Towson University
Department of Economics
Working Paper Series

Working Paper No. 2016-14

Determinants of Consumer Sentiment over Business Cycles: Evidence from the U.S. Surveys of Consumers

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July, 2016

Determinants of Consumer Sentiment over Business Cycles: Evidence from the U.S. Surveys of Consumers

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Abstract

We study the information content of the University of Michigan's Index of Consumer Sentiment as well as its five components. Using household data from the Surveys of Consumers, we identify the main determinants of these indicators and document their varying role over the business cycle. Our results suggest that while at the aggregate level, macroeconomic conditions explain sentiment well, important and additional information is contained at the level of households. We compare the role of objective and subjective information in determining household level sentiment, and show that significant heterogeneity in the absorption of news from local network sources is a major feature of consumer sentiment. The differential interpretation of current macroeconomic conditions is found to be more pervasive in periods of falling sentiment that typically predates business cycle peaks, and thus helps sentiment to foreshadow recessions.

Keywords: Consumer confidence, Cross-sectional heterogeneity, Asymmetry, News, Recessions.
JEL Classification: E27, E27, C25, C55

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The authors thank Richard Curtin and Rebecca McBee for their generous assistance on some data related issues, and two anonymous referees for helpful comments.

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1. Introduction

Since the pioneering work of Katona (1951), a long string of literature has highlighted the critical importance of consumer sentiment in business cycle analysis.[1] Researchers and policy makers often resort to sentiment measures in their work, and major media outlets unfailingly monitor news related to consumer sentiment every month. Figure 1 shows the two most population measures of sentiment in the United States, the University of Michigan Index of Consumer Sentiment and the Conference Board Consumer Confidence Index, along with real consumption growth. As we see from the figure both measures correlated well with consumption growth and lead the business cycle with remarkable consistency. In the literature, there has been a prolonged interest in the power of consumer sentiment to predict business cycle fluctuations, and aggregate consumption growth. Numerous studies have found that contemporaneous and lagged consumer sentiment measures are statistically significant in explaining and predicting personal consumption expenditures, even after aggregate measures of economic fundamentals are controlled for.[2] The predictive performance of sentiment is found to be robust to a number of factors, including difference in sample periods, question wording, and index construction, as discussed in Curtin (2007).

[1] For business cycle related research on sentiment indicators in general, see also Bock, Andersson and Frisén (2003), Parigi and Golinelli (2004), Silgoner (2008) and reference therein.

[2] See Juster and Wachtel (1974), Mishkin *et al.* (1978), Throop (1992), Fuhrer (1993), Carroll, Fuhrer, Wilcox (1994), and Bram and Ludvigson (1998). A few other studies, e.g., Garner (1991), on the other hand, showed that consumer sentiment measures sometimes lose a part of their predictive power in the presence of other macroeconomic aggregates. International evidence of the role of consumer sentiment can be found in, e.g., Acemoglu and Scott (1994), Berg and Bergstrom (1996), Fan and Wong (1998), and Easaw, Garratt, Heravi (2005).

Even though recent studies have attributed the predictive power of sentiment to its short publication lag and information content (see Lahiri; Monokroussos; Zhao (2015) and references therein), there has been no consensus as to what exactly is the information conveyed by consumer sentiment. Several competing conjectures have been proposed in prior studies as summarized in Fuhrer (1993): (1) Sentiment independently causes economic fluctuations; (2) Sentiment accurately forecasts economic fluctuations but does not cause them; (3) Sentiment captures consumers' pessimism and hence reflects consumers' forecasts of economic fluctuations, inaccurate as these forecasts may be; (4) Sentiment is a reflection of personal, respondent-specific conditions; (5) Sentiment reflects only current, widely known economic conditions; and (6) Sentiment measures consumer's perceptions of uncertainty and risk, associated with the likelihood of job/income loss. These conjectures, unfortunately, are difficult to evaluate when only aggregate data are used, as in most of the existing studies. As suggested in Souleles (2004), one could make spurious inference from studying aggregate sentiment data alone, since aggregate shocks may affect consumer sentiment at the household level asymmetrically.

In this study, we directly address the question about information content of consumer sentiment by exploring its determinants and their role over the business cycle, using household data available from the University of Michigan's Surveys of Consumers pooled over 1979 to 2013. We are particularly interested in studying how much of the variation in consumer sentiment can be explained using objective information, such as observable aggregate measures of the economic conditions, and subjective information obtained from survey responses. In addition, we examine several other categories of possible determinants of sentiment, including consumer's expectations and perceptions (e.g., government economic policies and news related to economic conditions),

socio-demographic characteristics of households, and professional macroeconomic forecasts.[3] Instead of resorting to time series causality tests, we conduct a series of empirical exercises to not only unveil the important determinants of sentiment at the micro level, but also measure their importance over the business cycle.

Our main findings indicate that consumer sentiment is much more than a mirror image of official macroeconomic statistics. Instead, sentiment indicators serve as a valuable source of information that mostly reflects consumer's own expectations and perceptions of both their own financial situations and regarding the overall economic conditions. Compared to these factors, official statistics and professional macroeconomic forecasts do not seem to play a significant role in explaining consumer sentiment other than helping to shape consumer perceptions. Evidence is also found in support of the conjecture that consumer sentiment is asymmetrically distributed across households. At the aggregate level, we observe that consumers tend to be overly pessimistic about economic conditions. At the household level, we observe systematic time-varying cross-sectional heterogeneity. Simple measures of asymmetry in the cross-sectional distributions of sentiment are found to be helpful in explaining sentiment at the aggregate level.

In Section 2, we describe the data set used in this study. Section 3 focuses on explaining sentiment indexes, both at the aggregate and the individual household levels. Section 4 looks more carefully at individual determinants of sentiment. Section 5 discusses the asymmetry in the aggregate as well as in cross-sectional distribution of sentiment, where we show that simple

[3] Most of these possible determinants come naturally from the conjectures on the information content of sentiment, while others arise from prior studies, e.g., Lovell (1975), Mishkin (1978), Garner (1981), Vuchelen (1985), Praet and Vuchelen (1989), Throop (1992), Jennings and McGrath (1994), Blood and Phillips (1995), Estelami, et al. (2001), and Vuchelen (2004).

measures of asymmetry augment the information contained in the aggregate measure of sentiment. Concluding remarks are in Section 6.

2. Household data on consumer sentiment

The Index of Consumer Sentiment (ICS), developed by Katona (1951), is a well-known measure of consumer's changing attitudes about business conditions and job prospects. Since 1978, this index has been published every month by the Survey Research Center at the University of Michigan, based on its Surveys of Consumers. Each month, a sample of households are selected and interviewed by phone. The sample size for each month's survey decreased from around 1000 in the early 80s to around 500 since 1988. Half of the households that are interviewed in the current month's survey are re-interviewed in the survey six months later, creating a short panel where each cross-sectional unit appears in the survey twice. Our sample consists of 411 monthly surveys from June 1979 to August 2013. There are 227,521 observations in the sample, which come from 139,545 households. Since not all households are available for the second interview, among the 500 households interviewed each month, around 40% of them participated in the interview six months earlier. The rest are newly selected. Among all the households, 87,691 have been interviewed twice.

The Index of Consumer Sentiment is constructed based on the following five questions:

1. (PerFinCurrent) "*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. (PerFinExpected) "*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. (BusCond12m) "*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 time, or what?*"
4. (BusCond5y) "*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'll have periods of widespread unemployment or depression, or what?*"
5. (BuyCond) "*About the big things people buy for their homes such as furniture, refrigerator, stove, television, and things like that. Generally speaking do you thin know is a good or a bad time to buy major household items?*"

To each of the five questions, a survey respondent may respond "good/better", "same", or "bad/worse". Based on these responses, a balance statistic is constructed for each of the five questions as the percentage of the respondents who responded "good/better" minus the percentage of those who responded "bad/worse" plus 100. The simple average of the five balance statistics is the Index of Consumer Sentiment, which is reported relative to the base year of 1966. Figure 2 shows the ICS index and its five components. Shaded areas are NBER recession periods. We can clearly see the dynamics and cyclical behavior of ICS and its components. We also note that the ICS consistently leads the business cycle with an average lead of little over 9 months, a feature that we will explore in sections below.

In addition to the five questions above, the survey allows us to extract information about many other aspects of consumers' expectations, perceptions, as well as their socio-demographic characteristics. We categorize this additional information and use them in the analysis discussed in the following sections. More specifically, consumer's expectations on the state of the economy, the real interest rate, the overall price levels, possible changes in their real family income, the

economy-wide unemployment rate are included in the "expectations" (E) category. Variables that are included in the "perceptions" (P) category are consumers' perceptions on the state of the economy in the past, their judgment on whether the government is doing a good job in making economic policies, as well as any favorable or unfavorable news stories heard by the consumers in the past few months. Consumer's marital status, level of education, race, place of residence, age, and the level of their family income are included in the "demographics" (D) category. A similar approach was originally adopted in Ivanova and Lahiri (1998).

To control for time-specific and economy-wide aggregate shocks, we use a set of macroeconomic variables and professional forecasts. The "macroeconomic variables" (M) category contains 3-month and 10-year treasury bill rates, CPI inflation rate, PMI composite index, month-to-month percent changes of the industrial production index, coincident economic activity index, real disposable personal income, as well as the monthly return to the S&P 500 index and the monthly standard deviation of daily S&P 500 index, plus a dummy variable indicating NBER dated recession months. In some exercises, we also consider the policy uncertainty variable based on the work of Baker, Bloom, Davis (2015)[4]. The "forecasts" (F) category contains Blue Chip consensus forecasts of current year real GDP growth, inflation rate, and unemployment. In addition, we include disagreement and uncertainty measures about real GDP decline, which are based on the probability forecasts available from the US Survey of Professional Forecasters (SPF), see Clements (2008). We also include uncertainty measures (standard deviation) about real GDP

[4] This monthly policy uncertainty variable for the United States includes three components: news coverage of policy-related economic uncertainty, tax code expiration data, and forecaster disagreement on the consumer price index (CPI), purchase of goods and services by state and local governments, and purchases of goods and services by the federal government. This series starts from 1985, and can be obtained from policyuncertainty.com. Since the rest of our variables start before 1985, unless significantly different, we report the results based on the longer sample period, i.e., without the policy uncertainty variable.

growth rates and GDP price deflator, both derived from SPF density forecasts, see Lahiri and Sheng (2010)[5]. To control for possible seasonal variations, we include a dummy variable for each month. These dummy variables are always included in the model and are not considered to be in any of the above categories. For an alphabetical list of all the variable names by category and a short description for each variable, see Table 1.

3. Explaining consumer sentiment

To find out what fundamental factors can possibly explain consumer sentiment, a natural first step is to follow the past research strategy, and regress sentiment on important macroeconomic variables in a purely time series setting. We conduct this exercise using the five components of consumer sentiment index, as well as the ICS index itself. The right-hand-side variables are the group of macroeconomic variables and macroeconomic forecasts as in Table 1. Three lags are included for each variable. In each of the six regressions, the lagged dependent variable is also included. We also estimated the models without the lagged dependent variable and with only the lagged dependent variable.

Results of these time series regressions are reported in Table 2. In addition to the $\bar{R}^2$s, we report the sum of the coefficients of the three lags of each independent variable from the full model. Coefficients are reported in bold when the three lags are jointly significant at 5%. From the first row of the table, across the components of the sentiment index and the index itself, unsurprisingly we observe very high overall explanatory power. All the regressions have $\bar{R}^2$s over 90%, except for expected personal financial situations (PerFinExpected, 81%) and 5-year-ahead expectation of

[5] SPF is a quarterly survey, so are the four disagreement and uncertainty measures. We use these measures with the rest of the monthly variables by setting the three monthly values in a quarter equal to the quarterly value.

overall business conditions (BusCond5y, 84%). In addition, in each regression, at least several of the right-hand-side variables are statistically significant, despite high multicollinearity among them. Under such situations, it is well known that different sets of variables become statistically significant in different sample periods, and are often individually unstable over time. In models without the lagged dependent variable (not reported in table 2), many more variables were statistically significant with generally bigger estimated coefficients.

The results from these rather simplistic time series regressions may suggest a misleading picture of the importance of consumer sentiment as an independent variable. It may appear that one can easily account for a large proportion of the variations in consumer sentiment using standard macroeconomic variables and their forecasts. Further, if one concludes that the sentiment index provides little additional information beyond what standard macroeconomic variables provide, it may seem safe to exclude sentiment from economic or policy analysis that already uses official statistics.

In order to explore what could be missing from the above analysis, we proceed to explain household-level sentiment using both the macroeconomic variables used in time series regressions, and a large set of household-level variables with a pooled time series and cross section data. We estimate ordered probit models for each of the five components of the sentiment index in such a setting.[6] Explanatory variables include household perceptions and expectations, macroeconomic variables and forecasts, household socio-demographic characteristics, and a dummy variable for each month, as discussed in the previous section. For each component of the sentiment index, we

[6] We have repeated this exercise using the semi-parametric ordered choice model discussed in Stewart (2004) and reached the same conclusions. Therefore, for simplicity of exposition and interpretation, we focus on ordered probit models. Results based on semi-parametric models are available upon request.

run a regression with all five groups of variables, a set of regressions with each group of variables, and a set of regressions with all but one group of variables.[7] We focus on the explanatory power of the full model and each of the groups, as well as the incremental explanatory power of each group, defined as the full model's explanatory power minus the explanatory power of the model with all but this group of variables. Results of these household-level regressions are reported in Table 3. The $\bar{R}^2$s in the table are the pseudo-$\bar{R}^2$ of McKelvey and Zavoina (1975).

Comparing the explanatory power of the full model (all variables) across components of the sentiment index, we find it is more difficult to explain sentiment components of personal nature than those about overall business conditions. For recent changes in household financial situations (PerFinCurrent) and expectations for family's financial situation (PerfinExpected), explanatory powers are only 19.4% and 30.6%. On the other hand, for expected overall business conditions, both 1-year ahead (BusCond12m) and 5-year ahead (BusCond5y), explanatory powers reach as high as 56% and 42% respectively. The buying conditions variable (BuyCond) is the most difficult variable to explain with $\bar{R}^2 = 16.8\%$. Comparing the explanatory power of individual groups of variables, an immediate finding is that consumer's expectations and perceptions are much more important than any other group of variables, especially macroeconomic variables and forecasts. For all five components of sentiment, expectations and perceptions alone account for most of the explained variations – more than 60% for models of current and expected household financial situations (PerFinCurrent and PerFinExpected) and buying attitudes (BuyCond), and over 90% for models of business conditions (BusCond12m and BusCond5y). It is also worth noting that, as one

[7] Note that we exclude the variables representing consumer's expectations in models of consumer's perceptions of their current financial situations (question 1), since consumer expectations formed at present should not affect what actually happened in the past.

would expect, explanatory power of macroeconomic variables and forecasts are significantly stronger in models of 1-year and 5-year ahead expectations of overall business conditions than other components. Note that the 1-year ahead expectations of overall business conditions is the most dominant component of sentiment. The lesser importance of these two groups of macro variables in the model of 5-year ahead expectations of the overall business conditions is understandably due to the greater level of uncertainty associated with longer horizon forecasts and the increased heterogeneity in long-run household expectations, as shown in Lahiri and Sheng (2008).

However, as Table 3 also shows, despite a rich set of variables on the right-hand-side, a large proportion of variations in each component of sentiment index still remains unexplained. This indicates the uniqueness of the information extracted by these questions, and the high-level of cross-sectional variations in the household data. To illustrate the latter point, we ran an ordered probit model of each component of sentiment index with our pooled time series- cross section data on a large set of dummy variables, one for each month of each year. Since these dummy variables completely account for any and all variations along the time dimension of the data, the explanatory power of the model shows the maximum proportion of variations that macroeconomic variables and forecasts could possibly capture. We find that the macroeconomic variables and forecasts we include in our models account for nearly 75% of variations along the time dimension.[8]

[8] The explanatory power of time dummy-saturated models are 5.6%, 3.6%, 18.3%, 7.0%, and 9.9%; the explanatory power of the model with our macroeconomic variables and forecasts (also reported in Table 3) are 5.4%, 2.8%, 16.5%, 5.5%, 9.3%, respectively for PerFinCurrent, PerFinExpected, BusCond12m, BusCond5y, and BuyCond. These statistics also show that most of the explained variation in the pooled time series/cross section data lies in the household expectations and perceptions, and not in purely time series variables.

To further explore the importance of different groups of variables, we conduct this same exercise but now separately for periods with rising and falling sentiment.[9] Results are reported in Table 4. We observe that household expectations and perceptions alone explain sentiment better in rising-sentiment periods. Macroeconomic variables have slightly higher explanatory power during falling-sentiment periods. However, it is worth noting that overall, during falling-setniment periods, our model's explanatory power decreases, meaning that the ICS as a standalone index contains more information that is unique, in the sense that it is not found in the host of explanatory variables used here. To show this point more clearly, we estimate these models (full models for each of the five components of ICS) year by year using 12 months of data at a time, and report how explanatory power changes over our sample in Figure 3. We clearly see that the relative explanatory power of the five components of sentiment are stable over time, and tend to fall precipitously during lower sentiment periods and economic slowdowns.

These observations, based on the full sample or separately for periods with rising- and falling-sentiment, are consistent with the time series regressions reported earlier in this section. Even though variations of consumer sentiment along the time dimension can be well-explained, such variations represent only a limited amount of information embedded in consumer sentiment. Much more reside in household-level data and their idiosyncrasies, which seem to depend on the cyclical state of the economy.

[9] We identified cyclical turning points of sentiment by visual inspection. The following periods are identified to be falling-sentiment periods, all remaining periods in the sample are considered rising-sentiment periods: 1980m1 to 1980m11; 1981m8 to 1983m5; 1989m1 to 1994m1; 2000m11 to 2002m5; 2007m1 to 2012m5. All NBER designated recession months are covered by falling-sentiment periods. We also conducted all our exercises using NBER recession instead of this dichotomy. The qualitative nature of the results and conclusions remain the same.

4. Determinants of consumer sentiment

Since cross-sectional variations in household-level data on consumer sentiment present the most important information, it is interesting to examine the role of each explanatory variable and to identify the main determinants of household sentiment. From the results of the ordered probit regressions of components of the sentiment index over the whole sample, we report the coefficient of each explanatory variable and its marginal effect on the probability of observing the "good/better" response and the "bad/worse" response in Table 5. Coefficient of a variable is reported in bold if the variable is statistically significant at 5%.

Among the variables in the group of household expectations, expected financial conditions of the country as a whole (EconBetterIn1y and EconWorseIn1y[10]) and expected changes in real household income (ERealIncUp and ERealIncDown) are the most important determinants of household sentiment. In addition, higher expected level of unemployment (EUnempMore) has a considerable marginal effect on expected business conditions and attitudes toward purchasing major household items. The latter also depends crucially on whether consumers expect a decrease in the price level in the future (EPricesDown). In the group of household perceptions, the most influential variables include perceptions on the performance of government economic policy (GoodGovt and PoorGovt), perceptions on current economic conditions compared with a year ago (EconBetter1yAgo and EconWorse1yAgo), and perceptions on the tone and content of economic news (e.g., GoodNews, BadNewsInfl). In particular, households tend to be more pessimistic if the government is perceived to be doing a poor job or if there has been bad news about inflation

[10] These variables, while similar to BusCond12m and BusCond5y, are constructed based on different survey questions. EconBetterIn1y, EconWorseIn1y, EconBetter1yAgo, and EconWorse1yAgo (see survey question A4 and A5) are about financial conditions, while the BusCond variables are about business conditions (see survey question A7 and A8). A list of all the survey questions can be obtained from www.sca.isr.umich.edu/survey-info.php

recently. Expected business conditions, especially 5 years ahead, are highly sensitive to perceptions on government economic policy, while much less sensitive on past/recent news reports. Also interesting to note is that, for personal financial situations, negative perceptions have bigger marginal effect than positive perceptions. This can be seen, for example, by comparing the effect of GoodGovt vs. PoorGovt and BadNewsInfl vs. GoodNewsInfl on expected personal financial situations, where the marginal effect of negative perceptions on observing a positive response to the survey questions is three times bigger than that of positive perceptions.

In fact, consumers do seem to be more sensitive to negative events than positive events. In Figure 4, we plot the balance statistics of several important determinants of household-level sentiment, including news heard of recent changes in business conditions (GoodNews and BadNews), news heard about prices (GoodNewsInfl and BadNewsInfl) and employment situations (GoodNewsUnemp and BadNewsUnemp), expected changes in unemployment (EUnempLess and EUnempMore) and real interest rate (EIntRateUp and EIntRateDown), as well as perceptions on the performance of government economic policies (GoodGovt and PoorGovt). The figure clearly shows that more often than not, the balance statistics for these important variables are below the neutral value of 100, at which an equal number of people respond positively and negatively. This was true even during the high and protracted growth period of the 1990s, as first pointed out by Souleles (2004).

While news reports are subject to interpretation and such interpretation may be highly heterogeneous, macroeconomic variables should be considered objective measures of business and economic conditions. To further explore the role of consumer's perception on the topic and tone of recent news reports and that of macroeconomic variables, we conduct an exercise taking

advantage of the panel structure of the survey sample. Specifically, using an ordered probit model, we regress the revisions in household's expectations of 1-year-ahead business conditions (BusCond12m) on a set of news variables (GoodNewsOnly, BadNewsOnly, BothNews) and the group of macroeconomic variables (excluding the Recession dummy variable) that became available during the 6-month window after controlling for observed and unobserved individual effects. The objective of this exercise is to assess the relative importance of freshly available objective information (macroeconomic variables) versus subjective information (perceptions on news reports) in forecast revisions after controlling for individual-specific effects. In the sample of households for which two interviews have been conducted 6 months apart, about 33% changed their response to the question about 1-year-ahead business conditions. Since there are 3 possible responses (better/same/worse) to this question, in the regression, the dependent variable can assume one of 5 possible ordered values[11]. We run four regressions as follows: The first includes as explanatory variables both news variables and macroeconomic variables, along with interactions terms between the two. The second is the same as the first, except that no interaction term is included. The third regression only uses news variables. The last regression only uses macroeconomic variables. Results of these regressions are reported in the last row of Table 6. Following the same practice as in the previous section, we run these regressions separately for periods with rising and falling sentiment, using the same definition of the dichotomy as before. The results here once again confirm our previous observation that a large proportion of variation in consumer sentiment is unique and cannot be explained well by other variables. But

[11] If the better/same/worse responses are coded 1/0/-1 respectively, the 5 possible values are then 2/1/0/-1/-2. It is possible to recode these 5 values into 3 categories, combining 2/1 responses and -1/-2 responses. We have also conducted our exercises this way. Results stay largely the same regardless.

macroeconomic variables and news heard by households are both significant determinants of sentiment, more so during periods with falling sentiment. The explanatory power of the news-only model for the full sample (3.2%) is roughly the same as that of the macroeconomic variable-only model (3.5%). Having both sets of variables together increases the explanatory power of the model (5.6%). More importantly, if interactions between news variables and macroeconomic variables are added to the model, explanatory power further increases. Interestingly, both news variables and macroeconomic variables have larger explanatory power during falling-sentiment periods. To illustrate the role of household's differential interpretation of publicly available objective measures of macroeconomic conditions in more details, we run the following regression, which is a simplified version of the regressions reported in Table 6. The dependent variable, as before, is the difference in household expectation on 12-month-ahead business conditions (BusCond12m) between the initial interview (E(t-6)) and the re-interview six months later (E(t)). Instead of using the full set of macroeconomic variables, we use only the LEI and CPI. LEI is the percent change of the composite Leading Economic Index form The Conference Board, and captures the forthcoming economic growth in a comprehensive fashion[12]. CPI is the inflation rate. Two estimated equation is reported below (the four threshold estimates of the ordered probit model are omitted), the first one estimated using only the observations from the falling-sentiment periods and the second one estimated using only the observations from the rising-sentiment periods. Coefficients in bold are significant at 5%.

[12] We use this variable here rather than our much larger set of macroeconomic variables used in the previous section due to its comprehensiveness. It contains information from the following ten indicators: average weekly hours, manufacturing; average weekly initial claims for unemployment insurance; manufacturers' new orders, consumer goods and materials; ISM® Index of New Orders; manufacturers' new orders, nondefense capital goods excluding aircraft orders; building permits, new private housing units; stock prices, 500 common stocks; Leading Credit Index™; interest rate spread, 10-year Treasury bonds less federal funds; and average consumer expectations for business conditions.

Falling sentiment:

$$E(t)-E(t-6) = \mathbf{0.25} \times GoodNewsOnly(t) \mathbf{-\ 0.22} \times BadNewsOnly(t) + 0.01 \times BothNews(t) \mathbf{-\ 0.10} \times CPI(t-1) \mathbf{+\ 0.18} \times LEI(t-1) \mathbf{+\ 0.08} \times GoodNewsOnly\ (t) \times LEI(t-1) \mathbf{-\ 0.07} \times BadNewsOnly(t) \times LEI(t-1) \mathbf{-\ 0.10} \times BadNewsOnly(t) \times CPI(t-1)$$

Rising sentiment:

$$E(t)-E(t-6) = \mathbf{0.15} \times GoodNewsOnly(t) \mathbf{-\ 0.29} \times BadNewsOnly(t) - 0.02 \times BothNews(t) - 0.03 \times CPI(t-1) \mathbf{+\ 0.10} \times LEI(t-1)$$

In these regressions, both GoodNewsOnly and BadNewsOnly variables are statistically significant with expected sign. But BothNews variable is insignificant, suggesting that the consumers who report to have heard both good news and bad news do not behave systematically differently than those who report to have not heard any news at all. During the falling-sentiment periods, the interaction between GoodNewsOnly and LEI is significantly positive, and the interactions between BadNEwsOnly and both LEI and CPI are significantly negative. During the high-sentiment periods, no interaction term is significant. So the evidence suggests that households are more sensitive to news during falling-sentiment periods - hearing good news when LEI is high (or hearing bad news when LEI and/or CPI is low) have bigger effect on sentiment. While direct measures of macroeconomic conditions are important, households do not seem to simply react to these objective measures. Equally important are their perceptions or interpretations developed in local environments. Using a small experimental sample derived from the same Michigan survey during 2011, Armantier et al. (2015) report conclusive evidence that respondents revise their prior expectations appropriately in the right direction when prompted with the actual inflation figures, but this study did not distinguish between official data and their personal interpretations simultaneously. What we find here is that not only official macro announcements, but also their

differential interpretations by individual respondents are equally important in forecast revisions. Our finding lends support to the view of Linden (1982), Garner (1991), and Blendon *et al.* (1997) that consumers' expectations are formed in "conversations between neighbors over the backyard fence" and are not a direct reflection of media coverage or published statistics. Needless to add, in more recent years, the individual perceptions and expectations are increasingly being formed in social networks that need not be spatially close.

5. Asymmetry in consumer sentiment

The results discussed in the previous two sections highlight the importance of cross-sectional heterogeneity and asymmetry in household-level sentiment. These important features of sentiment, while most evident from household-level data, also affect sentiment measures in the aggregate. In Figure 5, we plot the distribution of the five components of the sentiment index[13]. It is clear from the figure that at least for personal financial situations and consumer attitude towards purchasing major household items, the balance statistic largely stay below the neutral value of 100. This means that during most months in the sample period, more consumers hold pessimistic views on these items. However, the economy grew during the majority of the months, and recessionary periods are few. Since consumer perceptions may deviate from objective measure of the economic conditions as in standard macroeconomic variables, the value of sentiment that corresponds to a "no change" in economic conditions may not necessarily be 100. To identify the true "neutral" value of sentiment, we adopt the methodology of Koenig (2002), where he identifies the value of the well-known PMI index that is associated with an expansion of the economy. Koenig's

[13] However, since the ICS is scaled such that the values in 1966 is 100, the levels of ICS is not directly comparable with its components. Therefore, this figure plots normalized components of sentiment, where the normalization is such that the simple average of the five normalized components equals the sentiment index (ICS).

regression is in the form of $y_t = c_1(S_t - c_2) + c_3\Delta S_t + u_t$, where y_t is the target variable measuring economic conditions, and S_t is the sentiment index (in his case, PMI). c_2 is the neutral value, which is the parameter of interest. Parameters of this regression are estimated using nonlinear least squares, with Newey-West standard errors with 12 lags. The only component of the sentiment index with a readily-available corresponding macroeconomic variable y_t is the 1-year-ahead expected business conditions (BusCond12m), where y_t is the real GDP growth rate.[14] Estimation results show that the neutral value of BusCond12m is 52.6, with 95% confidence interval covering 36.9 to 68.2. Another interesting variable in the sentiment survey that permits such an analysis is consumer expectations on inflation rate (EPricesUp and EPricesDown) during the next year. While important in its own right, a unique feature of this variable is that not only does the survey ask for a qualitative response (viz. up/same/down), it also asks survey respondents to give a quantitative/numeric response.[15] Therefore, one can derive a continuous variable measuring consumer inflation expectation based on the survey responses. Let y_t be the CPI inflation rate, and S_t be the balance statistic derived based on EPricesUp and EPricesDown, we obtain the neutral value of consumer inflation expectation, which is 135.3, with 95% confidence interval of 119.1 to 151.5.

Obviously, for both expected business conditions and expected prices, the "true" neutral values are far from the theoretical neutral value of 100 of a balance statistic. Moreover, both values indicate a clear tendency that consumers tend to be more pessimistic than that warranted by actual economic conditions. This result, while based on aggregate measures of sentiment, is consistent

[14] To convert sentiment measures to a quarterly series matching the frequency of real GDP, we use the transformation detailed in Mariano and Murasawa (2003). See also Lahiri and Monokroussos (2013).
[15] The variable is denoted PX1 in the survey's public use files available from http://www.sca.isr.umich.edu/sda-public/

with the results discussed in the previous section based on household-level data regarding consumers' sensitivity to negative perceptions and their tendency to interpret or retain negative information, such as news reports. We are not the first in the literature to report that consumers' perceptions tend to be negative. As highlighted by Souleles (2004) and Toussaint-Comeau and McGranahan (2006), the majority of the households in the survey, which are of lower socio-economic status (in terms of education level, household income, minority, etc.), tend to receive negative shocks or perceive negatively the economic condition, even during periods with good prospect. This can be clearly demonstrated by simply regressing household quantitative inflation expectations on the group of socio-demographic variables. Our results show that, other things the same, inflation expectation of female consumers is 0.82% higher than that of male consumers, and inflation expectation of consumers without high school diploma is 1.32% higher than that of consumers with college degree, just to give a few examples. A similar finding has been reported by Armamtier et al. (2015) as well.

As Souleles (2004) points out, aggregate shocks may hit different groups of consumers differently, depending on the group's socio-demographic characteristics, therefore creating potentially substantial skewness in sentiment. As an example, the skewness of household quantitative inflation expectations is 2.65 and kurtosis is 19.56, calculated using our sample. This skewness is largely missing from aggregate measures of sentiment. Pesaran (1987) showed that it is the mean of the underlying distribution that is captured by the balance statistic, under the condition that the cross-sectional distribution of expectations is homogeneous and symmetric. However, more information may be captured by the balance statistic if the underlying distribution is not perfectly symmetric, as in the case of consumer sentiment. So, simple features of the cross-

sectional distribution other than the mean may prove to be useful in representing the missing heterogeneity and asymmetry in aggregate measures.

To illustrate this point, and to show that aggregate measures of sentiment are indeed affected by features of the distribution of household expectations, we run two sets of regressions. In the first set of regressions, we use household-level data on 1-year ahead business conditions (BusCond12m). Given the importance of price expectations as a determinant of expected business conditions, in the first regression, we regress individual responses of BusCond12m on the same individual's quantitative price expectations. In the second regression, we augment the first regression with the variance and skewness of all the individual quantitative inflation expectations from the same month's survey (common to all individuals in a month but vary over time). Our results show that in both regressions, price expectations, as well as its variance and skewness are statistically significant. The $\bar{R}^2$of the first regression is 4.2%, and that of the second regression is 9.9%. Then, we run a second set of regressions using aggregate data, where the balance statistic based on BusCond12m is regressed on the mean of individual quantitative inflation expectations first, and then regressed on the mean inflation expectations plus the same variance and skewness variables used in the first set of regressions. Again, all three variables are statistically significant. The $\bar{R}^2$of the mean-only regression is 15.1%. The $\bar{R}^2$of the regression with mean, variance, and skewness is 33.5%. These results not only demonstrate the importance of asymmetries at the household level in explaining both household-level and aggregate sentiment, but also indicate that information about the shape of the underlying distribution is partially captured in aggregate measures of sentiment. This latter result helps to explain why sentiment has been found in numerous studies to be helpful in explaining and forecasting macroeconomic aggregates, most

prominently consumption expenditure, as recently reaffirmed in Lahiri, Monokroussos and Zhao (2015).

6. Concluding remarks

In this paper, we employed household-level survey data on consumer sentiment and studied its information content, identified its main determinants, explored its cross-sectional asymmetry, and documented its variation over the business cycle.

We find that at the aggregate level, a standard set of macroeconomic variables and their forecasts explain sentiment well, as found in earlier studies. However, at the household-level, while macroeconomic variables continue to remain important, the majority of variations in household sentiment is explained by household perceptions and expectations about various economic conditions, including both their own financial and employment prospects and the conditions of the economy as a whole. In general, compared with expectations about overall business conditions, household sentiment regarding their own financial situations are harder to explain using observable factors, in terms of the explanatory power of the full model. In particular, we were able to identity several important determinants of consumer sentiment, including consumer perceptions on recent economic news, consumer perceptions on the performance of government economic policies, consumer expectations on employment situations of the economy and the overall inflation.

While accounting for only a small part of household level sentiment, macroeconomic indicators are found to have extra explanatory power during falling-sentiment periods, even though sentiment indicators are relatively harder to explain during these periods. Upon further examination, we found that households do not take macroeconomic indicators on face value, in the sense that information conveyed by these indicators are interpreted differently depending on

households' perception and retention of information from economic news, which in itself, serve as an equally important determinant of sentiment. The differential interpretation of macroeconomic conditions is found to be more pervasive during low sentiment periods that typically predates business cycle peaks, and thus helps sentiment to foreshadow recessions.

We explored cross-sectional heterogeneities and asymmetries at both household and aggregate levels. We found that consumers tend to be pessimistic in perceiving economic news and tend to retain/recall negative news, even when macroeconomic conditions are relatively good. Using data on price expectations, we further show that consumers with lower socio-economic status tend to be more pessimistic. We experimented with the use of higher order moments like variance and skewness to account for the asymmetry of cross-sectional distribution of sentiment, and demonstrate that these measures are important in explaining sentiment both at the household and aggregate levels.

Overall, our results suggest that consumer sentiment embodies significant idiosyncratic information based on household interpretations and perceptions of the economy and individual economic conditions that tend to be highly heterogeneous, asymmetric and cyclical. While related to and derived from recent macroeconomic developments, sentiment is not a simple replica of announced official statistics. This explains why aggregate sentiment has been found to be independently useful in business cycle forecasting and explaining consumer behavior.

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Table 1 - Variable description

This table briefly describes all the variables used in this study in alphabetical order, including the dependent variables. The variables are organized by category first and then alphabetically within each category. Variables with a star (*) preceding the description are continuous variables. SPF refers to the U.S. Survey of Professional Forecasters.

Variable Name	Variable Description
	Dependent Variables
BusCond12m	Expected business conditions in 12 months
BusCond5y	Expected business conditions in 5 years
BuyCond	Attitudes toward buying durable goods
PerFinCurrent	Current personal financial situation compared to 12 months ago
PerFinExpected	Expected personal financial situation in 12 months
	Expectations
EconBetterIn1y	Economy will be better in one year
EconWorseIn1y	Economy will be worse in one year
EIntRateDown	Expect interest rate to go down next year
EIntRateUp	Expect interest rate to go up next year
EPricesDown	Expect prices to go down in general in next 12 months
EPricesUp	Expect prices to go up in general in next 12 months
ERealIncDown	Expect real family income to go down in the next 1 to 2 years
ERealIncUp	Expect real family income to go up in the next 1 to 2 years
EUnemplLess	Expect less unemployment next year
EUnemplMore	Expect more unemployment next year
	Perceptions
BadNews	Any bad news about changes in business conditions is heard
BadNewsInfl	Bad news about inflation is heard
BadNewsUnemp	Bad news about unemployment is heard
BadNewsWar	Bad news about war is heard
EconBetter1yAgo	Economy now is better than a year ago
EconWorse1yAgo	Economy now is worse than a year ago
GoodGovt	Government doing good job in economic policy
GoodNews	Any good news about changes in business conditions is heard
GoodNewsInfl	Good news about inflation is heard
GoodNewsUnemp	Good news about unemployment is heard
GoodNewsWar	Good news about war is heard
PoorGovt	Government doing poor job in economic policy

(Continue on next page…)

Table 1 - Variable Description (Continue)

Variable Name	Variable Description
	Demographics
Age	* Age of respondent
AgeSq	* Age squared
Asian	Respondent is Asian or pacific islander
Black	Respondent is African-American except Hispanic
CollegeDegree	Grade 13-17+ with college degree
Divorced	Respondent is divorced
Female	Respondent is female
Grade912	Grade 9-12 no high school diploma
HighSchool	Grade 0-12 with high school diploma
Hispanic	Respondent is Hispanic
Income	* Current dollar household income per person in 1000
Indian	Respondent is American Indian or Alaskan native
Married	Respondent is married
NorthCentral	Respondent lives in north central
Northeast	Respondent lives in northeast
SomeCollege	Grade 13-17 no college degree
South	Respondent lives in south
Widowed	Respondent is widowed
	Macroeconomic Variables
CPIAUCSL	* Percent change of consumer price index for all urban consumers: all items
DSPIC96	* Percent change of real disposable personal income
GS10	* 10-year treasury constant maturity rate
INDPRO	* Percent change from previous month industrial production index
NAPM	* ISM manufacturing: PMI composite index
PolicyUncertainty	* Measure of policy uncertainty
Recession	NBER dated recessions
SP500L	* Percent change of monthly averages of daily S&P500 index
SP500SD	* Standard deviation of daily S&P500 index in a month
TB3MS	* 3-month treasury bill: secondary market rate
USPHCI	* Percent change coincident economic activity index for the United States
	Forecasts
Decline_Dis	* Disagreement about real GDP decline derived from SPF probability forecasts
Decline_Unc	* Uncertainty about real GDP decline derived from SPF probability forecasts
FRGDP	* Blue Chip forecasts of real GDP growth
FInfl	* Blue Chip forecasts of inflation rate
FUnemp	* Blue Chip forecasts of unemployment rate
PRGDP_sd	* Uncertainty (standard deviation) of real GDP derived from SPF density forecasts
PRPGDP_sd	* Uncertainty (standard deviation) of GDP price deflator derived from SPF density forecasts

Table 2 – Explaining aggregate sentiment

The first three rows of this table reports the explanatory power of the regressions of each of the five components of ICS and ICS itself (denoted SentIndex) on a lagged dependent variable and/or the group of macroeconomic variables and forecasts. Full model includes both the lagged dependent variable and all the macroeconomic variables and forecasts. For each right hand side variable, three lags are included in the model. In subsequent rows, the coefficients reported are the sum of the coefficients of the three lags from the full model. Coefficients are reported in bold when the three lags of an independent variable are jointly statistically significant at 5% (two-sided test). The row labeled "LDV" reports the sum of the coefficients of the three lags of the dependent variable.

Statistic/Variable	PerFinCurrent	PerFinExpected	BusCond12m	BusCond5y	BuyCond	SentIndex
Full model $\bar{R}^2$	0.90	0.81	0.90	0.84	0.90	0.93
Macro variable and forecasts only model $\bar{R}^2$	0.87	0.74	0.81	0.71	0.88	0.87
Lagged dependent variable only $\bar{R}^2$	0.89	0.79	0.88	0.83	0.87	0.91
LDV	**0.65**	**0.66**	**0.72**	**0.74**	**0.54**	**0.71**
GS10	0.47	**0.88**	**1.78**	1.22	0.43	0.64
TB3MS	**0.28**	-0.23	-0.20	-0.52	-0.09	-0.08
CPIAUCSL	**-3.22**	**-2.14**	-4.74	-2.27	-1.75	-1.84
NAPM	-0.24	0.01	-0.22	-0.10	-0.39	-0.11
INDPRO	2.03	-0.12	0.24	0.95	**2.51**	0.60
USPHCI	**20.5**	3.70	**29.6**	**13.2**	**27.2**	**12.4**
SP500L	0.21	0.22	**1.10**	**0.72**	**0.30**	**0.33**
SP500SD	**0.02**	0.07	**0.23**	**0.25**	-0.05	0.08
DSPIC96	0.22	-0.08	-0.60	-1.24	0.93	-0.03
FRGDP	0.08	-0.03	0.01	0.25	-0.02	-0.01
FInfl	**-0.71**	-0.40	-1.07	-0.13	**-1.73**	-0.45
FUnemp	**-1.99**	**-1.43**	**-1.62**	**-1.27**	**-2.85**	**-1.10**
PRPGDP_sd	-2.15	-2.82	-7.84	-6.69	-6.27	-3.83
PRGDP_sd	2.30	0.70	3.52	3.41	5.44	1.92
Decline_Dis	8.14	11.67	21.79	7.69	12.1	8.07
Decline_Unc	-15.6	-9.19	**-28.9**	-18.6	**-30.1**	**-13.0**

Table 3 – Explaining household-level sentiment

This table reports, in the upper panel, the explanatory power of each group of variables as well as all variables (i.e., the full model). In the lower panel, incremental explanatory power of each group of variables (i.e., the difference between the explanatory power of the full model and the model without a particular group of variable) are reported. The numbers reported in the table are pseudo-$\bar{R}^2$s (percentage).

Model	PerFinCurrent	PerFinExpected	BusCond12m	BusCond5y	BuyCond
Explanatory Power of Categories of Variables					
All Variables	19.4	30.6	56.3	42.3	16.8
Expectations and Perceptions	11.5	25.4	53.0	39.1	11.9
Demographics	8.4	9.8	2.8	4.7	2.0
Macroeconomic Variables	3.5	1.5	13.5	3.8	6.4
Macroeconomic Forecasts	4.1	1.8	11.5	4.3	7.9
Macro Variables and Forecasts	5.4	2.8	16.5	5.5	9.3
Incremental Explanatory Power of Categories of Variables					
Expectations and Perceptions	6.3	18.7	37.6	32.3	5.8
Demographics	6.1	4.5	0.3	1.4	1.0
Macroeconomic Variables	0.4	0.0	0.8	0.1	0.6
Macroeconomic Forecasts	0.9	0.3	1.3	1.0	1.9
Macro Variables and Forecasts	1.6	0.6	2.9	1.5	3.9

Table 4 – Explaining household-level sentiment: rising- vs. falling-sentiment periods

This table reports the explanatory power of each group of variables as well as all variables (i.e., the full model). The numbers reported in the table are pseudo-$\bar{R}^2$s (percentage).

Model	Period	PerFinCurrent	PerFinExpected	BusCond12m	BusCond5y	BuyCond
All Variables	Falling-sentiment	16.6	29.7	51.3	40.2	16.4
	Rising-sentiment	20.2	30.7	55	41.8	14
Expectations and Perceptions	Falling-sentiment	8.6	25	47.7	34.5	9.9
	Rising-sentiment	11.9	25	52.1	39.5	10.2
Demographics	Falling-sentiment	7.3	8.6	2.5	6.9	2.7
	Rising-sentiment	9.3	11.5	4.0	4.4	2.1
Macroeconomic Variables	Falling-sentiment	4.7	2.4	14.5	7.3	8.9
	Rising-sentiment	3.2	1.2	7.8	1.9	3.5
Macroeconomic Forecasts	Falling-sentiment	3.9	2.3	13.7	7.8	8.5
	Rising-sentiment	3.7	1.6	6.5	2.2	5.0
Macro Variables and Forecasts	Falling-sentiment	5.7	3.1	16.5	8.8	10.4
	Rising-sentiment	4.6	2.3	10.8	3.3	5.9

Table 5 – Ordered probit regression results: full sample

This table reports the coefficient and average marginal effects for household expectations and perceptions in models of each component of the sentiment index. Coefficients are in bold when significant at 5%. ME(1) is the marginal effect for the probability of "bad/worse" response; and ME(3) is for "good/better" response. For macroeconomic variables and forecasts, we report sum of coefficients and average marginal effects (as a percentage, namely (dy/dx)*100) for three lags and their joint significance.

Model	**PerFinCurrent**			**PerFinExpected**			**BusCond12m**			**BusCond5y**			**BuyCond**		
Variable	**Coeff.**	**ME(1)**	**ME(3)**	**Coeff.**	**ME(1)**	**ME(3)**	**Coeff.**	**ME(1)**	**ME(3)**	**Coeff.**	**ME(1)**	**ME(3)**	**Coeff.**	**ME(1)**	**ME(3)**
Expectations															
EconBetterIn1y				**0.32**	-4.68	10.6	**0.58**	-16.2	16.6	**0.45**	-14.5	14.7	**0.03**	-0.73	0.80
EconWorseIn1y				**-0.33**	6.77	-9.90	**-0.77**	21.8	-21.3	**-0.56**	18.1	-16.4	**-0.11**	3.11	-3.36
EIntRateDown				0.02	-0.26	0.47	-0.02	0.52	-0.53	0.01	-0.32	0.31	**-0.08**	2.13	-2.31
EIntRateUp				0.00	-0.06	0.12	**-0.07**	1.76	-1.78	**-0.10**	3.06	-3.01	0.00	-0.10	0.11
EPricesDown				0.00	0.06	-0.11	-0.04	1.05	-1.06	**-0.08**	2.47	-2.47	**-0.10**	2.99	-3.23
EPricesUp				**-0.04**	0.61	-1.13	**-0.06**	1.45	-1.47	**-0.15**	4.57	-4.54	0.00	-0.08	0.09
ERealIncDown				**-0.39**	7.67	-12.4	**-0.21**	5.38	-5.42	**-0.21**	6.43	-6.25	**-0.11**	3.23	-3.51
ERealIncUp				**0.70**	-7.23	25.2	**0.10**	-2.60	2.64	**0.12**	-3.54	3.55	**0.04**	-1.10	1.20
EUnemplLess				**0.08**	-1.32	2.59	**0.19**	-5.07	5.18	**0.23**	-7.27	7.45	-0.01	0.27	-0.29
EUnemplMore				**-0.07**	1.25	-2.21	**-0.39**	10.4	-10.4	**0.45**	15.9	-15.1	**-0.13**	3.79	-4.12
Perceptions															
BadNews				0.00	0.01	-0.01	**-0.17**	4.25	-4.29	**-0.04**	1.08	-1.06	**-0.02**	0.66	-0.72
BadNewsInfl				**-0.05**	0.82	-1.45	**-0.08**	1.88	-1.89	0.01	-0.37	0.36	-0.01	0.21	-0.23
BadNewsUnemp				-0.01	0.21	-0.39	**-0.03**	0.82	-0.83	**-0.05**	1.40	-1.37	**-0.03**	0.86	-0.93
BadNewsWar				0.01	-0.24	0.43	**-0.22**	5.62	-5.65	-0.05	1.35	-1.32	-0.04	1.26	-1.36
EconBetter1yAgo	**0.24**	-7.25	8.82	**0.04**	-0.72	1.37	**0.31**	-8.43	8.68	**0.11**	-3.25	3.25	**0.14**	-3.82	4.22
EconWorse1yAgo	**-0.25**	8.38	-8.61	**-0.06**	1.07	-1.91	**-0.48**	14.0	-14.0	**-0.20**	6.17	-5.99	**-0.15**	4.34	-4.71
GoodGovt	**0.17**	-5.19	6.19	**0.03**	-0.50	0.96	**0.29**	-7.56	7.72	**0.33**	-10.2	10.3	**0.10**	-2.68	2.94
GoodNews				**0.07**	-1.19	2.22	**0.12**	-3.13	3.18	**0.09**	-2.68	2.65	**0.07**	-1.83	2.00
GoodNewsInfl				0.01	-0.18	0.33	0.02	-0.55	0.55	**-0.05**	1.56	-1.53	-0.02	0.56	-0.61
GoodNewsUnemp				-0.02	0.38	-0.68	0.00	0.09	-0.09	**0.04**	-1.31	1.30	0.03	-0.84	0.92
GoodNewsWar				0.05	-0.84	1.58	-0.05	1.13	-1.14	0.07	-2.06	2.04	-0.04	1.24	-1.35
PoorGovt	**-0.25**	8.48	-8.77	**-0.10**	1.83	-3.22	**-0.34**	9.03	-9.04	**-0.32**	10.1	-9.59	**-0.15**	4.28	-4.63

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Model	**PerFinCurrent**			**PerFinExpected**			**BusCond12m**			**BusCond5y**			**BuyCond**		
Variable	**Coeff.**	**ME(1)**	**ME(3)**	**Coeff.**	**ME(1)**	**ME(3)**	**Coeff.**	**ME(1)**	**ME(3)**	**Coeff.**	**ME(1)**	**ME(3)**	**Coeff.**	**ME(1)**	**ME(3)**
Forecasts															
Decline_Dis	**0.17**	-5.25	5.75	**0.36**	-6.12	11.09	**0.38**	-9.57	9.67	0.02	-0.67	0.66	**0.36**	-10.1	10.9
Decline_Unc	-0.04	1.33	-1.46	**-0.14**	2.48	-4.49	**-0.49**	12.18	-12.3	-0.16	4.75	-4.67	**-0.78**	21.8	-23.7
FRGDP	**0.01**	-0.41	0.45	0.00	0.01	-0.01	0.00	0.01	-0.01	**0.02**	-0.47	0.46	**0.00**	0.04	-0.04
FInfl	**-0.02**	0.52	-0.57	**-0.02**	0.38	-0.68	**-0.05**	1.36	-1.37	**0.00**	0.12	-0.12	**-0.05**	1.39	-1.51
FUnemp	**-0.09**	2.75	-3.02	**-0.05**	0.84	-1.53	**-0.14**	3.56	-3.59	**-0.11**	3.18	-3.13	**-0.10**	2.92	-3.17
PRGDP_sd	**0.08**	-2.40	2.63	**-0.05**	0.83	-1.50	**0.15**	-3.68	3.72	0.04	-1.10	1.08	**0.21**	-5.77	6.27
PRPGDP_sd	**0.05**	-1.73	1.89	0.05	-0.90	1.62	**-0.07**	1.72	-1.74	-0.01	0.21	-0.21	**-0.04**	1.08	-1.18
Macroeconomic Variables															
CPIAUCSL	0.02	-0.49	0.54	-0.03	0.54	-0.98	**-0.12**	3.02	-3.05	**0.09**	-2.53	2.49	**-0.01**	0.33	-0.35
DSPIC96	-0.01	0.25	-0.27	0.01	-0.09	0.17	0.01	-0.28	0.29	-0.01	0.21	-0.21	**-0.02**	0.54	-0.59
GS10	**0.03**	-0.92	1.01	0.00	0.00	0.00	**0.07**	-1.65	1.67	**0.04**	-1.06	1.05	**0.01**	-0.30	0.33
INDPRO	**0.04**	-1.14	1.24	**0.03**	-0.43	0.78	**0.03**	-0.76	0.77	0.01	-0.33	0.32	**0.06**	-1.56	1.69
NAPM	**-0.01**	0.36	-0.40	0.00	-0.03	0.06	**-0.01**	0.27	-0.27	**-0.01**	0.17	-0.16	**-0.01**	0.40	-0.44
Recession	-0.01	0.16	-0.18	**-0.05**	0.85	-1.51	**-0.12**	3.06	-3.08	0.02	-0.56	0.55	**-0.07**	1.91	-2.07
SP500L	0.00	0.06	-0.06	0.00	-0.03	0.06	**0.02**	-0.61	0.62	**0.01**	-0.25	0.25	**0.00**	-0.07	0.07
SP500SD	**0.00**	0.05	-0.05	0.00	-0.02	0.03	**0.00**	-0.07	0.07	**0.01**	-0.17	0.17	**0.00**	0.07	-0.08
TB3MS	**-0.02**	0.47	-0.52	0.01	-0.10	0.18	**-0.02**	0.40	-0.41	**-0.03**	0.93	-0.91	-0.01	0.17	-0.19
USPHCI	**0.48**	-15.1	16.6	**-0.13**	2.15	-3.89	**0.65**	-16.3	16.4	0.04	-1.06	1.04	**0.71**	-20.0	21.7

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Model	PerFinCurrent			PerFinExpected			BusCond12m			BusCond5y			BuyCond		
Variable	**Coeff.**	**ME(1)**	**ME(3)**	**Coeff.**	**ME(1)**	**ME(3)**	**Coeff.**	**ME(1)**	**ME(3)**	**Coeff.**	**ME(1)**	**ME(3)**	**Coeff.**	**ME(1)**	**ME(3)**
Demographics															
Female	**-0.06**	2.03	-2.22	-0.01	0.09	-0.17	**-0.13**	3.36	-3.39	**-0.22**	6.74	-6.65	**-0.13**	3.50	-3.80
Asian	**-0.07**	2.21	-2.38	**-0.20**	-1.43	2.68	**-0.06**	0.97	-0.97	0.03	2.45	-2.40	**-0.12**	2.39	-2.59
Black	-0.02	0.52	-0.57	**0.23**	-3.65	7.48	-0.01	0.15	-0.16	**-0.14**	4.33	-4.22	**-0.05**	1.52	-1.65
Hispanic	**-0.06**	1.88	-2.03	0.02	-0.29	0.52	**-0.05**	1.29	-1.30	**-0.12**	3.50	-3.41	**-0.15**	4.37	-4.71
Indian	**-0.07**	2.21	-2.38	**0.09**	-1.43	2.68	-0.04	0.97	-0.97	**-0.08**	2.45	-2.40	**-0.08**	2.39	-2.59
Married	**0.12**	-3.66	3.99	0.01	-0.18	0.31	**0.03**	-0.78	0.79	**0.03**	-0.74	0.73	**-0.03**	0.76	-0.82
Widowed	-0.01	0.37	-0.38	**0.08**	-1.43	2.59	-0.03	0.71	-0.72	0.00	0.13	-0.13	**-0.10**	2.70	-2.93
Divorced	**-0.03**	1.08	-1.13	**0.18**	-2.93	5.64	-0.01	0.22	-0.22	**-0.03**	0.79	-0.77	**-0.05**	1.38	-1.50
Grade912	-0.03	0.96	-0.97	**0.08**	-1.59	2.49	0.05	-1.15	1.16	**0.09**	-2.75	2.60	**0.16**	-5.07	5.40
HighSchool	**0.07**	-2.45	2.53	**0.16**	-2.89	4.73	**0.09**	-2.30	2.31	**0.21**	-6.37	6.09	**0.28**	-8.30	8.89
SomeCollege	**0.11**	-3.69	3.86	**0.21**	-3.79	6.42	**0.10**	-2.44	2.46	**0.31**	-9.27	8.94	**0.29**	-8.82	9.46
CollegeDegree	**0.23**	-3.69	3.86	**0.16**	-3.79	6.42	**0.07**	-2.44	2.46	**0.34**	-9.27	8.94	**0.27**	-8.82	9.46
NorthCentral	0.00	-0.02	0.02	**-0.08**	1.36	-2.49	-0.01	0.34	-0.35	0.00	-0.02	0.02	0.02	-0.50	0.54
Northeast	**-0.05**	1.66	-1.78	**-0.12**	1.99	-3.57	**-0.05**	1.14	-1.15	0.00	0.10	-0.10	0.01	-0.19	0.21
South	**0.04**	-1.24	1.37	**-0.02**	0.29	-0.55	0.01	-0.34	0.34	0.00	-0.08	0.08	0.01	-0.13	0.14
Month Dummies															
Feb	-0.02	0.51	-0.56	0.00	-0.05	0.10	**-0.07**	1.68	-1.69	0.02	-0.44	0.44	**-0.05**	1.40	-1.52
Mar	-0.02	0.55	-0.61	-0.01	0.10	-0.19	**-0.06**	1.40	-1.41	0.03	-0.91	0.90	**-0.05**	1.50	-1.63
Apr	**-0.03**	0.94	-1.03	0.03	-0.45	0.83	**-0.08**	1.96	-1.98	0.02	-0.60	0.59	**-0.08**	2.14	-2.32
May	**-0.03**	0.94	-1.03	-0.02	-0.45	0.83	**-0.06**	1.96	-1.98	0.02	-0.60	0.59	**-0.06**	2.14	-2.32
Jun	**-0.03**	0.86	-0.94	0.01	-0.17	0.31	**-0.04**	1.11	-1.12	0.00	0.02	-0.02	**-0.06**	1.78	-1.93
Jul	-0.02	0.65	-0.71	0.02	-0.34	0.62	**-0.05**	1.18	-1.20	-0.01	0.38	-0.37	-0.03	0.85	-0.93
Aug	**-0.03**	0.91	-0.99	0.00	-0.02	0.04	**-0.10**	2.41	-2.43	-0.02	0.56	-0.55	**-0.06**	1.56	-1.70
Sep	**-0.04**	0.91	-0.99	0.02	-0.02	0.04	**-0.08**	2.41	-2.43	0.00	0.56	-0.55	**-0.09**	1.56	-1.70
Oct	**-0.06**	2.00	-2.17	0.01	-0.23	0.42	**-0.08**	2.07	-2.09	0.00	0.09	-0.09	**-0.10**	2.85	-3.09
Nov	**-0.06**	1.94	-2.11	0.00	0.06	-0.10	**-0.07**	1.86	-1.88	0.00	0.03	-0.03	**-0.11**	3.14	-3.40
Dec	**-0.06**	1.78	-1.94	0.01	-0.12	0.22	**-0.10**	2.51	-2.54	-0.01	0.25	-0.24	**-0.11**	3.16	-3.42

Table 6 – Explaining changes in sentiment: rising- vs. falling-sentiment periods

This table reports the explanatory power of the models explaining changes in sentiment using macro variables and news at the household level. For all the models reported below, the dependent variable is the change in BusCond12m between initial interview and re-interview (6 months later). Independent variables are indicated in the table, where interactions is the set of all pairwise interaction terms between news variables and macro variables. The numbers reported in the table are pseudo-$\bar{R}^2$s (percentage).

Period	Macroeconomic variables, news, and interactions	Macroeconomic variables and news	Macroeconomic variables only	News only
Falling-sentiment	9.01	7.44	5.07	3.99
Rising-sentiment	6.18	5.78	3.78	2.7
Full Sample	6.14	5.61	3.5	3.2

Figure 1 – Consumption and consumer sentiment in real time

This figure shows the Index of Consumer Sentiment (University of Michigan, black solid line, on left axis), the Consumer Confidence Index (The Conference Board, black dashed line, on left axis), and annualized real consumption growth (initial release/first vintage of quarterly observations, grey solid line, on right axis). University of Michigan index does not subject to revision. Due to data availability, real time data (preliminary release) for the Conference Board index starts from January 1996, prior to which the revised data is used. Shaded area represents NBER dated recession periods (same for all the figures below). Data from Jan 1978 to September 2015.

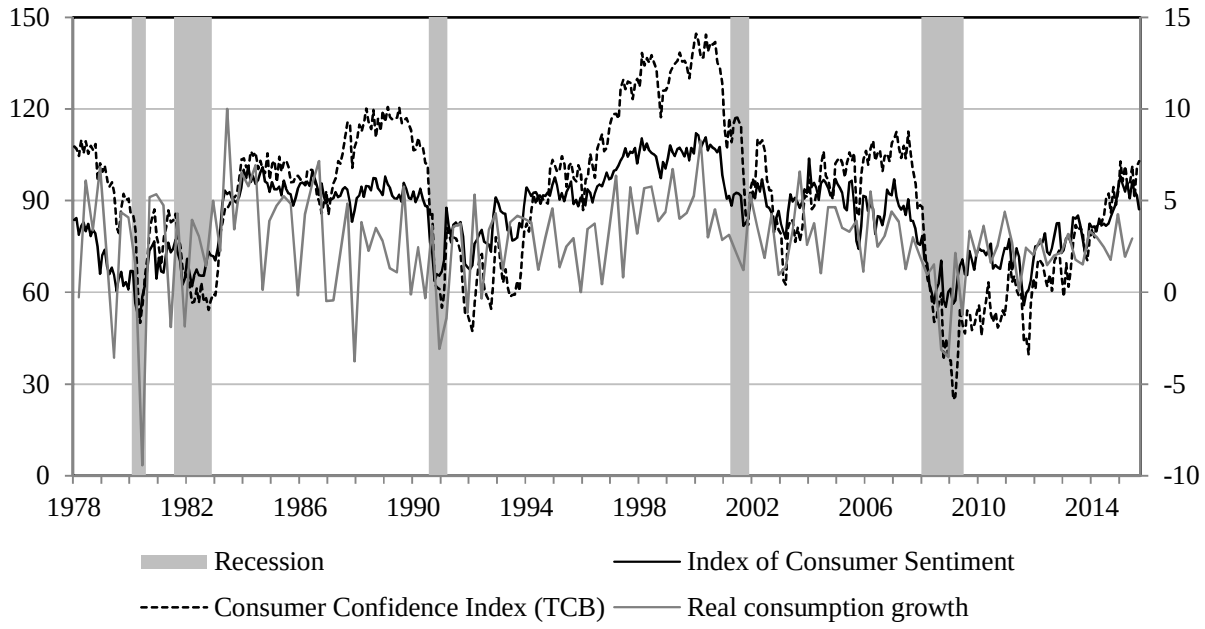


Figure 2 – Index of Consumer Sentiment and its five components

This figure shows the Index of Consumer Sentiment and its five components. Shaded areas are NBER recession periods. Data from Jan 1978 to September 2015.

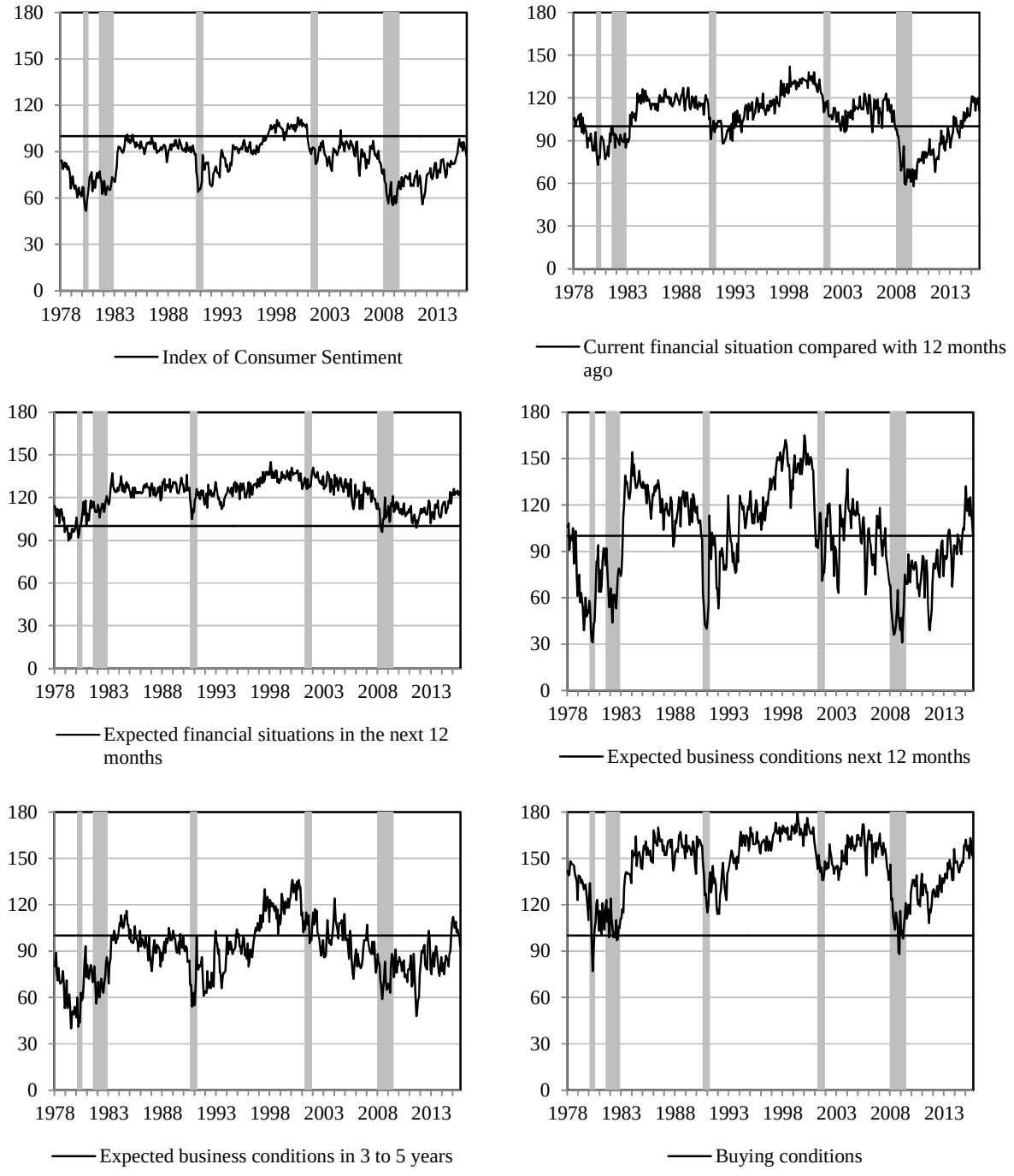


Figure 3 – Explanatory power over time

This figure shows the explanatory power of the full model over time, based on a set of rolling window regressions with one year rolling window. Each line in a plot shows the pseudo R squared of the model of the corresponding dependent variable. Shaded areas are NBER recession periods.

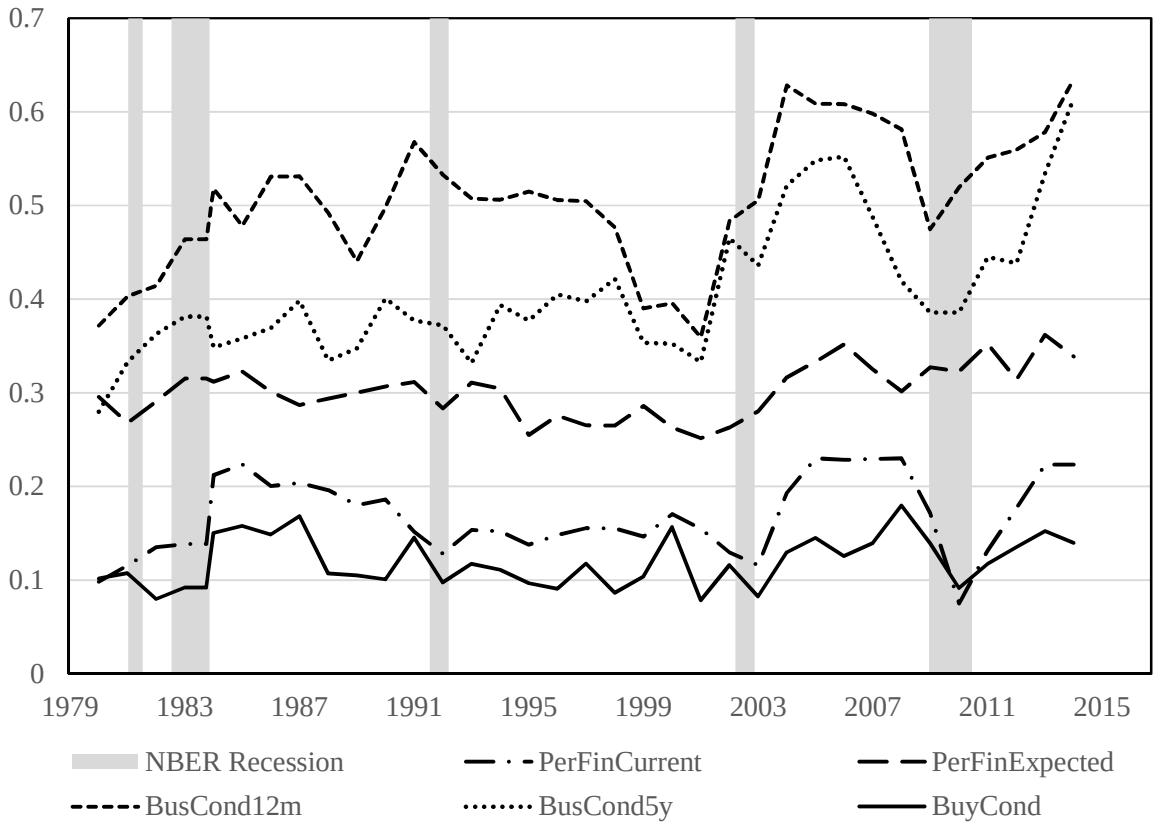
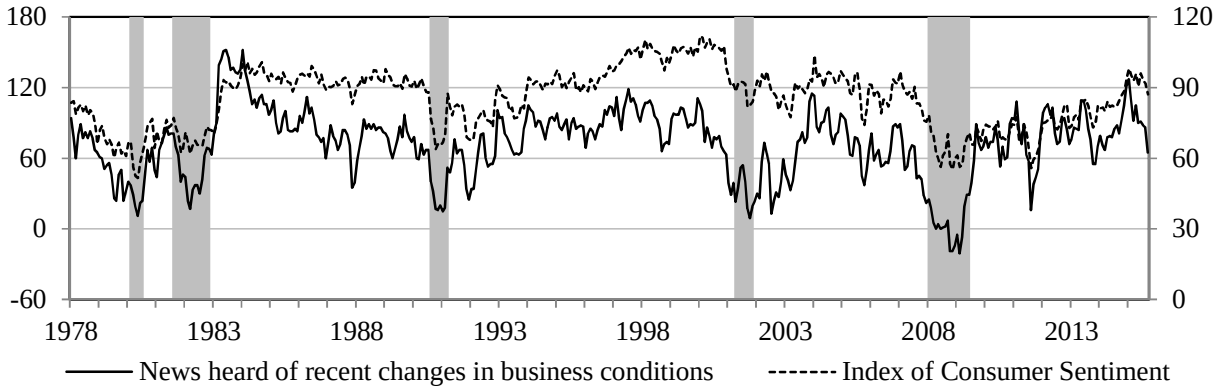
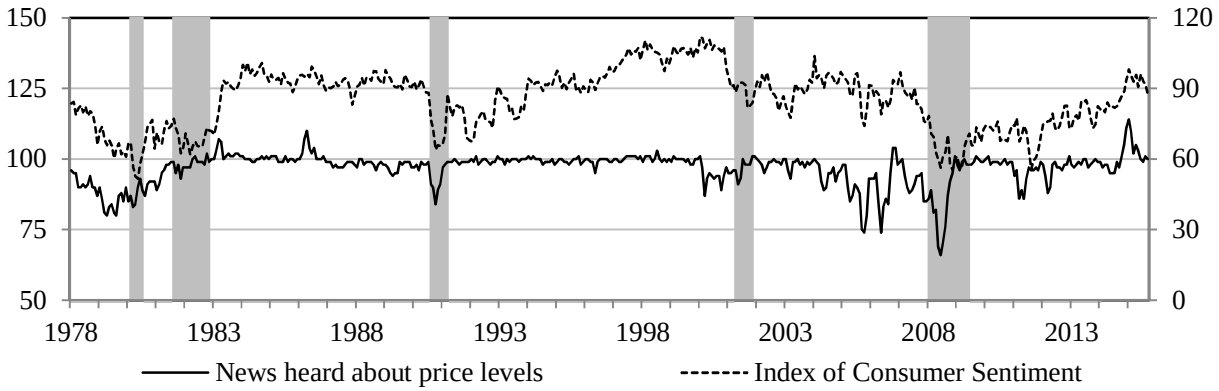


Figure 4 – Balance statistics for selected independent variables

This figure shows the balance statistics constructed based on selected independent variables that have strong effects on consumer sentiment. The Index of Consumer Sentiment (dashed line, on the right axis) is also included as a reference. Shaded areas are NBER recession periods. To clearly display the dynamics in each series, we use different scales in each plot. Data from Jan 1978 to September 2015.





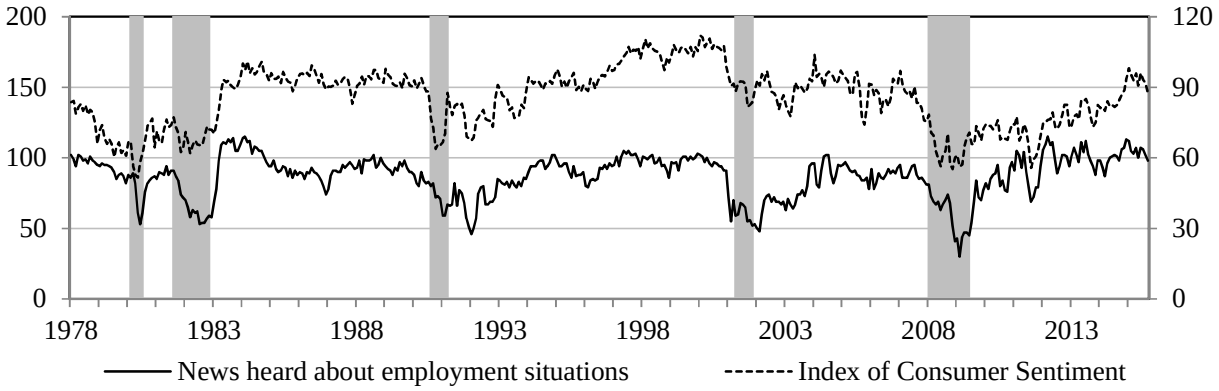


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Figure 4 – Balance statistics for selected independent variables (Continue)

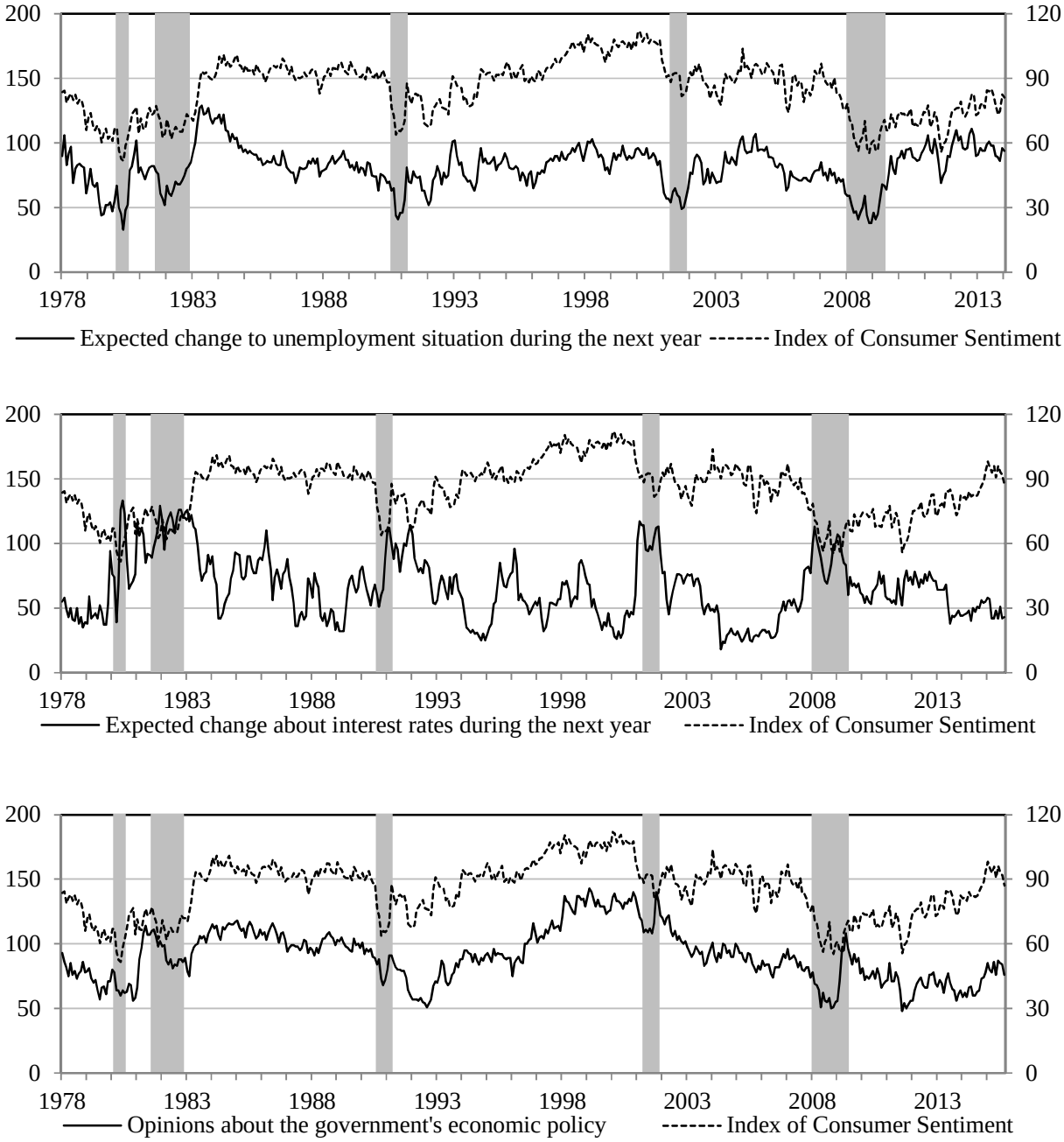

Figure 5 – Distribution of aggregate measures of sentiment

This figure shows the distribution of aggregate measures (balance statistics) of each of the 5 components of consumer sentiment index. As a reference, the distribution of ICS index is plotted as well. However, since the ICS is scaled such that the values in 1966 is 100, the levels of ICS is not directly comparable with its components. Therefore, this figure plots normalized components of sentiment, where the normalization is such that the simple average of the five normalized components equals the sentiment index (ICS). Data from June 1979 to September 2015.