

The CEA-CNET Consumer Sentiment Indexes

by Shawn G. DuBravac, CFA¹

Life is largely a matter of expectation. - Horace

Introduction

In 2005, the Consumer Electronics Association (CEA)[®] in partnership with CNET began testing a measure of consumer sentiment through a survey of individuals in CNET's then maintained CEA|CNET Tech First Panel. Beginning in January 2007, CEA and CNET began fielding a similar series of questions on a monthly basis through a random-digit-dial phone survey. These questions gauge consumer sentiment on the broader economy in general and technology specifically and have since collectively become the CEA-CNET Consumer Sentiment Indexes. The following outlines the motivation behind the creation of the CEA-CNET Consumer Sentiment Indexes – including a brief overview of other consumer sentiment indicators and a sketch of the methodological differences between the newly-minted CEA-CNET Consumer Sentiment Indexes and indicators currently available to market observers. The article concludes with an exploration of the statistical characteristics of the CEA-CNET Consumer Sentiment Indexes including an examination of their ability to capture complex economic activity.

The University of Michigan's Index of Consumer Sentiment and the Conference Board's Consumer Confidence Index

The University of Michigan's Index of Consumer Sentiment and the Conference Board's Consumer Confidence Index are the two most cited measures of consumer sentiment. The University of Michigan's Surveys of Consumers was founded in 1946 under the direction of George Katona. They began publishing the Index of Consumer Sentiment (ICS) in November 1952 – updating it three times a year. From 1960 through 1977 the ICS was published quarterly and since 1978 has been published on a monthly. While each survey contains approximately 50 questions, the ICS is made up of just five of these questions – each with three response options.²

The University of Michigan survey is fielded to approximately 500 randomly selected individuals – representative of the continental United States (i.e., excluding Alaska and Hawaii). It includes a rotating panel design whereby approximately 60 percent of respondents are first-time respondents and 40 percent are re-interviewed from previous surveys over the prior six months. The index is derived by first adding 100 to a diffusion measure between the positive and negative responses for each of the five questions. These are then rounded to the nearest whole number and summed. The sum of these numbers is then divided by 6.7558 to create an index from the base period of 100 set in February 1966. Lastly, to correct for sample design changes implemented in the 1950s, 2.0 is added to the derived number to finalize the index.

The base period of February 1966 and a corresponding index reading of 100 actually suggests some degree of optimism in the economy as it would require 66 percent of respondents to give positive

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² See Appendix I for a list of these 5 questions

responses on the economy and 34 percent to give negative responses.³ See Curtin (1982), Bram and Ludvigson (1998), and Wiandt (2004) for an in-depth explanation of the University of Michigan's Index of Consumer Sentiment.

The Conference Board's Consumer Confidence Index began as a bimonthly survey in 1967 and since 1977 has been published on a monthly basis. The Conference Board fields its survey to a representative sample of 5,000 households through a mailed questionnaire, receiving an approximate response rate of 70 percent. Like the University of Michigan's Index of Consumer Sentiment, the Consumer Confidence Index is derived from five questions and the survey provides respondents with three reply options – positive, negative, or neutral. Positive responses are expressed as a ratio percentage of the total of the positive and negative responses. A separate index is computed for each of the five questions and these are subsequently adjusted for seasonal variation and then arithmetically averaged to create the main index, which has a base year of 1985. See Linden (1982) and Bram and Ludvigson (1998) for more information on the Conference Board's Consumer Confidence Index.

The Predictive Power of Consumer Sentiment Measures

With consumer spending representing two-thirds of the U.S. economy, analysts are keenly interested in being able to measure consumer sentiment on an on-going basis and augment more traditional model-based approaches to forecasting with qualitative measures of consumer sentiment. Academic literature is filled with studies examining the predictive power of consumer sentiment measures like the ICS and the Consumer Confidence Index. For example, Fair (1971) finds the Index of Consumer Sentiment does a good job of explaining both durable and nondurable consumer expenditures. Mishkin (1978) posits the Index of Consumer Sentiment reflects consumer perceptions of the likelihood of financial distress which effects the decision to purchase durable goods. Mishkin in turn finds the Index of Consumer Sentiment does a good job of predicting spending on consumer durables – specifically when balance-sheet data are absent from the model.

Several other studies find positive aspects to the Index of Consumer Sentiment. For example, Carroll et al. (1994) find the Index of Consumer Sentiment has some explanatory power for measuring change in future household spending. Matsusaka and Sbordone (1995) find a relation between the Michigan Index of Consumer Sentiment and GDP growth. Consumer sentiment indexes have a unique advantage to other data because they are available in "real-time." For example, Howrey (2001) finds the first-month value of ICS is a statistically significant predictor of the full-quarter value of several categories of consumption growth. Recently, Gelper et al (2007) also found that the Index of Consumer Sentiment has predictive power for future consumer consumption.

Examining the Conference Board's Consumer Confidence Index, Batchelor and Dua (1998) find the consumer confidence index would have helped predict the 1991 recession – though the results did not generalize to other years. Bram and Ludvigson (1998) find the Consumer Confidence Index provides information about future consumer spending. Slacalek (2003) finds both the Index of Consumer Sentiment and the Consumer Confidence Index have statistically significant out-of-sample forecasting power for three-month consumption growth. Finally, Ludvigson (2004) finds that both the Index of Consumer Sentiment and the Consumer Confidence Index have modest incremental forecasting power for total personal consumer expenditure growth. While there remains significant debate about how

³ ie $100 + 66 - 34 = 132$, $132 \times 5 = 660$, $660 / 6.7558 = 97.7$, $97.7 + 2 \approx 100$

useful qualitative measures of consumer sentiment are in absolute terms, research-to-date suggests measures of consumer sentiment can prove very valuable on the margin when predicting future consumer spending and overall economic health.

Methodology behind the CEA-CNET Consumer Sentiment Indexes

Both the University of Michigan's Index of Consumer Sentiment and the Conference Board's Consumer Confidence Index are widely cited by financial market commentators and as illustrated in the previous section – are extensively studied. Both indexes benefit from a long historical time-series and also hold a prominent position because few viable alternatives for measuring consumer sentiment over time exist. In creating the CEA-CNET Consumer Sentiment Indexes, CEA and CNET have sought to leverage the positive attributes of the other indexes preceding the formation of the CEA-CNET Consumer Sentiment Indexes while minimizing the inherent weaknesses in their respective methodologies.

There are several strengths of qualitative measurements of consumer sentiment like the Index of Consumer Sentiment and the Consumer Confidence Index. First, these metrics are captured on a regular interval (i.e. monthly). Second, measures of consumer sentiment are released on a very timely basis. Because many quantitative measures of economic health are available only with a lag of up to several months, having a metric available during the current month can prove extremely valuable for analysts and forecasters looking for a real-time reading of the economy.

The CEA-CNET Consumer Sentiment Indexes was designed to improve on weaknesses of the Index of Consumer Sentiment and the Consumer Confidence Index by asking consumers about their expectations in the form of subjective probabilities. In modeling choice, economists typically assume individuals faced with partial information will form probabilistic expectations to fill voids and allow individual agents to maximize expected utility. Manski (2004) argues researchers would be better served to “measure expectations in the form called for by modern economic theory; that is, subjective probabilities.”

A simple example of a probabilistic expectation question is as follows:

What do you think is the percent chance that it will rain tomorrow?

Survey respondents then respond with an answer between zero percent and 100 percent. Manski (2004) highlights three compelling advantages to subjective probabilistic questioning:

- 1) Probability provides a well-defined, absolute numerical scale for responses – therefore, responses may be interpersonally comparable.
- 2) Researchers can use the algebra of probability (Bayes Theorem, the Law of Total Probability, etc.) to examine the internal consistency of a respondent's expectations around different events.
- 3) When probability has a frequentist interpretation, one can compare elicited subjective probabilities with known event frequencies and reach conclusions about the correspondence between subjective beliefs and frequentist realities

Economists began eliciting probabilistic expectations in the early 1990s. Guiso et al (1992), using probabilistic expectation questions inserted in the Bank of Italy Survey of Household Income and Wealth explore the effect earnings uncertainty has on savings and wealth accumulation. Hurd and McGarry

(1992), using the Health and Retirement Study, find respondent's reported probabilities aggregate closely to life table values and covary appropriately with known risk factors. Hurd and McGarry (2002) followed on to find that the subjective survival probabilities also predicted actual survival. Those who survived in the panel reported probabilities approximately 50 percent greater at baseline than those who died.

Dominitz and Manski (1997) use probabilistic questions from the Survey of Economic Expectations to study the cross-sectional variation in income expectations. Dominitz, Manski, and Heinz (2003) use the Survey of Economic Expectations to explore perceptions of Social Security benefits and Manski and Straub (2000) use it to study perceptions of job security. Researchers have used probabilistic expectations to measure expectations of equity returns (Dominitz and Manski, 2005), income expectations of emigrants (Mckenzie et al, 2007), and portfolio choice among retirees (Dominitz and Manski, 2007).

Despite a myriad of studies that have leveraged probabilistic questioning to explore consumer expectations, no study has used this methodology to measure consumer expectations on a continuous basis until now with the release of the CEA-CNET Consumer Sentiment Indexes.

Surveys like the Index of Consumer Sentiment and the Consumer Confidence Index inhibit respondents from expressing uncertainty. The CEA-CNET Consumer Sentiment Indexes attempt to overcome this shortfall inherent in traditional attitudinal research. Dominitz and Manski (2003) illustrate this point as follows:

Consider, for example, the question: "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?" How do respondents interpret the phrase "better off financially?" Do different respondents interpret the phrase in the same way? How do respondents who are uncertain of their future prospects answer the question?

Following Dominitz and Manski's recommendations, the CEA-CNET Consumer Sentiment Indexes designed questions to "elicit interpersonally comparable expectations of well-defined events. Importantly, the questions elicit expectations in the form called for by modern economic theory; that is, in the form of subjective probabilities." In other words, as opposed to asking consumers if they will be "better off," "worse off," or "about the same," the CEA-CNET Consumer Sentiment Indexes survey allows respondents to indicate a range of uncertainty in their response by providing them with the ability to give their subjective probabilistic expectations.

Each month, CEA and CNET survey a sample of 1,000 individuals weighted to be representative of the United States population.⁴ The survey asks several subjective probability questions regarding the outlook for the state of the U.S. economy and spending on consumer technologies.⁵ From these results, two indexes are derived: the CEA-CNET Index of Consumer Expectations (ICE) and the CEA-CNET Index of Consumer Technology Expectations (ICTE).

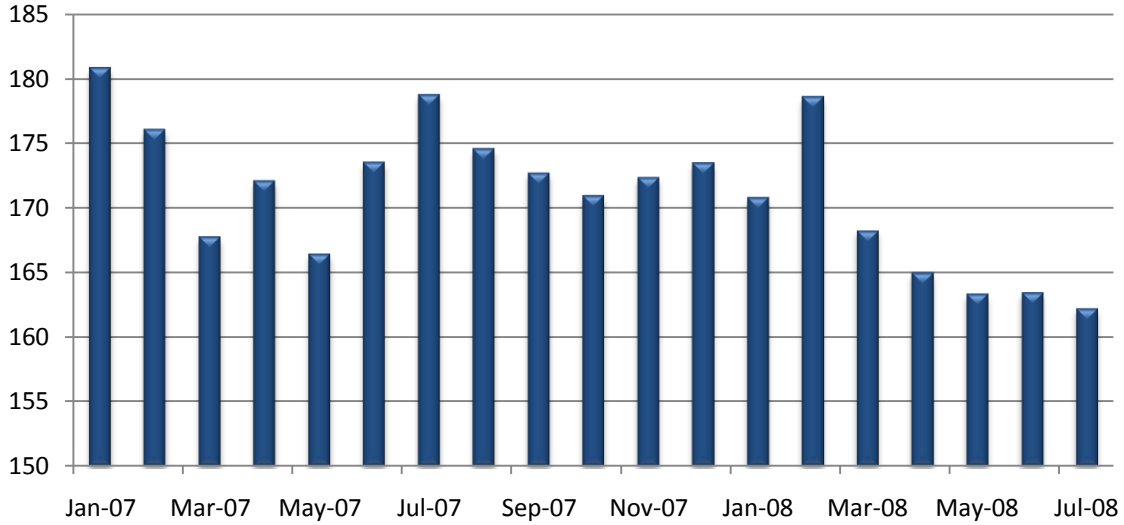
⁴ See Appendix II for a list of the weights.

⁵ See Appendix III for a full list of the questions asked in the CEA-CNET survey.

The CEA-CNET Index of Consumer Expectations is derived as follows:

$$ICE_t = \sum \left(\frac{\sum_{i=1}^n cc2a}{n} + \left(100 - \frac{\sum_{i=1}^n cc2d}{n} \right) + \frac{\sum_{i=1}^n cc2e}{n} \right)$$

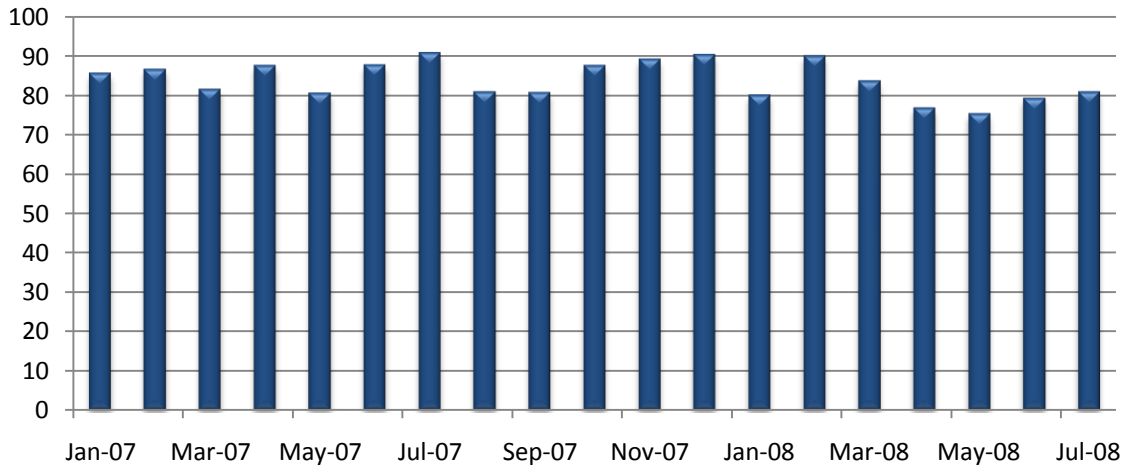
CEA-CNET Index of Consumer Expectations



The CEA-CNET Index of Consumer Technology Expectations is derived as follows:

$$ICTE_t = \sum \left(\frac{\sum_{i=1}^n cc3a}{n} + \frac{\sum_{i=1}^n cc3b}{n} \right)$$

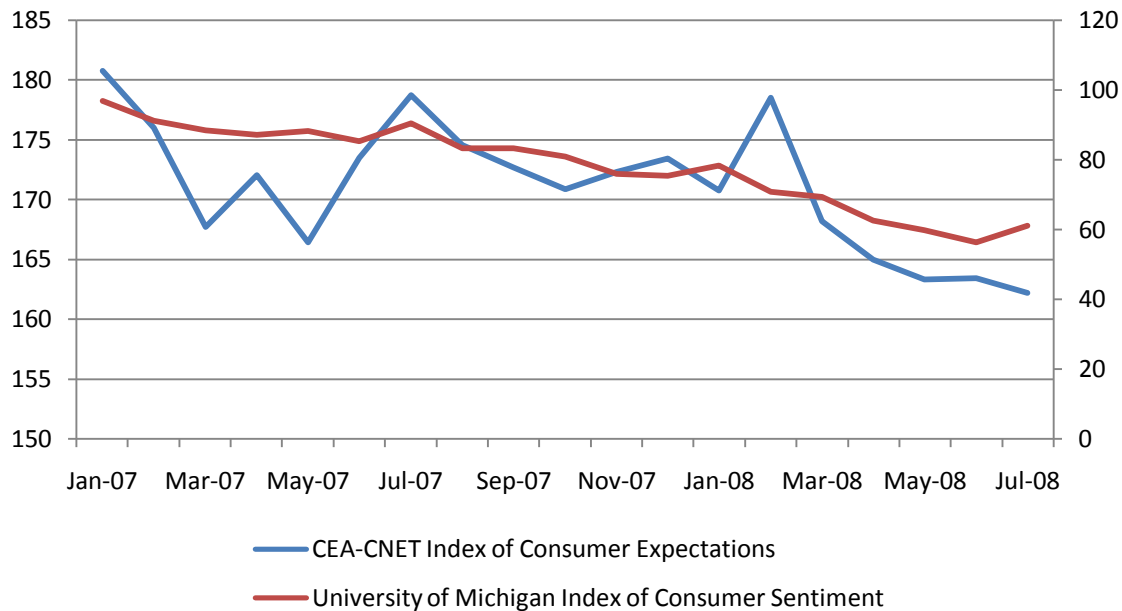
CEA-CNET Index of Consumer Technology Expectations



Defining Characteristics of the CEA-CNET Consumer Sentiment Indexes

There are several defining characteristics highlighting the value of the methodology underlying the CEA-CNET Indexes. First, as the chart below highlights, the CEA-CNET Index of Consumer Expectations and the University of Michigan's Index of Consumer Sentiment are highly correlated – with a correlation coefficient of 0.71. This high degree of correlation suggests the indexes are capturing some of the same information and therefore the CEA-CNET Index of Consumer Expectations can be used in largely the same way the Index of Consumer Sentiment is currently being used by analysts and forecasters.

Comparing the CEA-CNET ICE and the Michigan Index of Consumer Sentiment



Second, as Dominitz and Mansk (2003) find, attitudinal research tends to show less volatility when the questionnaire asks about topics relative to the respondent as opposed to broader, more removed topics. For example, respondents show less volatility in their responses when asked about their own financial outlook than when asked about general business financial conditions. Both the Index of Consumer Sentiment and the Conference Board's Consumer Confidence Index include questions about broad, ambiguous topics like "business conditions," while the CEA-CNET Indexes are derived largely from questions pertaining to the respondent's own self. The risk for both the University of Michigan and the Conference Board is that month-to-month changes in the index are driven by spurious volatility in the responses to questions about large, removed events for which the respondents are uncertain in their reply because of the distance of the question from their own personal experiences.

Third, as Dominitz and Mansk (2003) further note, qualitative questions — as opposed to probabilistic questions — have a higher Spearman rank correlation, suggesting qualitative survey data like the two currently available indexes provide relatively more overlapping information on consumer expectations than probabilistic questions. In other words, probabilistic questions provide more distinct information.

Dominitz and Mansk (2003) find the rank correlation of all pairs of the qualitative variables in the University of Michigan Index of Consumer Sentiment survey range from 0.72 to 0.93. As is illustrated in the table below, data from the CEA-CNET Indexes survey exhibit significantly lower Spearman rank correlations. This suggests each question within the CEA-CNET Indexes captures unique information from the other questions. This finding is especially meaningful for the two questions used in deriving the CEA-CNET Index of Consumer Technology Expectations. As respondents are providing unique insights into their financial well-being as well as their outlook for the broader economy and technology spending for each question – compared to providing a general sentiment across all the questions asked.

Table 1: Spearman Rank Correlations for CEA-CNET Index Variable Pairs

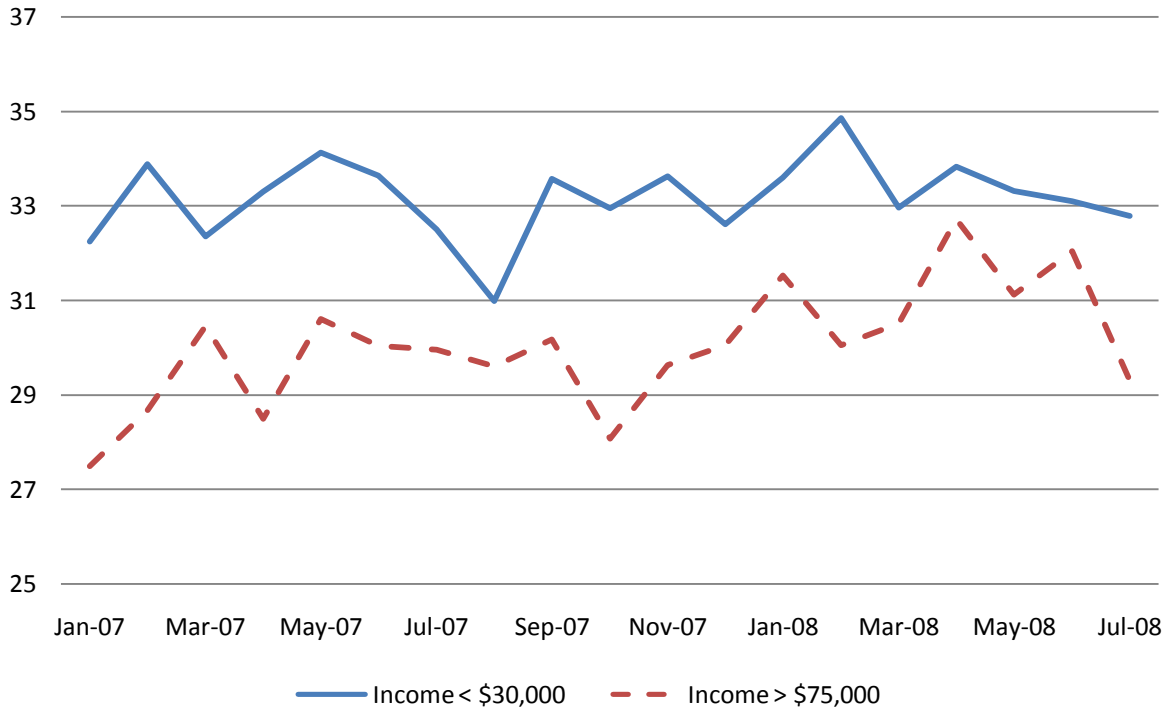
	CC2a	CC2b	CC2c	CC2d	CC2e	CC2f	CC3a	CC3b	CC3c
CC2a	100%								
CC2b	-67%	100%							
CC2c	5%	25%	100%						
CC2d	-16%	53%	84%	100%					
CC2e	42%	-34%	-47%	-51%	100%				
CC2f	1%	34%	87%	78%	-66%	100%			
CC3a	30%	-36%	-18%	-36%	75%	-42%	100%		
CC3b	50%	-27%	-26%	-31%	86%	-40%	84%	100%	
CC3c	20%	-5%	50%	41%	-23%	49%	-32%	-29%	100%

One final characteristic of the data is worth mentioning. In a cross section of individuals, it is likely some of the observed differences in responses will reflect lack of knowledge as opposed to deeply seated beliefs. This is confirmed in the CEA-CNET data by the fact that the cross-sectional standard deviation for the survey questions differs across certain respondent characteristics. For example, the time series of cross-sectional standard deviations for question CC2e – the percent chance that the respondent will be better off financially in the future – is shown in the following graph.

The chart depicts both the disagreement between these two groups as well as the disagreement within these two groups. As the chart illustrates, those with higher incomes have less within-group disagreement about their future financial well-being. Also consistent with other research studies, the disagreement within-group for the segment making more than \$75,000 annually increases as the economy in general and the financial markets specifically has weakened since the beginning of 2007. On

the other hand, uncertainty of opinion for the segment of the population earning between \$30,000 and \$50,000 does not tend to vary significantly over this same time period.

Uncertainty about Being Financially Better Off



Conclusions

Economists have traditionally found fault in attitudinal research. The CEA-CNET Indexes have sought to overcome some of the weaknesses inherent in attitudinal research by attempting to measure consumer sentiment overtime using probabilistic measures of consumer opinion. The addition of the CEA-CNET Indexes provides market observers with additional information from which to make informed discussions. While the CEA-CNET Indexes remain in their infancy, they provide a promising metric of consumer sentiment, as well as a new dataset from which to study consumer expectations.

Appendix I: The Questions Constituting the University of Michigan's Consumer Sentiment Index and the Conference Board's Consumer Confidence Index

Questions constituting the University of Michigan Consumer Sentiment Index

- 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? **[better/same/worse]**
- 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? **[better/same/worse]**
- 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? **[good times/uncertain/bad times]**
- 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? **[good times/uncertain/ bad times]**
- 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? **[good time to buy/uncertain, depends/bad time to buy]**

Questions constituting the Conference Board's Consumer Confidence Index

- 1) How would you rate present general business conditions in your area? **[good/normal/bad]**
- 2) What would you say about available jobs in your area right now? **[plentiful/not so many/hard to get]**
- 3) Six months from now, do you think business conditions in your area will be **[better/same/worse]**?
- 4) Six months from now, do you think there will be **[more/same/fewer]** jobs available in your area?
- 5) How would you guess your total family income to be six months from now? **[higher/same/lower]**

Appendix II: Target Weights Used in Deriving CEA-CNET Consumer Sentiment Indexes

	2007	2008
Gender		
Male	48.4%	48.4%
Female	51.6%	51.6%
Region		
Northeast	18.9%	18.7%
Midwest	22.4%	22.3%
South	36.4%	36.5%
West	22.3%	22.5%
Age		
Ages 18-24	12.7%	12.8%
Ages 25-34	18.0%	17.9%
Ages 35-44	19.6%	19.2%
Ages 45-54	19.5%	19.5%
Ages 55-64	14.1%	14.4%
Ages 65+	16.1%	16.2%
Race		
Hisp	13.0%	13.4%
Non Hisp White	69.8%	69.3%
Non Hisp Black	11.3%	11.3%
Education		
Age 18-24	12.7%	12.8%
Age 25+, Less than HS Grad	12.7%	12.4%
Age 25+, HS Grad or GED	27.7%	27.6%
Age 25+, Some College	22.5%	22.1%
Age 25+, College Grad	24.4%	25.1%

Appendix III: The Questions Constituting the CEA-CNET Consumer Sentiment Indexes

This and the following questions are about future, uncertain outcomes. In each case, try to think about the whole range of possible outcomes and think about how likely they are to occur during the specified time period.

Some questions will ask about the PERCENT CHANCE of something happening. The percent chance must be a number between zero and one hundred. Numbers like 2 or 5 percent may be “almost no chance,” 20 percent or so may mean “not much chance,” a 45 or 55 percent chance may be a “pretty even chance,” 80 percent or so may mean a “very good chance,” and a 95 or 98 percent chance may be “almost certain.”

The percent chance can also be thought of as the NUMBER OF CHANCES OUT OF 100.

- CC1 Let’s start with the weather where you live. What do you think is the PERCENT CHANCE that it will rain or snow tomorrow? [RECORD PERCENT FROM 0-100, -1 FOR DON’T KNOW]
- CC2 What do you think is the PERCENT CHANCE that [INSERT]? [RECORD PERCENT FROM 0-100, -1 FOR DON’T KNOW]
- A. The U.S. economy will be in BETTER shape 12 months from now
 - B. The U.S. economy will be in WORSE shape 12 months from now
 - C. Someone you know will lose their job in the next 12 months
 - D. [ASK IF CURRENTLY EMPLOYED, S1A (01-02)] You will lose your job in the next 12 months
 - E. You will be BETTER OFF financially in the next 12 months
 - F. You will be WORSE OFF financially in the next 12 months
- CC3 What do you think is the PERCENT CHANCE that [INSERT]? [RECORD PERCENT FROM 0-100, -1 FOR DON’T KNOW]
- A. You will purchase any consumer electronics product in the next 12 months
 - B. You will spend MORE on consumer electronics products in the next 12 months compared to the last 12 months
 - C. You will spend LESS on consumer electronics products in the next 12 months compared to the last 12 months

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