

Division of Economics
A.J. Palumbo School of Business Administration and
McAnulty College of Liberal Arts
Duquesne University
Pittsburgh, Pennsylvania

A Survey Analysis of the Relationships between Economic News
and Consumer Behavior

John W. Heisler IV

Submitted to the Economics Faculty
in partial fulfillment of the requirements for the degree of
Bachelor of Science in Business Administration in Economics

December 2009

Faculty Advisor Signature Page

Amy Phelps, Ph.D.
Assistant Professor of Quantitative Sciences

Date

Pinar Geylani, Ph.D.
Assistant Professor of Economics

Date

A SURVEY ANALYSIS OF THE RELATIONSHIPS BETWEEN ECONOMIC NEWS AND CONSUMER BEHAVIOR

John W. Heisler IV, BSBA

Duquesne University, 2009

Abstract

The news media affects consumer attitudes by processing and relaying relevant social, political, and economic information. Through an experimental survey designed to capture consumer sentiment and expectations, this paper provides insight into the direct effects of economic news on these variables. Furthermore, this research examines how modified expectations affect consumption decisions in a simulated purchase environment. Results indicate a relationship between the economic news participants receive and individual measures of consumer expectations; yet, survey results suggest only a marginal, non-significant relationship between sentiment and economic news. The data also shows that a relationship exists between consumer sentiment and purchase decisions in a simulated durable goods market. However, survey results do not suggest a correlation between economic news and consumer purchase decisions.

JEL Classifications: D10, D12, D14

Key Words: Media, consumer sentiment, consumer expectations, consumer purchase decisions, media bias

Table of Contents

I. An Overview of the Role of the Media in Economic Behavior	4
II. Literature Review	8
II. Methodology	11
A. The Survey	11
B. Hypotheses	14
III. Models.....	15
A. Analysis of Variance for Differences between Stimulus Groups	16
B. Logistic Regression for Modeling Likelihood of Purchase	16
C. Ordinary Least-Squares Regression for Modeling Willingness-to-Pay.....	18
IV. Results.....	19
A. Analysis of Differences in Sentiment and Expectations.....	19
B. The Impact of Consumer Sentiment, Consumer Expectations, and Economic News on Likelihood of Purchase	22
C. The Impact of Consumer Sentiment, Consumer Expectations, and Economic News on Willingness-to-Pay.....	26
V. Summary of Results and Economic Implications	29
VI. Conclusions and Suggestions for Future Research.....	32
VII. References	35
Appendix A1: “R-Word” Index	37
Appendix B1: Consumer Sentiment Survey Questions	38
Appendix B2: Simulated Purchase Decision Questions	40
Appendix B3: Experiment Stimuli.....	44
Appendix C1: Univariate Tests.....	47
Appendix C2: Equal Variance Tests.....	49
Appendix C3: Likelihood of Purchase Covariate Model.....	50
Appendix C4: Willingness-to-Pay Covariate Model	51
Appendix D1: Likelihood of Purchase (Consumer Expectations).....	52
Appendix D2: Odds Calculation Example.....	54
Appendix D3: Willingness-to-Pay (Consumer Expectations)	55

I. An Overview of the Role of the Media in Economic Behavior

The role of media has been studied in terms of its effects on economic development (Coyne and Leeson 2004, Djankov *et al* 2001), government accountability (Stiglitz 2002), consumer sentiment (Doms and Morin 2004), political outcomes (Behr and Iyengar 2001), and overcoming public choice problems (Sen 1999). This body of research offers many conclusions, but all support one unified idea: knowledge is power. In some respects, better-informed individuals lead to a better society. However, there is a point where information and the market structures through which it is distributed can be misleading and detrimental to the general welfare of American society. Research on consumer expectations of the economy and their relationship to economic reporting by mass media is limited. Furthermore, little research has investigated the way those modified expectations translate into consumption decisions.

The foundations of political philosophy and regulatory policies in the United States strongly support the theory that in competitive news markets the truth will prevail. However, a great deal of research has questioned this theory. There are obvious consequences of a competitive market structure in which truthful information is provided by organizations that seek to maximize profits through increased readership and viewership.¹ While the competitive structure provides encouragement for truthful information, it also incentivizes embellishment and sensationalism. As Prat and Stromberg (2005) note, firms who are insulated from the product market, such as the BBC and NPR, are often viewed as particularly informative and trustworthy. Even in the presence of competition, Schauer (1986) shows that prevalent false conclusions and misrepresentations in the media can be maintained for extended periods of time, with no

¹ The consequences of demand-driven bias are specified by Gentzkow and Shapiro (2008). These consequences include: distorted information to favor consumer's prior beliefs (ideological bias), and embellishment of the facts to create a more interesting story (sensationalism bias).

apparent remedy. Furthermore, as Mullainathan and Shleifer (2005) show, increased competition in the news market can support demand-driven bias by allowing consumers to easily self-segregate, and avoid information contradicting their prior beliefs. The effects of these issues are immediate in terms of political discourse, but the impact is not so clear in economics.

The research of Doms and Morin (2004) indicates instances when the tone and volume of the media's coverage of the economy differs from the actual state of the economy. An initial indication of the presence of this discrepancy is apparent in the "R-word index" published by *The Economist*. This index is solely designed to represent the number of articles containing the word "recession" in *The Washington Post* and *The New York Times*. Although the index is a very basic measure of the economic sentiment expressed in the media, it indicates specific periods in which the information provided by these publications differs from the actual state of the economy. Doms and Morin note that peaks in the index during the early 1990's are greater than the peaks during the early 1980's. As the economic decline in the early 1980's was comparatively worse than decline in the early 1990's, the explanations for this inconsistency are unclear.² This paper argues that the potential presence of such discrepancies have implications for consumer confidence and consumer expectations. Doms and Morin challenge future research with an important question which this paper seeks to investigate: "[Do] media-induced effects on sentiment have any meaningful impact on economic activity?" (Doms and Morin, 2004, p. 26).

The Survey of Consumers emphasizes the importance of consumer saving and spending practices and their role in the national economy. Katona (1975) holds that consumer sentiment is designed to capture the psychological motives which affect consumption behavior. Specifically, the index is expected to represent a general "willingness to buy." Katona's research shows that sentiment influences discretionary, infrequent, and planned purchases. The Survey responses are

² See Appendix A1 for R-Word Index.

used to calculate indices designed to measure consumer expectations on a national scale and to empirically represent consumer expectations for applications in econometric models. Because several studies have found a relationship between sentiment and consumption, the Index of Consumer Expectations is included in the Leading Indicators Composite Index published by the Bureau of Economic Analysis.³ In this analysis of the relationships between economic information expressed in the media and consumer behavior, we use elements of the Survey to empirically represent expectations in light of economic news.

Matusaka and Sbrodone (1995) find evidence of a significant relationship between the Index of Consumer Sentiment and GDP. Their estimates indicate that between 13% and 26% of variation in GDP is attributable to variations in consumer sentiment. As household consumption is a significant portion of GDP in the United States, this conclusion supports the idea that sentiment impacts consumption. Based on this research and previous research regarding the relationship between the media and consumer sentiment, as well as consumer expectations, there is support for a relationship between the news media and consumer purchase decisions.

Current literature still provides mixed evidence about how consumer sentiment and economic expectations are formed; this study seeks to add information to this body of research by testing for the presence of a direct relationship between economic news and consumer confidence. As Doms and Morin (2004) note, the relationship between economic information provided by the news media and the formation of consumer sentiment is logical based on the high costs of forming economic expectations through alternative means.⁴ What remains unclear about this conclusion is how consumers alter their expectations in light of information gleaned

³ After controlling for potential confounding factors Carrol, Fuhrer and Wilcox (1994) find that there is a relationship between consumption and sentiment as well as economic expectations. Recently, similar results were found by Souleles (2004).

⁴ Alternative means include forming expectations based on limited personal experiences or by obtaining, processing, and analyzing raw data and government reports such as the monthly industrial production report.

from the media and what economic impact this may have. The question this research asks is: Do consumers alter their expectations in a direct manner according to information provided by the media; in essence, can the media directly alter consumer sentiment and economic expectations? If so, do these modified expectations have a meaningful impact on consumer purchase decisions?

Prior research has examined the relationship between the media's reporting on economic conditions and consumer confidence in a time-series format at the aggregate level. While the conclusions indicate that there is a relationship, they fail to transcend the gap and show what effects this may have on consumption decisions. This study examines the preceding questions through an experimental survey format. This investigative method allows for a closer examination of individual level effects of economic news on consumer sentiment and expectations. The experimental design also permits a controlled manipulation of the economic information provided by the media. In manipulating the news stimulus that the participants are exposed to, a cross-sectional analysis permits the comparison of responses from each stimulus group. The relationship between the media and sentiment is assessed across three-dimensions. First, I examine the differences in individual level responses, across stimulus groups, to questions designed to measure consumer sentiment and economic expectations. Second, I look at the impact of consumer sentiment and consumer expectations on consumption decisions within a simulated durable goods market. Third, I examine the relationship between the media stimulus groups and participant consumption decisions within a simulated durable goods market.

Results indicate a significant relationship between economic news and consumer expectations. However, the data suggests only a marginal relationship between consumer sentiment and economic news. Participant responses show a relationship between purchase decisions within a simulated goods market and individual level measures of consumer sentiment

and expectations. Survey data does not suggest a relationship between economic news stimuli and consumer purchase decisions.

II. Literature Review

Doms and Morin (2004) analyze the relationship between the tone and volume of economic reporting relative to the actual prevailing economic events. Their findings indicate that there are periods in which the volume of economic reporting is not consistent with actual economic effects; during these periods, consumer sentiment deviates from what economic fundamentals suggest. Their research applies vector autoregressive models to examine the dynamic relationship between consumer confidence and a self-constructed composite news index. Doms and Morin find that upon controlling for the current and forecasted state of the economy, a 1 percentage point increase in their index of articles which mention the word “Recession” is associated with a 0.102 percentage point decline in the Index of Consumer Sentiment. Similarly, the data indicates that a 1 percentage point increase in their index of articles which mention the word “Layoff” is associated with a 0.05 percentage point decline in the Index of Consumer Sentiment. This relationship between the media and consumer sentiment is particularly important because other studies have found a connection between consumer sentiment and aggregate consumption expenditures.

Carroll, Fuhrer and Wilcox (1994) examine the explanatory power of consumer sentiment on consumption behavior in the United States. By some estimates, household consumption in the US accounts for approximately 65% of national GDP fluctuations; therefore, small changes to household consumption have major macroeconomic implications. Their findings indicate that lagged values of consumer sentiment explain approximately 20% of the variation in durable goods consumption between 1972 and 1992. Consumer sentiment as a contemporaneous

indicator of consumption lends evidence to traditionally accepted permanent-income models of consumption. These models hold that consumption is determined solely by individuals' incomes over their lifetimes; to that end, current spending would fully reflect optimistic or pessimistic future income expectations. Yet, the effectiveness of consumer sentiment as a predictive indicator undermines the permanent-income model of consumption. These findings could suggest that changes in consumer sentiment and economic expectations independently impact economic outcomes.

After the 1992 presidential election, theories surfaced which charged the national media outlets with 'over-reporting' the negative economic conditions in an effort to prevent the election of the incumbent political party. Goidel and Langley (1995) investigate these charges by examining the role of media in economic and political outcomes. Their research looks at both the independent effects as well as the accuracy of media's coverage of the economy and their relation to real changes in economic conditions. The study creates a monthly index of the number and general tone of articles devoted to the economy found on the front page of the *New York Times* from 1981- 1992. The research findings indicate that economic evaluations are influenced by both real economic conditions and by economic news coverage. Regression analysis results show that each additional negative article is associated with a 0.5 percentage point decrease in the Index of Consumer Sentiment. Their research also shows that increases in aggregate economic evaluations are not associated with the appearance of positive news articles. Conclusions indicate that, by highlighting negative economic conditions, media coverage of the economy may make the public more pessimistic in their future economic evaluations.

Thoop (1992) examines the causes and effects of consumer sentiment. One interesting finding of this research indicates an element of consumer sentiment overlooked by Doms and

Morin (2004) and Goidel and Langley (1995). Thoop finds that deviations in consumer sentiment noted in 1991 do indeed differ from what economic fundamentals may suggest. By examining the root-mean-squared forecast errors of consumer sentiment on durable goods purchases, his research indicates that because sentiment is a psychological indication of consumer attitudes, this deviation may be related to the escalation of the Gulf War. His findings show that when sentiment and economic fundamentals diverge, consumer spending on durable goods tends to follow sentiment. These findings show that major economic and political events alter expectations of economic conditions relative to the perceived current conditions. Thoop's findings indicate that during "normal times" consumer sentiment and consumer expectations function as effective measures of household's perceptions of whether it is a good or bad time to buy major household items.

Information theory plays a significant underlying role in this research. The theory of rational expectations and the assumption that individuals code macroeconomic information efficiently provide a framework for this analysis. To say that individuals code information efficiently is not to say that coding is free of idiosyncratic bias; rather, it necessitates individual responses to market signals based on internal processing constraints. As Sims (2003) proposes in his theory of rational inattention, the stochastic components of information coding arise from coding inaccuracy or the need to approximate detailed information with simpler approximations. To the degree that requirements of individual level coding are similar, individuals rely on common sources of coded information. My research employs one of the most popular information coding mechanisms, newspapers.⁵

⁵ Blinder and Kreuger (2004) find that the most popular sources of economic information in the United States are television and newspapers respectively.

Newspapers provide readers with an information coding service based on the content, placement, size, tone, and volume of information on a given topic. Referencing Sims (2003), consider the following example: Newspapers regularly publish treasury yields in a similar location within the publication; many readers often overlook these figures and therefore make no behavioral adjustments. However, if the New York Times prints a front-page article entitled, “TEN YEAR TREASURY NOTES HIT HIGHEST YIELD IN DECADES, 5.2%,” the placement, tone, and volume of information about this commonly available figure could elicit an uncommon behavioral response. Through this channel of information processing and coding, newspapers affect behavioral responses to economic information.

II. Methodology

I conducted a controlled experiment to test the direct effects of economic news on consumer sentiment and expectations. The experiment permitted the comparison of changes in consumer sentiment and expectations based on the presence of what participants deemed, as positive, negative, or neutral economic news stimuli. Furthermore, this format allowed for a closer examination of the impact of modified expectations in a simulated purchase environment.

A. The Survey

In this experiment, measures of consumer sentiment and consumer expectations were observed and consumer purchase decisions of durable goods were simulated based on the likelihood of purchase and willingness-to-pay in a stimulus-based decision task. A sample of 366 volunteers, of which 340 provided complete responses, participated in the experiment. The experiments were created online and taken by individuals representing the average consumer

population.⁶ Each participant took only one variation of the survey and had no knowledge of the other variations.

Slama and Tashchian (1985) specifically identify sex, education, income and stage of family life cycle as factors affecting involvement in purchasing activity. Based on this result, all participants were asked six socioeconomic background question targeting gender, age, income, education, employment status, and homeownership status.

Participants were then randomly redirected to one of three possible surveys. Each survey was identical in terms of the questions but differed only by containing a positive, neutral, or negative economic news article. As a manipulation check, a question asking participants to judge the economic outlook represented in the article as negative, neutral, or positive followed every stimulus. After answering this question, participants were then asked to respond to five questions to calculate a representative measure of consumer sentiment and consumer expectations.⁷ The Index of Consumer Sentiment⁸ and the Index of Consumer Expectations⁹ are traditionally calculated as point estimates based on binary outcomes, which do not permit statistical analysis in a cross-sectional framework.¹⁰ Therefore, this study measures consumer confidence and expectations based on scaled responses. The response measurement scale applied is a seven-point Likert scale. This scale was chosen based on research literature in the field of applied psychology by Symonds (1924), and Lissitz and Green (1975). Their analyses indicate that a seven-point scale reflects an optimal number of points for participants to assess a stimulus.

⁶ The survey was created and hosted at www.DuqEconSurvey.com.

⁷ See Appendix B1 for representative consumer sentiment questions.

⁸ The Index of Consumer Sentiment is calculated based on participant responses to questions 1 through 5 represented in Appendix B1.

⁹ The Index of Consumer Expectations is calculated based on responses to questions 2 through 4 represented in Appendix B1.

¹⁰ See References: Curtin, Richard T. for index calculation procedure resource.

Participants were then asked to answer eight questions designed to simulate purchase decisions. Based on the results of a pretest, four durable goods were selected for the final controlled experiment. Each of the selected items is free of any obvious brand affiliation to minimize confounding preferences. Two of the goods, a refrigerator and cooking range, were chosen to represent necessary, basic durable goods purchases. The second pair of goods, a flat-screen television and a portable GPS, were chosen to represent discretionary durable goods purchases.

In four of the questions, participants were asked to indicate their likelihood of purchase based on a seven-point Likert-type scale for each of the durable goods. Participants were provided with an image of the item, the market price of the good and two general qualities about the product. These general product attributes were chosen based on survey research by Sweeny and Soutar (2001) indicating that durable goods consumption value is most commonly explained by consumers as aspects of brand attributes such as *color, looks, perceived comfort, features, price* and *reliability*. I examine likelihood of purchase as a measurable aspect of a consumer's purchase decision based on research by Infosino (1986). His research interprets likelihood of purchase as a monotonic transformation of value which is simply represented as a point between the specified range provided to the participant. Furthermore, his research examines likelihood of purchase based on a similar Likert-type ten-point scale. Infosino's results indicate that likelihood of purchase functions as a reasonably accurate predictor of new product sales across customer and product price segments.

In the next four questions, participants were asked to indicate the maximum price they would be willing to pay for the same set of durable goods.¹¹ Willingness-to-pay is modeled as one aspect of a consumer's purchase decision based on prior marketing research examining this

¹¹ See Appendix B2 for simulated consumer purchase decision questions.

measure. Appelbaum and Laitinen (1979) define willingness-to-pay (WTP) as the maximum amount of money a consumer would be willing to pay for a product. By investigating WTP, my research attempts to exploit one of the foundational assumptions of this measure; WTP is stochastic at the individual level. This indicates that WTP may vary based on participant's financial sentiments at the time of observation. While proper measures of WTP are still debated in current marketing literature, this paper applies a simple open-ended response method. This specific method was chosen based on the research of Donaldson, Thomas, and Torgerson (1997). Their analysis indicates that a payment scale approach to eliciting WTP may be more accurate in terms of internal validity; however, this method introduces a significant range bias generated by the selection of values presented to respondents.

The randomly assigned stimuli were experimentally designed newspaper articles.¹² To simulate a realistic environment, each article was designed to appear as though it was from a reputable news source. Immediately following the stimulus, participants were asked to judge the economic outlook portrayed in the article they had just read. Response options were based on a seven-point Likert scale ranging from "Strongly positive" to "Strongly negative." Survey results indicate that 92.7% of respondents exposed to the positive stimulus judged it to be positive; of those exposed to the negative stimulus, 89.9% found it to be negative; and 87.3% of respondents exposed to the neutral stimulus judged it to be neutral.

B. Hypotheses

First, following the findings of Doms and Morin (2004), I hypothesize that consumers adjust their confidence and economic expectations according to the information provided in the media. I expect to find that individuals exposed to the positive media stimulus will respond with

¹² See Appendix B3 for experiment stimuli.

higher relative measures of consumer sentiment and economic expectations. Similarly, I expect inverse findings for those exposed to the negative stimulus.

Second, based on the findings of Carroll *et al* (1994) and Thoop (1992), I hypothesize that consumer sentiment and economic expectations will impact participant consumption decisions within the simulated durable goods market. Theory indicates that lower measures of consumer sentiment and economic expectations will be associated with a lower likelihood of purchase and a lower willingness to pay across the set of durable goods. Likewise, I expect to find that higher measures of consumer sentiment and economic expectations are associated with a higher likelihood of purchase and a higher willingness to pay.

Lastly, in combining the findings of Doms and Morin, Carrol *et al*, and Thoop, I hypothesize a relationship between the economic news and decisions made within the simulated durable goods market. Specifically, I theorize that groups exposed to the positive media stimulus express a higher likelihood of purchase, and a higher willingness to pay across the set of durable goods.

III. Models

Initial univariate tests were conducted on the sample population to ensure that any potential covariate demographics were not statistically different between stimulus groups.¹³ Test results indicate that demographic compositions between stimulus groups are not statistically different and therefore permit a comparative analysis.

For calculation purposes, participants responded to consumer sentiment and economic expectations questions on a seven-point likert scale. Participant responses to each question are

¹³ See Appendix C1 for univariate test results

measured on a full continuum ranging from 3 to -3, where “Strongly agree” is represented by 3 and “Strongly disagree” is represented by -3.

A. Analysis of Variance for Differences between Stimulus Groups

In order to test the differences in participant responses to consumer sentiment and economic expectations questions across stimulus groups, we first conduct an analysis of variance test to determine if the responses are statistically different at the chosen level of significance ($\alpha = 0.05$). Results were then subjected to a post-hoc Tukey pairwise comparison test to determine which groups issued significantly different responses.

To support the prior assumptions required by ANOVA testing procedures, robust equal variance tests were conducted on consumer sentiment and expectation variables across stimulus groups.¹⁴ Test results indicate that variances between groups are not statistically different and therefore permit ANOVA testing procedures.

I estimate the following analysis of variance model:

$$y_{ij} = \mu_j + \varepsilon_{i(j)} \tag{1}$$

Table 1. Variable Definitions

y_{ij}	Individual consumer sentiment (consumer expectations) response as a total score of the five (three) questions asked
μ_j	Mean for group i (negative, neutral, positive)

B. Logistic Regression for Modeling Likelihood of Purchase

Before analyzing the results of participants’ expressed likelihood of purchase, the seven corresponding categorical responses were restricted and collapsed into two. Likelihood of

¹⁴ See Appendix C2 for Robust Tests of Equal Variance

purchase is represented as a binary outcome, where responses represented as 1 include: “strongly agree”, “agree”, and “somewhat agree.” Likewise, responses represented as 0 include: “strongly disagree”, “disagree”, and “somewhat disagree.” As the response “neither agree nor disagree” was not indicative of any direction in terms of likelihood of purchase, when analyzing likelihood of purchase across the array of durable goods, I restrict my analysis to individuals whose responses fell into the 0 or 1 categories indicated above.

I examine the impact of consumer sentiment on likelihood of purchase based on the research of Carroll *et al* (1994) which suggest a relationship between consumer sentiment and consumption expenditures in the United States. I also separately examine consumer expectations based on the research of Thoop (1992) and based on the fact that the Bureau of Economic Analysis includes this variable in their composite index of leading economic indicators.

As consumer sentiment is a superset of consumer expectations, including both individual measures in the same model would double-count, or weight, the effects of a participant’s economic expectations. Based on this fact, I analyze the effects of consumer sentiment on likelihood of purchase across the array of durable goods and then separately analyze the effects of economic expectations on likelihood of purchase across the same set of durable goods.

The logistic regression procedure applied is based on prior research of Guadagni and Little (1983) and based on the nature of likelihood of purchase as a binary dependent variable. Results from this analysis allow for an estimate of the probabilistic impact of relative measures of consumer sentiment and expectations, as well as economic news, on participants’ expressed tendencies towards purchases across an array of durable goods.

The applied methodology for selecting the best model to examine the effects of sentiment, consumer expectations, and the media stimulus is similar to a stepwise regression

procedure. To control for any potential confounding variables, initially any potential covariates included in the survey are included in the logistic regression model.¹⁵ Based on the relationships between covariates and the significance of a given covariate within the model, coefficients are dropped to estimate the following clear and parsimonious model.

I estimate the following logistic regression model:

$$P(y_{ij}) = \frac{e^{\alpha + \beta_1 C_{ij} + \beta_2 M_{ij} + \beta_3 I_{ij} + \beta_4 A_{ij} + \varepsilon_{ij}}}{\left[1 + e^{\alpha + \beta_1 C_{ij} + \beta_2 M_{ij} + \beta_3 I_{ij} + \beta_4 A_{ij} + \varepsilon_{ij}} \right]} \quad (2)$$

Table 2. Variable Definitions

y_{ij}	Binary likelihood of purchase: 1 representing Likely; 0 otherwise
C_{ij}	Expressed Consumer Sentiment
M_{ij}	Media Stimulus: 1 representing “Positive”; 0 representing “Neutral”; -1 representing “Negative”
I_{ij}	Ordinal Expressed Income: \$10,000 increments; where \$150,000 is upper limit
A_{ij}	Participant Age

C. Ordinary Least-Squares Regression for Modeling Willingness-to-Pay

Similar to the methodology applied in choosing the estimated logistic regression model, each potential confounding covariate is initially included in an estimated ordinary least-squares regression model, where the maximum price participants are willing to pay is the dependent variable.¹⁶ Based on the relationships between covariates and the significance of a given covariate within the model, coefficients are dropped to estimate the following clear and parsimonious model.

¹⁵ Appendix C3: Potential covariate logistic regression model

¹⁶ Appendix C4: Potential covariate linear regression model

I estimate the following linear regression model:

$$P_i = \alpha + \beta_1 C_i + \beta_2 M_i + \beta_3 I_i + \beta_4 G_i + \varepsilon_i \quad (3)$$

Table 3. Variable Definitions

P_i	Maximum price willing to pay across the index of durable goods
C_i	Expressed Consumer Sentiment
M_i	Media Stimulus: 1 representing “Positive”; 0 representing “Neutral”; -1 representing “Negative”
I_i	Ordinal Expressed Income: \$10,000 increments; where \$150,000 is upper limit
G_i	1 representing “Female”; 0 otherwise

IV. Results

This analysis attempts to empirically test the hypothesis that economic news directly affects individual measures of consumer sentiment and economic expectations, as well as the hypothesis that those modified expectations affect consumption decisions in a simulated consumer purchase environment.

A. Analysis of Differences in Sentiment and Expectations

Table 3 shows the results of the analysis of variance test for consumer sentiment between the three stimulus groups. Results do not indicate a statistical difference in measures of consumer sentiment between the three media stimulus groups.

The results of the estimated ANOVA model using equation (1) appear in Table 3 and Table 5.

Table 3. ANOVA test results on measures of consumer sentiment

<i>Consumer Sentiment ANOVA test</i>					
<i>Source</i>	<i>SS</i>	<i>Df</i>	<i>MS</i>	<i>F-Stat</i>	<i>Pr > F</i>
Model	128.07	2	64.03	2.81	0.0618
Stimulus Group	128.07	2	64.03	2.81	
Residual	7686.94	337	22.80	<i>Adj. R²</i>	<i>Root MSE</i>
Total	7815.01	339	23.05	0.0105	4.77

This result indicates a rejection of the hypothesis that economic news significantly affects consumer sentiment in a direct manner. The ANOVA test results indicate a marginally non-significant p-value of 0.062.

Table 4. Pairwise comparison test on measures of consumer sentiment

<i>Consumer Sentiment Pairwise Comparison</i>				
<i>Group 1 v. Group 2</i>	<i>Group 1 Mean</i>	<i>Group 2 Mean</i>	<i>Mean Difference</i>	<i>Honest Statistical Difference Test</i>
Positive v. Negative	-0.748	-2.125	1.147	3.068
Positive v. Neutral	-0.748	-1.917	1.313	2.605
Negative v. Neutral	-2.125	-1.917	0.166	0.462
Harmonic Mean Sample Size		Studentized Critical Value		
113.18		3.329		

Post-hoc analysis results show a mean difference of 1.147 index points between the positive and negative stimulus groups. However, this result does not indicate a statistical difference between groups at the chosen significance level. In terms of the mean expressed consumer sentiment within groups, these results are directionally consistent. While all groups express negative measures of sentiment on average, results show the mean of the positive stimulus group to be greater than the mean of the neutral stimulus group. Likewise, the mean of the neutral stimulus group is higher than the mean of the negative stimulus group. Nevertheless, given the chosen procedure, the data does not indicate a statistical difference in expressed sentiment between stimulus groups.

As shown in Table 5, ANOVA test results suggest a statistical difference in measures of consumer expectations between stimulus groups.

Table 5. ANOVA test results on measures of consumer expectations

<i>Consumer Expectations ANOVA test</i>					
<i>Source</i>	<i>SS</i>	<i>Df</i>	<i>MS</i>	<i>F-Stat</i>	<i>Pr > F</i>
Model	118.32	2	59.15	5.13	0.0064
Stimulus Group	118.32	2	59.15	5.13	
Residual	3888.65	337	11.53	<i>Adj. R²</i>	<i>Root MSE</i>
Total	4006.97	339	11.82	0.024	3.39

Table 6. Pairwise comparison test on measures of consumer expectations

<i>Consumer Expectations Pairwise Comparison</i>				
<i>Group 1 v. Group 2</i>	<i>Group 1 Mean</i>	<i>Group 2 Mean</i>	<i>Mean Difference</i>	<i>Honest Statistical Difference Test</i>
Positive v. Negative	-0.210	-1.357	1.147	3.592*
Positive v. Neutral	-0.210	-1.523	1.313	4.111*
Negative v. Neutral	-1.357	-1.523	0.166	0.519
<i>Harmonic Mean Sample Size</i>		<i>Studentized Critical Value</i>		
113.18		3.329		

Test results show a difference in expressed economic expectations between positive and negative, as well as positive and neutral stimulus groups. Similar to the expressed measures of consumer sentiment, all groups express negative measures of economic expectations. The data indicate that the economic expectations expressed by the positive group are on average 1.15 points greater than the average measures of economic expectations expressed by the negative stimulus group. Likewise, economic expectations within the positive stimulus group are on average 1.31 points higher than those of the neutral stimulus group. Test results indicate no statistical difference between negative and neutral stimulus groups. Given that 87.3% of survey participants interpreted the neutral stimulus to be “neutral,” this finding is an indication that the information contained within the negative news stimulus was not different from the survey participant’s prior perception of the prevailing economic conditions.

As previously stated, the U.S. Bureau of Economic Analysis includes the Index of Consumer Expectations in its leading economic indicators composite index. Given that this research result indicates a direct relationship between the information provided by the media and survey participant responses to measures of consumer expectations questions used to calculate the Index, one interpretation of this result also suggests that the media may have significant power in affecting the economic forecasts of the Bureau of Economic Analysis. To the extent that those forecasts are accurate, these results also suggest that media may have significant power in determining economic outcomes.

Consumer expectations are a subset of consumer sentiment, so it is not intuitively clear why the data suggests a significant difference in consumer expectations between stimulus groups but not consumer sentiment. One possible interpretation of this result is that economic news exerts no influence on retrospective or contemporaneous economic evaluations. The measure of consumer expectations is strictly prospective in nature; therefore, the data may suggest that economic news has a greater influence on what people believe is going to happen, rather than a combination of what has, what is, and what will happen. Similarly, the variance associated with the extra two questions contained in the measures of consumer sentiment may be the main factor leading to the result of a non-significant difference.

B. The Impact of Consumer Sentiment, Consumer Expectations, and Economic News on Likelihood of Purchase

These results show the impact of consumer confidence, economic expectations, and the economic news on consumer likelihood of purchase decisions within a simulated durable goods market. To promote clarity, logistic regression results for models containing consumer sentiment as an independent variable are displayed and corresponding results containing consumer

expectations as an independent variable are available in Appendix D1. The general trend indicates that consumer sentiment and consumer expectations behave similarly in each regression model. The effect of the narrower variability within consumer expectations leads to a significant effect, but a greater magnitude of effect.

The results of the estimated logistic regression model using equation (2) appear in Table 7.

Table 7: Estimated Logistic Regression Model, Consumer Sentiment

$P(y_{ij}) = \frac{e^{\alpha + \beta_1 C_{ij} + \beta_2 M_{ij} + \beta_3 I_{ij} + \beta_4 A_{ij} + \varepsilon_{ij}}}{1 + e^{\alpha + \beta_1 C_{ij} + \beta_2 M_{ij} + \beta_3 I_{ij} + \beta_4 A_{ij} + \varepsilon_{ij}}}, P(\varepsilon_{ij} \leq \varepsilon) = e^{-e^{-\varepsilon}}$					
<i>j</i>		Refrigerator	Cooking Range	Television	GPS
Coefficient					
α	Estimate	-0.953	-0.211	-0.649	-1.659
	Robust S.E.	0.490	0.496	0.487	0.565
	(P-Value)	(0.052)	(0.671)	(0.183)	(0.003)
	Odds-Ratio	(N/A)	(N/A)	(N/A)	(N/A)
β_1	Estimate	0.068	0.064	0.101	0.078
	Robust S.E.	0.026	0.027	0.026	0.028
	(P-Value)	(0.009)	(0.017)	(0.000)	(0.006)
	Odds-Ratio	1.071	1.066	1.106	1.081
β_2	Estimate	-0.376	0.037	-0.015	0.092
	Robust S.E.	0.152	0.152	0.154	0.161
	(P-Value)	(0.013)	(0.808)	(0.922)	(0.566)
	Odds-Ratio	0.686	1.038	0.985	1.096
β_3	Estimate	0.125	0.111	0.059	0.033
	Robust S.E.	0.029	0.029	0.030	0.032
	(P-Value)	(0.000)	(0.000)	(0.049)	(0.308)
	Odds-Ratio	1.133	1.118	1.060	1.033
β_4	Estimate	0.000	-0.014	0.019	0.012
	Robust S.E.	0.009	0.009	0.009	0.010
	(P-Value)	(0.99)	(0.13)	(0.051)	(0.23)
	Odds-Ratio	1.000	0.986	1.019	1.013
Pseudo R^2		0.0698	0.0573	0.0496	0.0281
Wald χ^2		27.78	22.05	20.34	9.54
P-Value (χ^2 -Statistic)		(0.000)	(0.000)	(0.000)	(0.048)
<i>N</i>		301	287	300	292

Logistic Regression with Robust Standard Errors

The above estimates of β_1 suggest a significant relationship between consumer sentiment and participant's expressed likelihood of purchase across the array of durable goods. The estimates of β_2 do not indicate a significant relationship between media stimulus and likelihood of purchase across the selection of products.

For clarity of interpretation and comparative purposes, I estimate the effects of consumer sentiment and consumer expectations on likelihood of purchase based on values which are equivalent to exactly 1/6th of the maximum possible variation in these measures; therefore, I examine these measures in 5 and 3 point changes respectively.¹⁷

Due to the complicated nature of logistic regression interpretation where ordinal and continuous variables are present, estimated odds are calculated based on median measures of income (\$80,000-\$89,999, representing 9 on the ordinal scale), median age (45), median media stimulus (0), and median consumer sentiment (-1). Assume these values are applied unless explicitly stated in the interpretation.¹⁸

Refrigerator. The estimate for β_1 suggests that for an expressed consumer sentiment of 5 points, an individual is 1.19 times as likely to indicate that they are likely to purchase this item, *ceteris paribus*. Similarly, for a 3 point increase in consumer expectations, under the same conditions, an individual is 1.15 times as likely to respond that they are likely to purchase. The estimate for β_2 suggests contradictory findings to the hypothesized relationship between the media and consumer purchase decisions. Applying median measures of income and sentiment, an individual exposed to the positive media stimulus, they would be approximately half as likely to indicate that they would be likely to purchase this item. Similarly, an individual exposed to the negative stimulus would be approximately 1.5 times as likely to indicate that they would be

¹⁷ For clarity, regression estimates corresponding to consumer expectations are in Appendix D3.

¹⁸ For odds calculation example, See Appendix D2.

likely to purchase, *ceteris paribus*. According to the value of β_3 an individual of median household income would be approximately 8.55 times more likely to indicate that they are likely purchase the item.

Cooking Range. The above estimate for β_1 shows that for an expressed consumer sentiment of 5 points, an individual is 1.18 times as likely to show that they are likely to purchase the cooking range, *ceteris paribus*. Similarly, under the same conditions, a 3 point increase in consumer expectations would make the individual 1.11 times as likely to indicate that they are likely to purchase the item. The p-value associated with β_2 shows that there is not a significant relationship between the media stimulus and likelihood of purchase. The value of β_3 indicates that for an individual of median household income, the individual is approximately 6.72 times as likely to respond that they are likely to purchase, *ceteris paribus*.

While the regression estimates for the refrigerator and cooking range indicate that there is a positive association between likelihood of purchase and consumer sentiment, calculations show that household income is a stronger influential factor in determining likelihood of purchase for these items. The refrigerator and cooking range are intended to be similar in terms of consumer perception; based on this, the relationship between the news stimulus and the refrigerator is likely spurious, because it does not hold true for the range or any other products shown.

Television. The estimate of β_1 shows that for an expressed consumer sentiment of 5 points, an individual is approximately 0.85 times as likely to show that they are likely to purchase the television, *ceteris paribus*. Likewise, under the same conditions, a 3 point increase in consumer expectations shows that the individual is 0.69 times as likely to submit that they are likely to purchase this item. The p-value of β_2 shows that there is not a statistically significant relationship between the economic news participants' receive and their likelihood of purchase for

this item. The estimate of β_3 indicates that for an individual of median household income, the individual is approximately 1.53 times as likely to indicate that they are likely to purchase, holding all else constant. The value of β_4 shows that an individual of median age is approximately 2.93 times as likely to select that they are likely to purchase the television, *ceteris paribus*.

GPS. The estimate of β_1 shows that a 5 point increase in consumer sentiment indicates that the individual is 3.37 times as likely to indicate that they are likely to purchase this item, *ceteris paribus*. Similarly, a 3 point increase in consumer expectations indicates that the individual is approximately 3.03 times as likely to show that they are likely to purchase this item. The p-value corresponding to β_2 shows that there is not a significant relationship between the media stimulus participants are exposed to and their expressed likelihood of purchase for this item.

Across the basket of durable goods, the results of this analysis support the theorized relationship between consumer purchase decisions and consumer sentiment, as well as consumer expectations. While past research has demonstrated this relationship strictly at the aggregate level, survey data suggests that this relationship also consistently holds true at the individual level. In terms of the hypothesized relationship between economic news and consumer purchase decisions, the data does not suggest a consistent relationship at the individual level.

C. The Impact of Consumer Sentiment, Consumer Expectations, and Economic News on Willingness-to-Pay

These results show the impact of consumer confidence, economic expectations, and the economic news on consumer decisions regarding willingness-to-pay within a simulated durable

goods market. For clarity, ordinary-least squares regression results for models containing consumer sentiment as an independent variable are displayed and corresponding results containing consumer expectations as an independent variable are available in Appendix D3. The results of the estimated linear regression model using equation (3) appear in table 8.

Table 8. Estimated Impact Model, Consumer Sentiment

$P_i = \alpha + \beta_1 C_i + \beta_2 M_i + \beta_3 I_i + \beta_4 G_i + \varepsilon_i$					
P_i		Refrigerator	Cooking Range	Television	GPS
Coefficient					
α	Estimate	699.091	480.445	208.974	133.286
	Robust S.E.	33.49	25.168	10.830	9.080
	(P-Value)	(0.00)	(0.000)	(0.000)	(0.000)
β_1	Estimate	8.860	6.291	3.246	2.527
	Robust S.E.	2.876	2.104	0.919	0.753
	(P-Value)	(0.002)	(0.003)	(0.000)	(0.001)
β_2	Estimate	-14.260	5.548	1.697	7.243
	Robust S.E.	17.83	12.298	5.611	4.135
	(P-Value)	(0.424)	(0.652)	(0.763)	(0.081)
β_3	Estimate	15.637	9.998	1.250	1.278
	Robust S.E.	3.356	2.540	1.030	0.805
	(P-Value)	(0.000)	(0.000)	(0.226)	(0.11)
β_4	Estimate	9.852	4.854	-7.569	-11.537
	Robust S.E.	30.22	23.203	9.359	6.928
	(P-Value)	(0.745)	(0.834)	(0.419)	(0.097)
R-Squared		0.082	0.068	0.045	0.0603
F-Statistic		8.36	6.44	4.46	5.50
P-Value (F-Statistic)		(0.000)	(0.001)	(0.002)	(0.000)

OLS with White Heteroskedasticity-Corrected Standard Errors, n=340

Across the array of durable goods, the above estimates of β_1 suggest that there is a significant relationship between measures of consumer sentiment and consumers' willingness-to-pay (WTP). Based on the estimates of β_2 , and their corresponding p-values, the data does not suggest a statistically significant relationship between the media stimulus and participants' expressed WTP.

Refrigerator. The estimate of β_1 suggests that every 1 point increase in consumer sentiment is associated with an \$8.86 increase in expressed WTP for the refrigerator. Similarly, in regression models where consumer sentiment is replaced with consumer expectations, estimates indicate that a 1 point increase in consumer expectations is associated with a \$12.10 increase in WTP. The estimate of β_3 indicates that each \$10,000 increase in household income is associated with a \$15.64 increase in WTP. The regression results do not suggest a significant relationship between the media stimulus and participants' expressed WTP.

Cooking Range. The value of β_1 shows that every 1 point increase in the measure of consumer sentiment is associated with a \$6.29 increase in WTP for the cooking range. Likewise, every 1 point increase in consumer expectations is associated with an \$8.17 increase in WTP. The variance and associated p-value corresponding to β_2 fail to indicate a significant relationship between the media stimulus and participant's WTP. The estimate of β_3 shows that every \$10,000 increase in household income is associated with a \$10.00 increase in WTP for the range.

Television. The estimate for β_1 shows that every 1 point increase in consumer sentiment is related to a \$3.25 increase in WTP for the television. Likewise, running the same regression model and replacing consumer sentiment with consumer expectations indicates that every 1 point increase in expectations is associated with a \$3.92 increase in WTP. The p-value associated with β_2 fails to indicate a significant relationship between economic news and consumers' WTP. Contrary to the regression results of the refrigerator and cooking range, the p-value related to β_3 does not suggest a relationship between WTP for this item and household income.

GPS. The value of β_1 shows that every 1 point increase in consumer sentiment is associated with a \$2.57 increase in WTP. Similarly, results show that every 1 point increase in

consumer expectations is associated with a \$3.27 increase in WTP. The estimate of β_2 and the corresponding p-value suggest a marginal relationship between the media stimulus and consumers WTP. The value indicates that the positive stimulus is associated with a \$7.24 increase in WTP. Likewise, the negative stimulus is associated with a \$7.24 decrease in WTP. One interpretation suggests that as this item is a particularly discretionary purchase, while in some sense the other products are often viewed as necessary purchases, discretionary purchases may be specifically affected by economic news. The significance of β_4 indicates a marginal relationship between gender and WTP. Coefficient estimates indicate that on average females are willing to pay \$11.54 less for the GPS than males. While it is important to report the results and interpretations of β_2 and β_4 within this model, given the chosen level of significance, I reject the findings as an indication of a statistically significant relationship.

Across the basket of durable goods, this analysis of willingness-to-pay suggests support for the hypothesized relationship between consumer sentiment and consumer purchase decisions. In response to the hypothesis that economic news significantly affects consumer purchase decisions within the simulated durable goods market, the data does not indicate such a relationship. The coefficient estimates for the media stimuli do not fall under the chosen level of significance in any of the regression models.

V. Summary of Results and Economic Implications

The results of this study suggest a different relationship between consumer sentiment and economic news than the findings of Doms and Morin (2004). Their results indicate a significant relationship between the tone, volume, and content of economic news and consumer sentiment. However, results from this investigative format do not indicate a statistically significant

relationship between consumer sentiment and the content of economic news. By examining this relationship in a direct manner, the results suggest that the hypothesized relationship may be driven by consumer expectations rather than consumer sentiment as a whole.

The empirical results of this study support the theories of Carroll *et al* (1994) and Thoop (1992) concerning the relationship between the consumption of durable goods and consumer sentiment, as well as consumer expectations. Results from the chosen investigative format suggest that parts of the aggregate relationships found in prior research also hold true at the individual level of analysis. The data suggest that when considering purchase decisions, individuals evaluate likelihood of purchase and maximum price willing to pay based in part on economic fundamentals, such as household income, demographic characteristics, and their general economic sentiments and expectations. This result is an indication that the relationship between consumer sentiment and purchase decisions may be a more fundamental relationship than prior research results suggest.

Within a marketing framework, these results suggest that during periods of economic dislocation, companies advertising durable goods could conduct advertising in a way that influences consumer sentiment or consumer expectations as an effective method to support purchase decisions. Along the same lines, in terms of the relationship between economic news and consumer expectations, results suggest that product advertising following negative economic news print articles may decrease the effectiveness of such advertisement.

Given the competitive structure of news media markets, in conjunction with previously cited literature, it is acceptable to suggest that the news media's attention to the economy increases during periods of economic turbulence. Considering that this holds true in reality, combined with the findings of this research, there is evidence to suggest that the media may

augment negative economic conditions by affecting consumer expectations beyond what economic fundamentals may suggest. This conclusion suggests that by concentrating on negative economic conditions, the relationship between the media and consumer expectations may contribute to the paradox of thrift highlighted by John Maynard Keynes.

Consider an example of one possible interpretation of these research results. If, in theory, the government were able to exert some significant control over the content of major media outlet's coverage of the economy, through this medium, the government could possibly affect consumer expectations as a policy tool. While such a measure would likely have adverse implications, if it were possible, the results of this research suggest that the government could thereby influence consumer purchase decisions to stimulate or stifle economic activity. The implications of such a measure are beyond the scope of this research and I would not advocate any such policy tool, but it is important to consider possible implications of the demonstrated relationship between economic news and consumer expectations.

The motivating goal of this research was to test for the presence of a direct relationship between economic news and consumer purchase decisions within a simulated durable goods market. The data suggests no such relationship within this investigative format.

One possible interpretation of this result is in the direction of influence. As Goidel and Langley (1995) suggest, there appears to be a different relationship between increases in positive economic news and consumer sentiment, versus the relationship between the presence of negative economic news and changes in consumer sentiment. Given the prevailing economic conditions, the direction of influence on consumer purchase decisions may be significantly different during negative conditions. As economic expectations are relative measures, the current circumstances likely have a confounding influence on any potential effects of positive economic

news within generally negative economic conditions. The similarities in responses to questions between the negative and neutral stimulus groups support this interpretation.

A second possible interpretation of this result is that any effect may be primarily related to the volume of economic reporting. In line with Sims (2003), consumers derive signals from economic news based not strictly on content, but also according to positioning and volume. The results of this analysis may suggest that any of the effects of economic news on consumer purchase decisions may be related to the noted increases in economic news surrounding negative economic events.

VI. Conclusions and Suggestions for Future Research

The purpose of this study was to test three research questions, in a cross-sectional framework, through an experimental survey design.

One, do consumers adjust expressed confidence and economic expectations according to economic news provided in the media? Survey results indicate a relationship between economic news and consumer expectations; however, the data does not suggest a statistically significant relationship between consumer sentiment and economic news. This result suggests that the influence of economic news primarily affects consumer's beliefs about the future.

Two, is there a relationship between purchase decisions and consumer sentiment, as well as consumer expectations? The models developed within this paper suggest that consumer sentiment and consumer expectations function similarly in consumer purchase decisions. By modeling likelihood of purchase and willingness-to-pay, results suggest a fundamental relationship between considered durable goods purchases and consumer sentiment, as well as consumer expectations. While Carroll *et al* (1994) find a relationship between sentiment and

consumption expenditures, this research indicates that sentiment actually affects consumer purchase decisions at the individual level.

Three, uniting the previous hypothesized relationships, is there a relationship between economic news and consumer purchase decisions? Within the chosen investigative format, the data does not suggest that the economic news stimuli significantly impact participants' purchase decisions within a simulated durable goods market. In response to the motivating question behind this research; Doms and Morin's (2004) proposed question: "[Do] media-induced effects on sentiment have any meaningful effect on economic activity?" (Doms and Morin, 2004, p. 26). The results of this analysis do not explicitly suggest a significant relationship between economic news and consumer purchase decisions within a simulated durable goods market.

One interesting question future research should investigate are the effects of media sensationalism on consumer sentiment or consumer expectations. The presence of media sensationalism has been identified in previous research; however, given the difficulty of categorizing a piece of economic news as sensational above the necessary truth, it is unclear what amount of sensationalism is currently present or what effects this may have. Similarly, a closer examination of the effects of how major news media outlets frame economic information is necessary for a better understanding of the true relationship between economic news and consumer perception.

For a better understanding of the relationships between economic news reporting and its real economic effects, it would be advantageous to conduct an analysis at the aggregate level. The effects of economic news on consumption only provide a small subset of the potential effects of economic news on real outcomes. Economic news may exert independent effects on an array of factors such as consumer and business savings practices, business hiring and firing

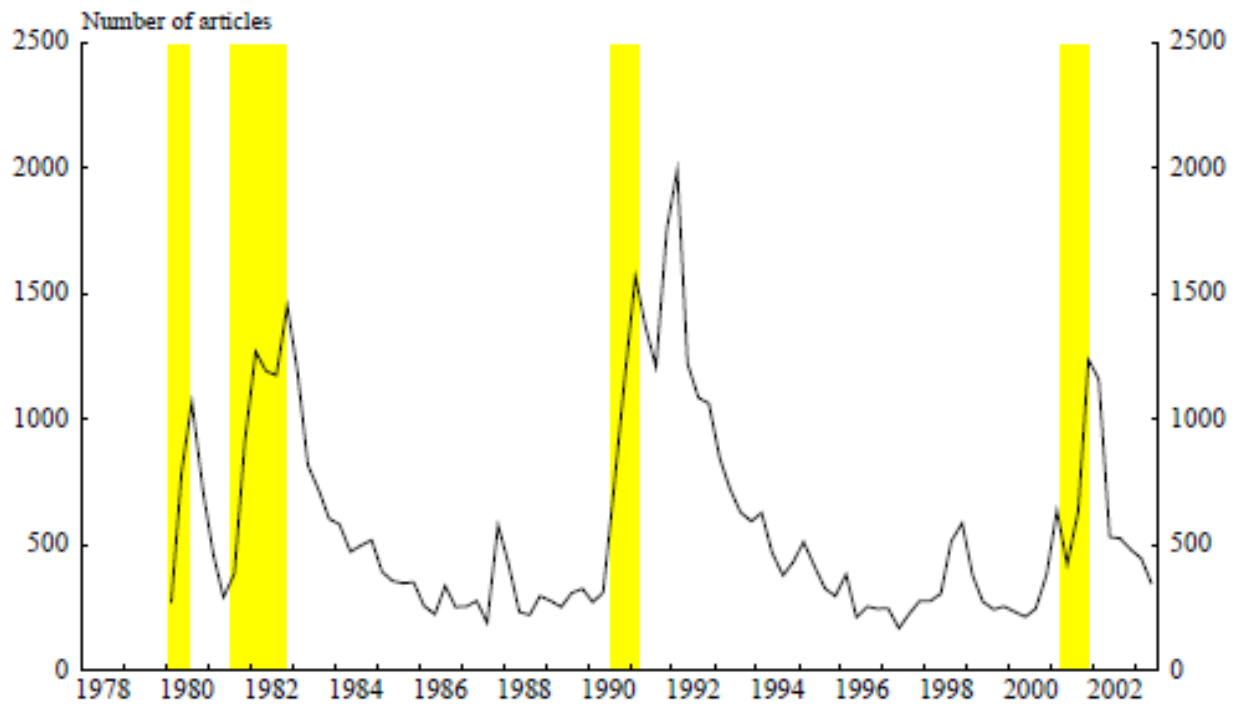
practices, and aggregate investment expenditures. As it is difficult to separate the effects of real economic factors from the independent effects of the media, a cross country analysis between various levels of government regulation of media outlets may yield interesting conclusions about the true relationship between economic news and actual economic outcomes.

VII. References

- Applebaum, J.A. & K. Laitinem (1979). Willingness to Pay and the Compensation Threshold. *Economics Letters*, Vol. 4 (3), 211-14.
- Behr, R.L. & S. Iyengar,(1985). Television news, real world cues, and changes in the public agenda. *Public Opinion Quarterly*, Vol. 49, 38-57.
- Blinder, A. & Krueger A. (2004). What Does the Public Know about Economic Policy? And How Does it Know it?. *Brookings Papers on Economic Activity*, Vol. 2004, 327-87.
- Brakman S., K. Alsem, L. Hoogduin & G.H. Kuper (2004). The Impact of Newspapers on Consumer Confidence: Does Spin Bias Exist?. *CESifo Working Paper Series* No. 1328.
- Carroll, C., J. Fuhrer & D. Wilcox. (1994). Does consumer sentiment forecast household spending? If so, why? *American Economic Review*, Vol. 84, 1396-1408
- Coyne C.J. & P.T. Leeson (2004). Read All About It! Understanding the Role of Media in Economic Development. *Kyklos*, Vol. 57, 21–44.
- Curtin, Richard T. "Index Calculation." *Survey of Consumers*. University of Michigan/Reuters. <http://www.sca.isr.umich.edu/documents.php?c=i>. 10 Oct. 2009.
- Djankov S., C. McLiesh, T. Nenova & A. Shleifer. (2001) Who Owns the Media? *NBER Working Paper* No. 8288.
- Doms M. & N. Morin (2004). Consumer Sentiment, the Economy, and the News Media. working paper, Federal Reserve Bank of San Francisco.
- Donaldson C., R. Thomas, & D. J. Torgerson (1997), Validity of Open-Ended and Payment Scale Approaches to Eliciting Willingness to Pay, *Applied Economics*. Vol. 29, 79-84.
- Gentzkow, M. & Jesse M. Shapiro. (2008). Competition and Truth in the Market for News. *Journal of Economic Perspectives*. Forthcoming.
- Goidel, R. K. & R. Langley (1995). Media Coverage of the Economy and Aggregate Economic Evaluations: Uncovering Evidence of Indirect Media Effects. *Political Research Quarterly*, Vol. 48, 313-28.
- Guadagni, P. M. & J. Little (1983). A Logit Model of Brand Choice Calibrated on Scanner Data. *Marketing Science*, Vol. 2 (Summer), 203-38.
- Infosino, W. J. (1986). Forecasting New Product Sales from Likelihood of Purchase Ratings. *Marketing Science*. Vol. 5 (Autumn), 372-84.

- Lissitz, R. & S. Green. (1975). Effect of the Number of Scale Points on Reliability: A Monte Carlo Approach. *Journal of Applied Psychology*, Vol. 60. 10-13.
- Matusaka J.G. & A.M. Sbordone (1995). Consumer Confidence and Economic Fluctuations. *Economic Enquiry*, Vol. 33, 296-318.
- Prat, A. & D. Stromberg. (2005). Commercial Television and Voter Information. *CEPR Discussion Papers* 4989.
- Slama, M. & A. Tashchian. (1985). Selected Socioeconomic and Demographic Characteristics Associated with Purchasing Involvement. Vol. 49, 72-82.
- Schauer, F. (1986). The Role of People in First Amendment Theory. *California Law Review*, Vol. 74. 761-88.
- Sen, A. (1999). *Development as Freedom*. New York: Alfred A. Knopf.
- Sims, C. (2003). Implications of Rational Inattention. *Journal of Monetary Economics*, Vol. 50, 665-90.
- Souleles, N. (2004). Expectations, Heterogeneous Forecast Errors and Consumption: Micro Evidence from the Michigan Consumer Sentiment Surveys. *Journal of Money, Credit, and Banking*, Vol. 36, 39-72.
- Stigler, G. (1961). The Economics of Information. *Journal of Public Economics*, Vol.69, 213-25.
- Stiglitz, J. (2002). Transparency in Government. World Bank Institute Development Studies, *The Right to Tell: The Role of Mass Media in Economic Development*. 27-44.
- Sweeny, J. & G. Soutar. (2001). Consumer Perceived Value: The development of a multi-item scale. *Journal of Retailing*. Vol. 77, 203-220.
- Symonds, P. M. (1924). On the Loss of Reliability in Ratings Due to Coarseness of the Scale. *Journal of Experimental Psychology*, Vol. 7, 456-61.
- Thoop A. (1992). Consumer Sentiment: Its Causes and Effects. *Federal Reserve Bank of San Francisco Economic Review*. no. 1. 35-60.

Appendix A1: "R-Word" Index



(Doms and Morin, 2004. p. 41)

Appendix B1: Consumer Sentiment Survey Questions

1. We are interested in how people are getting along financially these days:

Please indicate the degree to which you agree or disagree with the following statement.

"I (and my family who live with me) are financially better off than I/we were a year ago."

• Strongly Agree • Agree • Slightly Agree • Neither Agree nor Disagree • Slightly Disagree • Disagree • Strongly Disagree

2. Now looking ahead:

Please indicate the degree to which you agree or disagree with the following statement.

"In a year from today, I (and my family who live with me) will be financially better off than I/we are today?"

• Strongly Agree • Agree • Slightly Agree • Neither Agree nor Disagree • Slightly Disagree • Disagree • Strongly Disagree

3. Now turning to business conditions in the country as a whole:

Please indicate the degree to which you agree or disagree with the following statement.

"In the country as a whole, during the next 12 months we will have good times financially."

• Strongly Agree • Agree • Slightly Agree • Neither Agree nor Disagree • Slightly Disagree • Disagree • Strongly Disagree

4. Looking ahead in the country as a whole:

Please indicate the degree to which you agree or disagree with the following statement.

"In the country as a whole, during the next five years we will have continuous good times financially."

• Strongly Agree • Agree • Slightly Agree • Neither Agree nor Disagree • Slightly Disagree • Disagree • Strongly Disagree

5. About the big things people buy for their homes--such as furniture, a television, and things like that:

Please indicate the degree to which you agree or disagree with the following statement.

"Generally speaking, I think now is a good time for people to buy major household items?"

- Strongly Agree
- Agree
- Slightly Agree
- Neither Agree nor Disagree
- Slightly Disagree
- Disagree
- Strongly Disagree

Appendix B2: Simulated Purchase Decision Questions

Likelihood of Purchase Questions:



Imagine that you needed to buy a refrigerator and you can get it in the color of your choice:

Please indicate the degree to which you agree or disagree with the following statement.

"At a price of \$928.00 (including tax, delivery, and installation), I would buy this refrigerator."

Product Qualities:

Stainless Steel

25.1 Cubic Feet Capacity

PRICE:

\$928.00

• Strongly Agree • Agree • Slightly Agree • Neither Agree nor Disagree • Slightly Disagree • Disagree • Strongly Disagree



Imagine that you needed to buy a cooking range and you have your choice of gas or electric:

Please indicate the degree to which you agree or disagree with the following statement.
"At a price of \$638.00 (including tax, delivery, and installation), I would buy this cooking range."

Product Qualities:

30 inch width

Gas or Electric burners

PRICE:

\$638.00

• Strongly Agree • Agree • Slightly Agree • Neither Agree nor Disagree • Slightly Disagree • Disagree • Strongly Disagree



Imagine that you needed to buy a small television:

Please indicate the degree to which you agree or disagree with the following statement.
"At a price of \$229.00 (including tax and delivery), I would buy this television."

Product Qualities:

20 inch screen

High definition

PRICE:

\$229.00

• Strongly Agree • Agree • Slightly Agree • Neither Agree nor Disagree • Slightly Disagree • Disagree • Strongly Disagree



Imagine that you needed to buy a portable GPS navigator:

Please indicate the degree to which you agree or disagree with the following statement.

"At a price of \$212.00 (including tax and delivery), I would buy this portable GPS navigator."

Product Qualities:

4.3 inch screen

Touchscreen

PRICE:

212.00

• Strongly Agree • Agree • Slightly Agree • Neither Agree nor Disagree • Slightly Disagree • Disagree • Strongly Disagree

Willingness-to-Pay Questions:



If you needed to buy a refrigerator, what is the maximum price you would be willing to pay for the refrigerator shown above, assuming that you could choose the color?



If you needed to buy a cooking range, what is the maximum price you would be willing to pay for the cooking range shown above, assuming that you could choose gas or electric?



If you needed to buy a small television, what is the maximum price you would be willing to pay for the 20 inch television shown above?



If you needed to buy a stand-alone GPS navigator (i.e. a GPS that was not part of another product), what is the maximum price you would be willing to pay for the GPS navigator shown above?

Appendix B3: Experiment Stimuli

Positive stimulus:

The New York Times

October 22, 2009

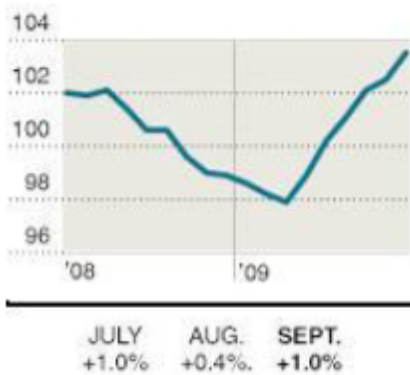
Reports Point to Economic Expansion

By THE ASSOCIATED PRESS

Labor market and manufacturing data released on Thursday portrayed the U.S. economy as steadily emerging from a protracted recession.

Leading Indicators

An index of 10 economic indicators of the Conference Board intended to predict overall economic activity; 2004=100.



"The skeptics of our recovery found no support in the economic indicators today. All the signs point to an economy that is starting to grow again," said Richard Bloomington, chief global economist at The Economic Outlook Organization in Princeton, New Jersey.

In a sign of recovery for the jobs market, the number of workers filing new claims for jobless benefits dropped to a nine-month low last week, the U.S. Labor Department said in its weekly report on Thursday. An Associated Press report found that eighty-five percent of Chief Executives at 200 of the largest U.S. companies expect the unemployment rate to decline steadily over the next two quarters.

Reports from the New York Federal Reserve Bank showed manufacturing activity jumping unexpectedly, to its highest level in the past year, on surging new orders and shipments, and rising employment.

Negative stimulus:

The New York Times

October 22, 2009

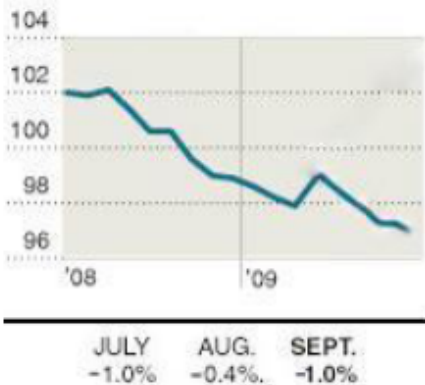
Reports Point to Economic Decline

By THE ASSOCIATED PRESS

Labor market and manufacturing data released on Thursday portrayed the U.S. economy as slowly slipping back into a protracted recession.

Leading Indicators

An index of 10 economic indicators of the Conference Board intended to predict overall economic activity; 2004=100.



"Skeptics of the recovery found evidence in the economic indicators today. They all point to an economy that is in decline again," said Richard Bloomington, chief global economist at The Economic Outlook Organization in Princeton, New Jersey.

In a sign of tough times for the jobs market, the number of workers filing new claims for jobless benefits jumped to a nine-month high last week, the U.S. Labor Department said in its weekly report on Thursday. An Associated Press report found that eighty-five percent of Chief Executives at 200 of the largest U.S. companies expect the unemployment rate to increase steadily over the next two quarters.

Reports from the New York Federal Reserve Bank showed manufacturing activity dropping unexpectedly, to its lowest level in the past year, on slumping new orders and shipments, and rising unemployment.

Neutral stimulus:

The New York Times

October 22, 2009

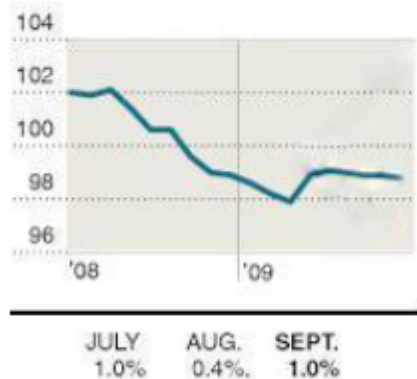
Reports Point to Economy

By THE ASSOCIATED PRESS

Labor market and manufacturing data were released on Thursday by the U.S. Department of Labor and the New York Federal Reserve bank.

Leading Indicators

An index of 10 economic indicators of the Conference Board intended to predict overall economic activity; 2004=100.



"This much anticipated data will be factored into current economic indicators. They all paint the economy in a way that analyst opinions just can't match," said Gideon McCollum, chief global economist at The Organization for Economic Data in Princeton, New Jersey.

In a sign of the times for the information market, the data released by the U.S. Department of Labor is expected to reflect changes in the way part-time and full-time workers are defined. A report by the Bureau of Labor Statistics found that five percent of workers once considered part-time employees, may or

may not be categorized as full-time workers.

Reports from the New York Federal Reserve Bank are designed to gauge manufacturing activity across the country. While the results of the data were still unclear at the time of publication, analysts expect to see results no later than October 29th.

Appendix C1: Univariate Tests

<i>Gender</i>			
<i>Group</i>	<i>Female</i>	<i>Male</i>	<i>Total</i>
Positive	83	36	119
Neutral	65	44	109
Negative	70	42	112
Pearson $\chi^2 = 2.72$		Pr = 0.257	

<i>Education</i>							
<i>Group</i>	<i>High School, No Diploma</i>	<i>High School Grad.</i>	<i>Some College, No Degree</i>	<i>Voc. or Assoc. Degree</i>	<i>Bachelor's Degree</i>	<i>Post-graduate Degree</i>	<i>Total</i>
Positive	1	14	22	14	41	27	119
Neutral	3	9	17	10	46	24	109
Negative	1	6	18	9	45	33	112
Pearson $\chi^2 = 8.29$		Pr = 0.601					

<i>Employment</i>									
<i>Group</i>	<i>Full Time</i>	<i>Part Time</i>	<i>Self-Employed</i>	<i>Student</i>	<i>Retired</i>	<i>Home-maker</i>	<i>Disabled</i>	<i>Unemployed</i>	<i>Total</i>
Positive	64	15	9	9	4	15	1	3	119
Neutral	64	15	3	6	9	9	0	3	109
Negative	71	10	6	2	8	10	0	5	112
Pearson $\chi^2 = 15.66$		Pr = 0.334							

<i>Income (Analysis of Variance)</i>					
<i>Source</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F-Stat</i>	<i>Pr > F Total</i>
Between Groups	86.16	2	43.08	2.42	0.0902
Within Groups	5992.36	337	17.78		
Total	6078.52	339	168.26		
Bartlett Test: $\chi^2 = 0.0907$		Pr > $\chi^2 = 0.946$			

<i>Homeowner</i>			
<i>Group</i>	<i>NO</i>	<i>YES</i>	<i>Total</i>
Positive	31	88	119
Neutral	33	76	109
Negative	22	90	112
Pearson $\chi^2 = 3.36$		Pr = 0.186	

<i>Age (Analysis of Variance)</i>					
<i>Source</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F-Stat</i>	<i>Pr > F Total</i>
Between Groups	167.61	2	83.81	0.50	0.61
Within Groups	56873.12	337	168.76		
Total	57040.74	339	168.26		
Bartlett Test: $\chi^2 = 1.35$		Pr > $\chi^2 = 0.509$			

Appendix C2: Equal Variance Tests

<i>Consumer Sentiment Test for Equal Variance</i>				
<i>Source</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Frequency</i>	<i>Pr > F Total</i>
Positive	-0.748	4.845	119	0.60
Neutral	-1.917	4.929	109	
Negative	-2.125	4.544	112	
Total	-1.576	4.801	340	

<i>Consumer Expectations Test for Equal Variance</i>				
<i>Source</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Frequency</i>	<i>Pr > F Total</i>
Positive	-0.210	3.461	119	0.87
Neutral	-1.523	3.455	109	
Negative	-1.357	3.268	112	
Total	-1.008	3.438	340	

Appendix C3: Likelihood of Purchase Covariate Model

Logistic Regression Full Potential Covariate Model:

<i>Durable Good</i>	<i>Refrigerator</i>	<i>Cooking Range</i>	<i>Television</i>	<i>GPS</i>
<u>Independent Variables</u>	Coefficient (p-value)	Coefficient (p-value)	Coefficient (p-value)	Coefficient (p-value)
<i>Age</i>	-0.017 (0.18)	-0.020 (0.12)	0.008 (0.49)	-0.002 (0.89)
<i>Gender</i>	0.424 (0.12)	-0.269 (0.33)	-0.226 (0.41)	-0.296 (0.34)
<i>Homeowner Status</i>	0.467 (0.19)	-0.288 (0.42)	-0.512 (0.15)	-0.220 (0.57)
<i>Income</i>	0.112 (0.00)	0.115 (0.00)	0.074 (0.03)	0.047 (0.20)
<u>Education</u>				
<i>High school, No Diploma</i>	1.069 (0.39)	-0.385 (0.77)	-0.691 (0.53)	-0.933 (0.44)
<i>Some College, No Degree</i>	0.455 (0.37)	0.871 (0.10)	0.235 (0.66)	-0.117 (0.82)
<i>High School Graduate</i>	(Omitted)	(Omitted)	(Omitted)	(Omitted)
<i>Vocational Degree</i>	-0.537 (0.34)	0.4909 (0.38)	-0.071 (0.03)	-1.327 (0.04)
<i>Bachelor's Degree</i>	-0.28 (0.34)	0.515 (0.26)	-0.12 (0.78)	-0.742 (0.12)
<i>Post-Graduate Degree</i>	-0.408 (0.40)	0.077 (0.88)	0.081 (0.87)	-0.91 (0.09)
<u>Employment</u>				
<i>Full-time Employed</i>	-0.232 (0.72)	0.35 (0.59)	-0.191 (0.76)	-0.791 (0.25)
<i>Part-time employed</i>	-0.429 (0.51)	0.097 (0.88)	-0.141 (0.82)	-1.639 (0.03)
<i>Self-employed</i>	-0.069 (0.91)	0.816 (0.21)	0.428 (0.51)	0.990 (0.12)
<i>Student</i>	-0.890 (0.24)	-0.456 (0.56)	-0.56 (0.45)	-1.035 (0.23)
<i>Homemaker</i>	-0.371 (0.61)	-0.567 (0.45)	-0.011 (0.98)	-0.428 (0.58)
<i>Retired</i>	-0.192 (0.81)	0.102 (0.90)	0.359 (0.66)	-0.281 (0.75)
<i>Unemployed</i>	0.202 (0.83)	-0.397 (0.68)	0.342 (0.72)	-0.393 (0.69)
<i>Disabled</i>	(Omitted)	(Omitted)	(Omitted)	(Omitted)
Constant	-0.325 (0.74)	-0.479 (0.635)	0.049 (0.96)	0.346 (0.74)

Appendix C4: Willingness-to-Pay Covariate Model

OLS Full Potential Covariate Model: Maximum Price Willing to Pay

<i>Durable Good</i>	<i>Refrigerator</i>	<i>Cooking Range</i>	<i>Television</i>	<i>GPS</i>
<u>Independent Variables</u>	Coefficient (p-value)	Coefficient (p-value)	Coefficient (p-value)	Coefficient (p-value)
<i>Age</i>	-0.771 (0.61)	-1.165 (0.29)	0.249 (0.58)	0.154 (0.67)
<i>Gender</i>	16.77 (0.60)	-0.845 (0.97)	-8.135 (0.40)	-15.559 (0.04)
<i>Homeowner Status</i>	40.248 (0.31)	-18.91 (0.53)	-2.237 (0.86)	-3.789 (0.70)
<i>Income</i>	14.037 (0.00)	10.58 (0.00)	1.200 (0.30)	1.059 (0.25)
<u>Education</u>				
<i>High school, No Diploma</i>	-12.665 (0.92)	29.136 (0.76)	-9.003 (0.81)	11.945 (0.69)
<i>Some College, No Degree</i>	-22.769 (0.72)	20.162 (0.66)	6.827 (0.72)	30.256 (0.04)
<i>High School Graduate</i>	(Omitted)	(Omitted)	(Omitted)	(Omitted)
<i>Vocational Degree</i>	-4.394 (0.94)	25.65 (0.61)	2.38 (0.90)	21.026 (0.19)
<i>Bachelor's Degree</i>	-25.096 (0.65)	21.334 (0.60)	-2.309 (0.89)	21.656 (0.10)
<i>Post-Graduate Degree</i>	-37.082 (0.54)	10.693 (0.80)	-2.182 (0.90)	19.873 (0.16)
<u>Employment</u>				
<i>Full-time Employed</i>	-59.983 (0.42)	-4.716 (0.93)	-6.162 (0.78)	-3.588 (0.84)
<i>Part-time employed</i>	-67.000 (0.38)	-22.371 (0.69)	-14.661 (0.53)	-17.23 (0.34)
<i>Self-employed</i>	-10.303 (0.89)	78.177 (0.16)	-1.843 (0.94)	12.541 (0.48)
<i>Student</i>	-90.16 (0.32)	-68.665 (0.30)	-10.092 (0.71)	13.541 (0.53)
<i>Homemaker</i>	-54.16 (0.52)	-29.269 (0.63)	-9.104 (0.72)	0.935 (0.96)
<i>Retired</i>	-109.16 (0.25)	-58.522 (0.39)	-13.696 (0.63)	0.747 (0.97)
<i>Unemployed</i>	-29.91 (0.79)	-8.751 (0.92)	24.121 (0.48)	-14.52 (0.59)
<i>Disabled</i>	(Omitted)	(Omitted)	(Omitted)	(Omitted)
Constant	788.24 (0.00)	526.34 (0.00)	202.83 (0.00)	111.02 (0.00)
Adjusted R^2	0.0252	0.0310	-0.0347	-0.0041

Appendix D1: Likelihood of Purchase (Consumer Expectations)

$$P(y_{ij}) = \frac{e^{\alpha + \beta_1 E_{ij} + \beta_2 M_{ij} + \beta_3 I_{ij} + \beta_4 A_{ij} + \varepsilon_{ij}}}{\left[1 + e^{\alpha + \beta_1 E_{ij} + \beta_2 M_{ij} + \beta_3 I_{ij} + \beta_4 A_{ij} + \varepsilon_{ij}} \right]} \quad (2a)$$

Table 2a. Variable Definitions

y_{ij}	Binary likelihood of purchase: 1 representing Likely; 0 otherwise
E_{ij}	Expressed Consumer Expectations
M_{ij}	Media Stimulus: 1 representing “Positive”; 0 representing “Neutral”; -1 representing “Negative”
I_{ij}	Ordinal Expressed Income: \$10,000 increments; where \$150,000 is upper limit
A_{ij}	Participant Age

The results of the estimated logistic regression model using equation (2a) appear in table 7a.

Table 7a: Estimated Logistic Regression Model, Consumer Expectations

$$P(y_{ij}) = \frac{e^{\alpha + \beta_1 E_{ij} + \beta_2 M_{ij} + \beta_3 I_{ij} + \beta_4 A_{ij} + \varepsilon_{ij}}}{1 + e^{\alpha + \beta_1 E_{ij} + \beta_2 M_{ij} + \beta_3 I_{ij} + \beta_4 A_{ij} + \varepsilon_{ij}}} P(\varepsilon_{ij} \leq \varepsilon) = e^{-e^{-\varepsilon}}$$

<i>j</i>		Refrigerator	Cooking Range	Television	GPS
Coefficient					
α	Estimate	-0.989	-0.234	-0.644	-1.686
	Robust S.E.	0.484	0.496	0.479	0.563
	(P-Value)	(0.041)	(0.637)	(0.179)	(0.003)
	Odds-Ratio	(N/A)	(N/A)	(N/A)	(N/A)
β_1	Estimate	0.0968	0.088	0.129	0.103
	Robust S.E.	0.037	0.038	0.037	0.041
	(P-Value)	(0.009)	(0.022)	(0.000)	(0.012)
	Odds-Ratio	1.102	1.092	1.114	1.108
β_2	Estimate	-0.381	0.034	-0.010	0.089
	Robust S.E.	0.152	0.153	0.154	0.016
	(P-Value)	(0.012)	(0.823)	(0.948)	(0.581)
	Odds-Ratio	1.683	1.035	0.989	1.093
β_3	Estimate	0.126	0.111	0.057	0.033
	Robust S.E.	0.029	0.029	0.030	0.032
	(P-Value)	(0.000)	(0.00)	(0.055)	(0.298)
	Odds-Ratio	1.134	1.118	1.059	1.033
β_4	Estimate	0.000	-0.014	0.018	0.013
	Robust S.E.	0.009	0.009	0.010	0.010
	(P-Value)	(0.952)	(0.141)	(0.063)	(0.225)
	Odds-Ratio	1.000	0.986	1.018	1.013
R-Squared		0.0699	0.0572	0.0443	0.0262
Wald χ^2		27.43	22.05	17.73	8.79
P-Value (F-Statistic)		(0.000)	(0.000)	(0.001)	(0.067)
<i>N</i>		301	287	300	292

Logistic Regression with Robust Standard Errors

Appendix D2: Odds Calculation Example

Odds-ratio example:

$$P(Y_{\beta 1, Refrigerator}) = \frac{e^{\beta_1 C_{ij}}}{e^{\alpha + \beta_2 M_{ij} + \beta_3 I_{ij} + \beta_4 A_{ij}}}$$

Replace with parameter estimates;

Median values for independent variables in denominator;

Choice effect for independent variables in numerator.

$$P(Y_{\beta 1, Refrigerator}) = \frac{e^{0.068(5)}}{e^{-0.953 - 0.376(0) + 0.125(9) + 0.000(45)}}$$

$$P(Y_{\beta 1, Refrigerator}) = \frac{1.40}{1.18} = 1.186$$

Appendix D3: Willingness-to-Pay (Consumer Expectations)

$$P_i = \alpha + \beta_1 E_i + \beta_2 M_i + \beta_3 I_i + \beta_4 G_i + \varepsilon_i \quad (3a)$$

Table 7a. Variable Definitions

P_i	Maximum price willing to pay across the index of durable goods: Refrigerator, Cooking Range, Television, GPS
E_i	Expressed Consumer Sentiment
M_i	Media Stimulus: 1 representing “Positive”; 0 representing “Neutral”; -1 representing “Negative”
I_i	Ordinal Expressed Income: \$10,000 increments; where \$150,000 is upper limit
G_i	1 representing “Female”; 0 otherwise

The results of the estimated ordinary least-squares regression model using equation (3a) appear in table 8a.

Table 8a. Estimated Impact Model, Consumer Expectations

$P_i = \alpha + \beta_1 E_i + \beta_2 M_i + \beta_3 I_i + \beta_4 G_i + \varepsilon_i$					
P_i		Refrigerator	Cooking Range	Television	GPS
Coefficient					
α	Estimate	696.202	478.175	207.651	132.370
	Robust S.E.	32.979	24.857	10.731	8.995
	(P-Value)	(0.000)	(0.000)	(0.000)	(0.000)
β_1	Estimate	12.103	8.169	3.922	3.273
	Robust S.E.	4.027	2.858	1.224	1.081
	(P-Value)	(0.003)	(0.005)	(0.001)	(0.003)
β_2	Estimate	-14.985	5.279	1.728	7.139
	Robust S.E.	17.887	12.307	5.591	4.194
	(P-Value)	(0.403)	(0.668)	(0.757)	(0.090)
β_3	Estimate	15.594	9.946	1.209	1.257
	Robust S.E.	3.337	2.523	1.028	0.795
	(P-Value)	(0.000)	(0.000)	(0.240)	(0.12)
β_4	Estimate	14.211	7.893	-6.038	-10.317
	Robust S.E.	30.302	23.173	9.333	6.938
	(P-Value)	(0.639)	(0.734)	(0.518)	(0.138)
R-Squared		0.081	0.065	0.035	0.059
F-Statistic		8.43	6.36	3.84	5.62
P-Value (F-Statistic)		(0.000)	(0.000)	(0.005)	(0.000)

OLS with White Heteroskedasticity-Corrected Standard Errors, n=340