consumption Expenditures Growth

| | | 1987:Q1 to 2013:Q2 | |
|---|---|---|---|
| | Sentiment | Summary Components | Summary Components and Sentiment |
| **Adjusted $R^2$** | **0.286** | **0.539** | **0.553** |
| | | 1987:Q1 to 2007:Q4 | |
| | Sentiment | Summary Components | Summary Components and Sentiment |
| **Adjusted $R^2$** | **0.130** | **0.397** | **0.447** |

Note: Sentiment is the University of Michigan's Consumer Sentiment Index. The three summary components from the Surveys of Consumers are the income and wealth component, the prices component, and the interest rate components.

## Table 3

Consumption Growth Forecasts: 1987:Q1 to 2013:Q2
Dependent Variable is the 1-Quarter Growth Rate for Different Categories of Consumption

| | Sentiment | Summary Components | Summary Components and Sentiment |
|---|---|---|---|
| | DURABLE GOODS CONSUMPTION | | |
| **Adjusted $R^2$** | **0.030** | **0.137** | **0.119** |
| | NON-DURABLE GOODS CONSUMPTION | | |
| **Adjusted $R^2$** | **0.096** | **0.169** | **0.206** |
| | SERVICES CONSUMPTION | | |
| **Adjusted $R^2$** | **0.361** | **0.432** | **0.440** |

Note: Sentiment is the University of Michigan's Consumer Sentiment Index. The three summary components from the Surveys of Consumers are the income and wealth component, the prices component, and the interest rate components.

## Table 4

Consumption Growth Forecasts: 1987:Q1 to 2013:Q2
Dependent Variable is the 4-Quarter Growth Rate for Different Categories of Consumption

| | Sentiment | Summary Components | Summary Components and Sentiment |
|---|---|---|---|
| | DURABLE GOODS CONSUMPTION | | |
| **Adjusted $R^2$** | **0.085** | **0.300** | **0.288** |
| | NON-DURABLE GOODS CONSUMPTION | | |
| **Adjusted $R^2$** | **0.185** | **0.477** | **0.519** |
| | SERVICES CONSUMPTION | | |
| **Adjusted $R^2$** | **0.365** | **0.595** | **0.615** |

Note: Sentiment is the University of Michigan's Consumer Sentiment Index. The three summary components from the Surveys of Consumers are the income and wealth component, the prices component, and the interest rate components.

## Table 5

Consumption Growth Forecasts
Dependent Variable is 1-Quarter Private Consumption Expenditures Growth

| | Fundamentals | Sentiment and Fundamentals | Summary Components and Fundamentals |
|---|---|---|---|
| | 1987:Q1 to 2013:Q2 | | |
| **Adjusted $R^2$** | **0.385** | **0.404** | **0.526** |
| | 1987:Q1 to 2007:Q4 | | |
| **Adjusted $R^2$** | **0.267** | **0.277** | **0.461** |

Note: Sentiment is the University of Michigan's Consumer Sentiment Index. The three summary components from the Surveys of Consumers are the income and wealth component, the prices component, and the interest rate components. The fundamental variables included in the forecasting regressions are listed in the text.

## Table 6

Consumption Growth Forecasts
Dependent Variable is 4-Quarter Private Consumption Expenditures Growth

| | Fundamentals | Sentiment and Fundamentals | Summary Components and Fundamentals |
|---|---|---|---|
| | 1987:Q1 to 2013:Q2 | | |
| **Adjusted $R^2$** | **0.422** | **0.414** | **0.559** |
| | 1987:Q1 to 2007:Q4 | | |
| **Adjusted $R^2$** | **0.252** | **0.230** | **0.437** |

Note: Sentiment is the University of Michigan's Consumer Sentiment Index. The three summary components from the Surveys of Consumers are the income and wealth component, the prices component, and the interest rate components. The fundamental variables included in the forecasting regressions are listed in the text.

**Table 7**

Consumption Growth Reduced-Form Specification:

$$\Delta \ln C_t = \alpha_0 + \alpha_1 \Delta \ln YP_t + \alpha_2 ICC_t + \alpha_3 rr_{t-1} + \alpha_4 oil_{t-1} + \delta \ln C_{t-1}^{GAP} + \beta' S_t + \varepsilon_t$$

Instrumental Variables Regression, 1987:Q1 to 2013:Q2

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| $\Delta \ln YP_t$ | .204* | .168 | .121 | .157 |
| | (.119) | (.105) | (.099) | (.100) |
| $ICC_t$ | 1.63*** | .858* | .176 | |
| | (.481) | (.453) | (.558) | |
| $rr_{t-1}$ | -.549** | -.455** | -.091 | |
| | (.263) | (.231) | (.256) | |
| $oil_{t-1}$ | -.106** | -.113*** | .002 | |
| | (.042) | (.037) | (0.074) | |
| $\ln C_{t-1}^{GAP}$ | -.624*** | -.709*** | -.670*** | -.502* |
| | (.233) | (.207) | (.198) | (.259) |
| $\text{Sentiment}_t$ | | .709*** | | |
| | | (.174) | | |
| $\text{Income and Wealth Component}_t$ | | | .969*** | .942*** |
| | | | (.280) | (.223) |
| $\text{Interest Rate Component}_t$ | | | -.613** | -.646*** |
| | | | (0.258) | (0.149) |
| $\text{Prices Component}_{t-1}$ | | | -.614 | -.610*** |
| | | | (0.476) | (0.201) |
| *Sum of Squared Residuals* | *234.426* | *181.566* | *163.169* | *163.747* |

Note: The text provides a description of the variables and of the set of instruments used in the regressions. The *ICC* and sentiment variables are standardized, and so are the summary component measures from the survey. Regressions include a constant and control for an NBER-dated contemporaneous recession dummy. Standard errors are in parenthesis. * , **, and *** denote significance at the 10 percent, 5 percent and 1 percent levels, respectively.

# Appendix

We provide here the list of variables from the Michigan Surveys of Consumers used in the analysis. The survey data can be found at http://www.sca.isr.umich.edu. We use the Surveys' mnemonics, which can be found in the Surveys of Consumers Time Series Codebook at http://www.sca.isr.umich.edu/subset/codebook.php. The series used in the analysis are grouped into three categories, which are used to construct the three principal components described in the main text.

| | |
|---|---|
| PAGORN_NY | *"We are interested in how people are getting along financially these days. Would you say that you (and your family living there) are better or worse off financially than you were a year ago? Why do you say so?"* HIGHER INCOME - LOWER INCOME |
| PTRD_R | *"Annual Trend in Past and Expected Household Financial Situation"* BETTER - WORSE |
| NEWSRN_NE | *"During the last few months, have you heard of any favorable or unfavorable changes in business conditions? What did you hear?"* FAVORABLE NEWS: EMPLOYMENT - UNFAVORABLE NEWS: UNEMPLOYMENT |
| NEWSRN_F_DEM | *"During the last few months, have you heard of any favorable or unfavorable changes in business conditions? What did you hear?"* FAVORABLE NEWS: HIGHER CONSUMER DEMAND |
| NEWSRN_U_DEM | *"During the last few months, have you heard of any favorable or unfavorable changes in business conditions? What did you hear?"* UNFAVORABLE NEWS: LOWER CONSUMER DEMAND |
| BAGO_R | *"Would you say that at the present time business conditions are better or worse than they were a year ago?"* BETTER - WORSE |
| BTRD_R | *"Trend in Past and Expected Changes in Business Conditions"* BETTER - WORSE |
| DURRN_NT | "*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 a bad time for people to buy major household items? Why would you say so?"* GOOD TIME TO BUY: TIMES ARE GOOD; PROSPERITY - BAD TIME TO BUY: TIMES ARE BAD; CAN'T AFFORD TO BUY - BAD TIME TO BUY: BAD TIMES AHEAD; UNCERTAIN FUTURE |
| VEHRN_GT | *"Speaking now of the automobile market -- do you think the next 12 months or so will be a good time or a bad time to buy a vehicle, such as a car, pickup, van, or sport utility vehicle? Why do you say so?"* GOOD TIME TO BUY: TIMES ARE GOOD; PROSPERITY |
| VEHRN_TB | *"Speaking now of the automobile market -- do you think the next 12 months or so will be a good time or a bad time to buy a vehicle, such as a car, pickup, van, or sport utility vehicle? Why do you say so?"* BAD TIME TO BUY: TIMES ARE BAD; CAN'T AFFORD TO BUY |
| VEHRN_FB | *"Speaking now of the automobile market -- do you think the next 12 months or so will be a good time or a bad time to buy a vehicle, such as a car, pickup, van, or sport utility vehicle? Why do you say so?"* BAD TIME TO BUY: BAD TIMES AHEAD, UNCERTAIN FUTURE |
| HOMRN_NT | *"Generally speaking, do you think now is a good time or a bad time to buy a house? Why do you say so?"* GOOD TIME TO BUY: TIMES ARE GOOD; PROSPERITY - BAD TIME TO BUY: TIMES ARE BAD; CAN'T AFFORD TO BUY - BAD TIME TO BUY: BAD TIMES AHEAD; UNCERTAIN FUTURE |
| PEXP_R | *"Now looking ahead -- do you think that a year from now you (and your family living there) will be better off financially, worse off, or just about the same as now?"* BETTER - WORSE |
| INEX_R | *"During the next 12 months, do you expect your (family) income to be higher or lower than during the past year?"* RELATIVE SCORE |
| RINC_R | *"During the next year or two, do you expect that your (family) income will go up more than prices will go up, about the same, or less than prices will go up?"* MORE - LESS |
| BEXP_R | *"And how about a year from now, do you expect that in the country as a whole business conditions will be better, or worse than they are at present, or just about the same?"* BETTER - WORSE |
| BUS12_R | *"Now 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?"* GOOD - BAD |
| BUS5_R | *"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 5 years or so, or that we will have periods of widespread unemployment or depression, or what?"* GOOD - BAD |
| UMEX_R | *"How about people out of work during the coming 12 months -- do you think that there will be more unemployment than now, about the same, or less?"* LESS - MORE |

| | |
|---|---|
| PAGORN_NAD | *"We are interested in how people are getting along financially these days. Would you say that you (and your family living there) are better or worse off financially than you were a year ago? Why do you say so?"* HIGHER ASSETS + LOWER DEBTS - LOWER ASSETS - HIGHER DEBTS |
| NEWSRN_F_STK | *"During the last few months, have you heard of any favorable or unfavorable changes in business conditions? What did you hear?"* FAVORABLE NEWS: STOCK MARKET |
| NEWSRN_U_STK | *"During the last few months, have you heard of any favorable or unfavorable changes in business conditions? What did you hear?"* UNFAVORABLE NEWS: STOCK MARKET |
| HOMRN_NP | *"Generally speaking, do you think now is a good time or a bad time to buy a house? Why do you say so?"* GOOD TIME TO BUY: PRICES ARE LOW; GOOD BUYS AVAILABLE - BAD TIME TO BUY: PRICES HIGH |
| HOMRN_NI | *"Generally speaking, do you think now is a good time or a bad time to buy a house? Why do you say so?"* GOOD TIME TO BUY: GOOD INVESTMENT - BAD TIME TO BUY: BAD INVESTMENT |
| HOMRN_BIAP | *"Generally speaking, do you think now is a good time or a bad time to buy a house? Why do you say so?"* GOOD TIME TO BUY: PRICES WON'T COME DOWN; ARE GOING HIGHER |
| PAGORN_HP | *"We are interested in how people are getting along financially these days. Would you say that you (and your family living there) are better or worse off financially than you were a year ago? Why do you say so?"* HIGHER PRICES |
| NEWSRN_NP | *"During the last few months, have you heard of any favorable or unfavorable changes in business conditions? What did you hear?"* FAVORABLE NEWS: LOWER PRICES - UNFAVORABLE NEWS: HIGHER PRICES |
| DURRN_NP | *"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 a bad time for people to buy major household items? Why would you say so?"* GOOD TIME TO BUY: PRICES ARE LOW; GOOD BUYS AVAILABLE - BAD TIME TO BUY: PRICES ARE HIGH |
| VEHRN_NP | *"Speaking now of the automobile market -- do you think the next 12 months or so will be a good time or a bad time to buy a vehicle, such as a car, pickup, van, or sport utility vehicle? Why do you say so?"* GOOD TIME TO BUY: PRICES ARE LOW; GOOD BUYS AVAILABLE - BAD TIME TO BUY: PRICES ARE HIGH |
| PX1_MED | *"During the next 12 months, do you think that prices in general will go up, or go down, or stay where they are now? By what percent do you expect prices to go up, on the average, during the next 12 months?"* MEDIAN |
| DURRN_BIAP | *"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 a bad time for people to buy major household items? Why would you say so?"* GOOD TIME TO BUY: PRICES WON'T COME DOWN; ARE GOING HIGHER |
| VEHRN_BIAP | *"Speaking now of the automobile market -- do you think the next 12 months or so will be a good time or a bad time to buy a vehicle, such as a car, pickup, van, or sport utility vehicle? Why do you say so?"* GOOD TIME TO BUY: PRICES WON'T COME DOWN; ARE GOING HIGHER |
| VEHRN_GAS | *"Speaking now of the automobile market -- do you think the next 12 months or so will be a good time or a bad time to buy a vehicle, such as a car, pickup, van, or sport utility vehicle? Why do you say so?"* BAD TIME TO BUY: PRICE OF GAS |
| NEWSRN_F_CRED | *"During the last few months, have you heard of any favorable or unfavorable changes in business conditions? What did you hear?"* FAVORABLE NEWS: EASIER CREDIT |
| NEWSRN_U_CRED | *"During the last few months, have you heard of any favorable or unfavorable changes in business conditions? What did you hear?"* UNFAVORABLE NEWS: TIGHTER CREDIT |
| DURRN_NR | *"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 a bad time for people to buy major household items? Why would you say so?"* GOOD TIME TO BUY: INTEREST RATES ARE LOW - BAD TIME TO BUY: INTEREST RATES ARE HIGH; CREDIT IS TIGHT |
| VEHRN_NR | *"Speaking now of the automobile market -- do you think the next 12 months or so will be a good time or a bad time to buy a vehicle, such as a car, pickup, van, or sport utility vehicle? Why do you say so?"* GOOD TIME TO BUY: INTEREST RATES ARE LOW - BAD TIME TO BUY: INTEREST RATES ARE HIGH; CREDIT IS TIGHT |
| HOMRN_NR | *"Generally speaking, do you think now is a good time or a bad time to buy a house? Why do you say so?"* GOOD TIME TO BUY: INTEREST RATES ARE LOW - BAD TIME TO BUY: INTEREST RATES ARE HIGH; CREDIT IS TIGHT |
| RATEX_R | *"No one can say for sure, but what do you think will happen to interest rates for borrowing money during the next 12 months -- will they go up, stay the same, or go down?"* DOWN - UP |

DURRN_BIAR *"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 a bad time for people to buy major household items? Why would you say so?"* GOOD TIME TO BUY: BORROW IN ADVANCE OF RISING INTEREST RATES

VEHRN_BIAR *"Speaking now of the automobile market -- do you think the next 12 months or so will be a good time or a bad time to buy a vehicle, such as a car, pickup, van, or sport utility vehicle? Why do you say so?"* GOOD TIME TO BUY: BORROW IN ADVANCE OF RISING INTEREST RATES

HOMRN_BIAR *"Generally speaking, do you think now is a good time or a bad time to buy a house? Why do you say so?"* GOOD TIME TO BUY: BORROW IN ADVANCE OF RISING INTEREST RATES

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