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**THE EFFECT OF CUSTOMER SATISFACTION
ON
CONSUMER SPENDING GROWTH**

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ABSTRACT

Predicting aggregate consumer spending is vitally important to marketing planning, yet traditional economic theory holds that predicting changes in aggregate consumer spending is not possible. Previous attempts to predict consumer spending growth using standard macroeconomic predictor variables have met with little success. We show that the lagged change in customer satisfaction, which contributes to future demand, has a significant impact on spending growth. However, this impact is moderated by increases in consumers' debt-service ratio, a key budget constraint that affects consumers' ability to spend. Using an asymmetric growth model, over 23% of the variation in the one-quarter-ahead spending growth is explained, which represents both a notable improvement over earlier specifications.

Keywords: Customer Satisfaction, Consumer Spending, Consumer Confidence, Forecasting

INTRODUCTION

The economic importance of consumer spending growth can hardly be overestimated. In the U.S. national accounts, consumer spending represents more than 70 percent of GDP. Therefore, it should come as no surprise that changes in consumer spending are closely monitored by public-policy makers and marketing managers alike. Indeed, even fairly small changes in consumer spending have profound implications for the health of the economy as a whole, as well as for numerous companies and industries. Neither the government nor individual firms want to see consumer spending go down, and economic policy is designed to balance current spending with savings/investments in order to enable spending in the future. The Federal Reserve has repeatedly cut interest rates to make borrowing (and subsequent spending) easier (CNN Money.com 2003, ChicagoTribune.com 2008), while many durable-good manufacturers have switched to zero-percent financing to keep their sales levels up (Pauwels et al. 2004).

Reports of declining consumer expenditures cause managers to adapt their marketing strategy along multiple dimensions. Increased nervousness about future consumer spending makes organizations reluctant to make long-run commitments to brand advertising, switching instead to tactics they know will drive short-run sales (Financial Times 2006). Retailers adjust not only their pricing strategy, but also their assortment composition in the wake of reduced consumer spending. For example, amidst a glooming outlook for the U.S. economy, Wal-Mart cut prices of thousands of back-to-school items in the summer of 2007, and discontinued a number of higher-priced lines (Financial Times 2007). As consumer spending improves, managers make the reverse adjustments. As a case in point, increased consumer spending in the summer of 2004 caused shoe retailers to not only increase their marketing expenditures, but also to add more high-end products to their assortment (New York Times 2004).

It is therefore critical to *anticipate* movements in consumer spending. The problem, however, is that consumer spending growth is very difficult to predict. According to the well-known Permanent-Income (Friedman 1957) and Life-Cycle (Modigliani 1971) models of consumption, consumption expenditures follow a random-walk process (see the influential paper of Hall 1978 for a formal treatment). This implies that future consumption is a function only of current consumption, and that all other information is irrelevant. An empirically testable implication of this contention is that consumption should be “unrelated to *any* economic variable that is observed in earlier periods.” (Hall, 1978, p. 972). Indeed, current spending by households is assumed to reflect all available relevant information, making future *changes* in spending de facto unpredictable. A similar reasoning underlies many tests on the efficient market hypothesis in finance (see e.g. Cornell 1977, Fama 1970).

Still, prior empirical work has found several, albeit weak, correlates of spending growth. Carroll, Fuhrer and Wilcox (1994), for example, found that lagged values of the Index of Consumer Sentiment explained about 14 percent of the one-quarter-ahead variation in the growth of total real personal consumption expenditures, around 8 percent was explained by Murphy (2000) on the basis of lagged debt-service ratios, and Case, Quigley and Shiller (2001) explained around 8 percent (in combination with income, but using contemporaneous analyses) of the variation in consumer spending on the basis of changes in housing wealth. Ludvigson (2004) concludes that Sentiment and Confidence Indices add only modest information to spending forecasts. On the one hand, these results are impressive, as they empirically seem to refute a key implication of the Life-Cycle/Permanent-Income (LCM/PIM) models of consumption. On the other hand, from the point of view of an applied economic forecasting, they are of limited value.

Several researchers have taken the failure of the LCH/PIH model in aggregate data as established, and have tried to identify the underlying reasons for this failure. Explanations that have been put forward include myopia on the part of consumers, consumer liquidity constraints, and credit-induced habit modifications (see e.g. Messinis et al. 2002; Shea 1995). These studies have certain implications with respect to how consumers react to predictable improvements vs. deteriorations of their financial condition. As a result, a variety of asymmetric consumption models have been proposed. Many of them provide empirical support for the notion that consumers react differently to an improvement compared with a deterioration in their financial condition (see e.g. Carruth and Dickerson 2003, Shea 1995). For example, Deleersnyder et al. (2004) and Lamey et al. (2007) find an asymmetric consumer response across economic expansions and contractions. Rao and Bharadwaj (2008) make a case for distinguishing between up- and down-states of the economy.

However, to the best of our knowledge, no prior specification (neither symmetric nor asymmetric) has considered the role marketing might have in predicting future consumer spending growth. Still, the marketing discipline, as a bridge between production and consumption, is at the very center of the issue and might well contribute to the prediction of aggregate consumer spending. In this study, we consider the role of lagged gross consumption utility - customer satisfaction - as a predictor of discretionary spending growth. We examine the impact of customer satisfaction, not only because it has been found to be the most commonly used perceptual metric by researchers and managers (Gupta and Zeithaml 2006; Keiningham et al. 2007; Zeithaml et al. 2006), but also because it is generic and universally applicable across all products and services, and since it comes with a theoretical rationale.

Discretionary expenditures are usually defined as personal consumer expenditures minus food, medical care and housing. As indicated in Hall (1978, p. 979), “all of the theoretical foundations of the aggregate consumption function apply to individual categories of consumption as well,” and Katona’s (1975, 1979) distinction between “willingness” and “ability” to pay was also phrased in terms of discretionary consumer expenditures. Non-discretionary expenditures, in contrast, are much more stable and do not fluctuate much in the aggregate, regardless of economic conditions or changes in customer satisfaction (Lamey et al. 2007).

We find that lagged changes in customer satisfaction, which contribute to consumers’ *willingness* to spend, have a significant impact on spending growth. It is also moderated by the household debt-service ratio, which is a constraint on consumers’ *ability* to spend. We introduce a simple asymmetric growth model that explains a substantial part of future spending growth. These findings represent a notable improvement over earlier attempts to forecast spending growth, and illustrate the importance of marketing metrics to macro-economic concerns of relevance to business planning and adaption.

CUSTOMER SATISFACTION AND EXPENDITURE GROWTH

Customer satisfaction has been shown to impact choice and purchase behavior at the *individual* consumer level (e.g., Homburg, Koschate and Hoyer 2005; Keiningham, Perkins-Munn and Evans 2003; Rust and Zahorik 1993; see Oliver 1997 for a comprehensive review). In this paper, we examine whether a similar relationship can be found when both satisfaction and spending are aggregated across the US population. In prior research, aggregate satisfaction scores have already been linked to aggregate market share (Anderson, Fornell and Lehmann 1994), shareholder value (Anderson, Fornell and Mazvancheryl 2004; Gruca and Rego 2005), long-term profitability

(Mittal et al. 2005) and stock prices (Fornell, Mithas, Morgeson and Krishnan 2006). We will show how consumption is dependent on both customer satisfaction (willingness to spend) and debt service (ability to spend) in a framework that captures the asymmetric nature of these relationships.

At a basic level, it is obvious that the degree of utility or satisfaction one derives from consumption may impact how one spends money. Willingness is likely to be linked to the satisfaction obtained from previous consumption. Indeed, Johnson et al. (1995) found that the degree of satisfaction with *previous* purchases has a strong effect on *expected* utility, and thus on future expenditure decisions. A similar argument is made in Boulding et al. (1993): Consumers form expectations about their future levels of satisfaction based on their current satisfaction.

Moreover, experimental studies document that satisfied customers are willing to pay more (Homburg, Koschate and Hoyer 2005). Satisfaction also contributes to positive word-of-mouth and increased product usage, which in turn boost future consumer spending (Danaher and Rust 1996). Finally, satisfaction might lead to more cross- and up-selling (Li, Sun and Wilcox 2005). In combination, these factors lead to the following proposition:

P1: Improvements in aggregate customer satisfaction have a significant positive impact on future changes in aggregate discretionary consumer spending.

Of course, we do not argue that satisfaction operates regardless of price. Price affects not only consumer utility, but also their repeat purchase probability, and the impact of consumer budget constraints. We therefore include the overall price evolution as a control variable when testing proposition P1. Similarly, Katona's concept of consumers' "willingness to pay" was the impetus for the establishment of the Index of Consumer Sentiment (ICS) as a measure of the public's confidence in the economy. The relationship between lagged ICS and spending growth was recently investigated in Bram and Ludvigson (1998). To see whether changes in consumer

satisfaction have any *incremental* explanatory power relative to the ICS, we also include the latter as another control variable in subsequent validation exercises.

While higher levels of buyer satisfaction may induce more spending, the consumers' ability to spend will be tempered by the availability of cash and credit; i.e., rising levels of debt may restrain future spending (see e.g. Johnson and Li 2007 for a recent review). Murphy (1998, 2000), for example, found a significant negative relationship between the debt-service ratio of households and future aggregate spending growth. The debt-service ratio captures the demands on current income of servicing debt. As these demands increase, what is left for discretionary spending shrinks. As debt-service ratios go up, lending standards tend to become more stringent and interest rates tend to increase, which in turn, slows future spending growth. Hence, in testing the effect of customer satisfaction on consumer spending growth, we control for increases in the debt-service ratio. However, consumers are known to only change their spending habits when their level of indebtedness increases (see e.g. Messinis et al. 2002). Not only will an increase in debt-service ratio have a direct (main) effect, it will also attenuate the impact of one's satisfaction with earlier purchases. As the *ability* to pay becomes more constrained, the explanatory power of the *willingness* to pay (driven by one's earlier satisfaction) will become smaller. We therefore propose:

- P2: The impact of changes in customer satisfaction on future changes in discretionary consumer spending is attenuated by increases in debt-service ratio.

EMPIRICAL ANALYSIS

We test our propositions empirically using data from the American Customer Satisfaction Index (ACSI). The ACSI is an economic indicator based on modeling customer experience with the

quality of goods and services purchased in the US, produced either by domestic firms or by foreign firms with a substantial US market share. Full details about the methodology can be found in Fornell et al. (1996).

Customers of more than 200 companies are interviewed (approximately 250 per company) to produce four levels of indices or scores: (i) scores for the 200 or so measured companies, (ii) 43 industry scores, (iii) 10 economic sector scores, and (iv) one national customer satisfaction score. It is the latter that we use in the current paper. The aggregate scores are obtained as weighted averages of scores at the more disaggregate level, with the respective weights determined in function of their relative (company, industry, and sector) sales. The ACSI is designed to be representative of the nation's economy as a whole. Accordingly, company scores are weighted by revenue and economic sectors by their contribution to GDP.

We use the ACSI to operationalize customer satisfaction for the following reasons. First, the index is (as indicated before) designed to be representative of the US economy as a whole. Second, time-series data consistently measured over a long time period are publicly available (www.theacsi.org). Finally, the measure has a long tradition in marketing research, and has been successfully linked to other key metrics as word-of-mouth (Anderson 1998), profitability (Anderson et al. 1994), shareholder value (Anderson et al. 2004; Gruca and Rego 2005) and stock prices (Fornell et al. 2006), to name a few.

To analyze the relationship between ACSI and discretionary consumer spending, and to test whether or not ACSI provides incremental explanatory power over and beyond other variables used in prior research, a dataset was constructed with quarterly observations on (i) the ACSI from the National Quality Research Center, University of Michigan, (ii) discretionary consumer expenditures (DCE) and real personal disposable income (Income) from the Bureau of Economic

Analysis (Bureau of Economic Analysis 2008), (iii) the Consumer Price Index (CPI) from the Bureau of Labor Statistics (Bureau of Labor Statistics 2008), (iv) the Index of Consumer Sentiment (ICS) from the University of Michigan (2008),¹ and (v) the Debt Service Ratio (DSR) and real consumer credit (Credit) based on total consumer credit outstanding, from the Federal Reserve (Federal Reserve Board 2008). The data set covers the time period Q4, 1994 (the starting date for ACSI) through Q2, 2006. In a validation analysis, we will assess whether the identified relationships continue to hold as the economy was severely affected by the housing and financial crisis by adding data points from Q3, 2006-Q2, 2008.

Following standard practice in time-series analyses (see e.g. Deleersnyder et al. 2002, Nijs et al. 2001), all data were log-transformed. Not only does this reduce potential heteroskedasticity in the data, the first difference of the log-transformed series provides a good measure for the growth rate of the original series (Franses and Koop 1988). The need to take such a first difference was indicated by preliminary ADF unit-root tests (e.g. Dekimpe and Hanssens 1995).

We graphically illustrate the potential relationship between our key variables, i.e., the growth rate in discretionary consumer spending and the (lagged) change in customer satisfaction (SAT), in Figure 1. Summary statistics on the different variables are given in Table 1.

--- Insert Figure 1 & Table 1 about here ---

To test the significance of the above relationship, we estimated the following asymmetric growth model (cf. Lamey et al. 2007):

$$\Delta \ln(\text{DCE})_t = \alpha + \beta_1 \Delta \ln(\text{SAT})_{t-1} + \beta_2 \Delta \ln(\text{DSR}^+)_{t-1} + \beta_3 \Delta \ln(\text{SAT})_{t-1} * \Delta \ln(\text{DSR}^+)_{t-1} + \gamma_1 \Delta \ln(\text{CPI})_{t-1} + u_t, \text{ with } \Delta \ln(\text{DSR}^+)_{t-1} = \max \{0, \Delta \ln(\text{DSR})_{t-1}\}. \quad (1)$$

Lagged values are taken of all explanatory variables for the following reasons: (i) it is consistent with the hypothesis that changes in customer satisfaction explain *future* changes in spending, (ii) a contemporaneous relationship would not contradict the traditional lifecycle or permanent income models of consumption (Carroll, Fuhrer and Wilcox 1994), (iii) lagging the variables is also in line with earlier studies trying to find predictors of household expenditure growth (e.g. Bram and Ludvigson 1998; Hall 1978; Murphy 2000), (which facilitates comparisons with earlier studies using other macro-economic variables), and (iv) by lagging the explanatory variables, simultaneity problems are avoided. We tested whether there is evidence of serial correlation in the error term, in which case the error terms would not be orthogonal to the variables dated $t-1$ (Carroll et al. 1994). This was not the case. We also tested for the need to include the lagged dependent variable as an additional control variable, but this variable was not significant ($p=0.30$).

Empirical results are presented in the second column of Table 2. Following the recommendation of Long and Ervin (2000), heteroscedasticity-consistent standard errors using HC3 are used to assess significance levels. The Bera-Jarque test did not indicate violations of the residuals' normality assumption ($p = 0.30$), and Chow's forecast test assessed at every possible break point since the first quarter of 2003 indicated parameter stability. All variance inflation factors (maximum value = 1.36) were well below the rule-of-thumb value of 5.0 advocated in Judge et al. (1988); accordingly, there was no evidence of problematic multicollinearity.

--- Insert Table 2 about here ---

The asymmetric model in Equation (1) explains close to 25% of the variation in discretionary spending growth ($R^2 = 0.30$; $R^{2,adj} = 0.23$). β_1 is significant ($\beta_1 = 0.35, p < 0.05$), as is β_3 ($\beta_3 = -40.50, p < 0.01$), supporting our earlier propositions. We tested whether a drop in the debt ratio

had an effect, but it did not, neither as main effect ($p=0.63$) nor in interaction with the lagged change in satisfaction ($p=0.82$). This supports Messinis et al. (2002), who argue that there is habit modification “*only* when household indebtedness increases” (p. 667, italics added). Satisfaction with the previous purchases therefore influences future spending growth, irrespective of the size of the drop in the debt ratio. In contrast, the net effect weakens when the debt-service ratio becomes larger, as indicated by the negative interaction with $\Delta\ln(\text{DSR}^+)$. The net impact stays positive and significant (5%) as long as the quarterly growth in the debt ratio does not exceed a certain threshold, corresponding to 0.14 % (i.e., $\Delta\ln(\text{DSR}^+)$ smaller than 0.0014) in our base model. Standard errors for the net effect were derived using the Delta rule (see e.g. Kelley 1947, or Dekimpe and Hanssens 1995 or Srinivasan et al. 2004 for marketing applications). In our sample, $\Delta\ln(\text{DSR}^+)$ varied between 0 and 0.031 (3.1%).

In the 16 quarters of available data, the DSR either decreased (14 times) or increased (2 times) at a rate lower than this threshold. In those cases, past changes in customer satisfaction had a significant impact on subsequent spending growth. At the somewhat less stringent 10% level the threshold becomes 0.27%, and the number of times where past changes in customer satisfaction had an impact increases to 20.

ROBUSTNESS CHECKS

To validate our findings, three sets of robustness checks were conducted. First, the fit of our model, with an $R^{2,\text{adj}}$ of 0.23 was considerably higher than in earlier studies. To assess whether the improved fit was due to idiosyncracies of the particular time period (where all variables would do better), we implemented several of the test equations used in prior work (see e.g., Carroll et al. 1994, Ludvigson 2004, Murphy 2000), and regressed the change in consumer spending on lagged

differences of, respectively, the Income, Credit, Debt Service Ratio and Consumer Sentiment variable. The number of lags varied between 1 and 4. Lagged differences were used (rather than lagged levels as in some prior studies) on the basis of prior unit-root tests. The $R^{2,adj}$ of these models never exceeded 0.12.

Second, we checked whether our results were robust when adding other potential drivers of spending growth, such as lagged changes in Consumer Sentiment (as in Bram and Ludvigson 1998), Income (suggested in Hall 1978), and Credit (studied in Ludvigson 1999). The corresponding estimates are given in the final columns of Table 2. In all instances, β_1 (for the main effect of satisfaction changes) and β_3 (for the interaction effect with the debt service variable) remained significant, and of comparable magnitude to the base model. Hence, the parameter estimates were very robust across alternative specifications and suggest that customer satisfaction has predictive power *over and above* information contained in those other variables.

In further testing, we added 8 observations to the sample, 2006, Q3 through 2008, Q2. These observations reflect changes in consumer expenditures during the recent financial/housing crisis (<http://news.bbc.co.uk/2/hi/business>), a crisis so severe that it has been compared with the Great Depression (e.g., AP.google.com 2008). The question here is: Do our results hold in a period of great economic turmoil? As shown in Table 3 (column 3), our key findings remain (both the main and the interaction effect) significant with parameter estimates of comparable magnitude to what we had before (0.35 vs. 0.36 for β_1 ; -40.50 vs. -38.41 for β_3). However, the overall fit of the model dropped considerably, as the $R^{2,adj}$ dropped with 40.1% from 0.23 to 0.14.

Adding a step dummy to allow for a structural change in the drift term (in the same spirit as Perron (1989) controlled for the impact of the depression following the stock market crash of 1929 in his models of US GDP), restored the fit of the model ($R^{2,adj} = 0.23$), again with very similar

parameter estimates for the satisfaction-related variables (see column 4 of Table 3). Even though the model clearly exhibits an intercept shift, and therefore reflects a different regime for consumer spending growth, the parameters for the satisfaction-related variables remained quite similar. Formal tests for a structural break in the slope parameters did not suggest significance, neither for the main effect ($p=0.43$) nor for the interaction effect ($p= 0.52$).

Hence, even though the recent financial/housing crisis has played havoc with consumer spending, the underlying relationships are robust and remain intact.

CONCLUSION

We argue that a major marketing variable may have been overlooked in the debate on whether or not consumer spending growth can be predicted. We find that customer satisfaction explains a good deal of future growth in discretionary spending, both as a main effect and in combination with household debt-service ratio. We show that the explanatory power of these variables is considerably higher than of other variables, such as credit, income, and consumer sentiment, which have all been examined in prior research. In addition, our findings contribute to the growing evidence that consumers react differently to positive vs. negative changes in their financial situation. In line with Messinis et al. (2002), we find that past consumption experience weakens as debt increases. When debt is reduced, the main effect remains.

As indicated before, reports on expected changes in consumer spending may lead marketing managers to alter their marketing plans. But, by then, it may be too late. Marketing managers should not only *react* to the evolution in consumer spending. Our results suggest that good marketing, which leaves customers satisfied, also helps to *pro-actively* curb spending reductions. Even though this has already been suggested at the firm (Boulding et al. 1993) and industry

(Fornell et al. 1996) level, our results show that this is more than a zero-sum game, where customer-oriented firms (industries) gain at the expense of competition. Rather, when the overall quality of offerings improves and customer satisfaction increases, the aggregate level of consumer spending increases as well, *unless* the household debt service creates too much of a budget constraint. As such, while offering easy credit (or even zero financing) may allow firms to temporarily protect sales, the resulting increase in customer debt not only poses a threat to the long-run health of the economy, but also undermines the potential contribution of good (i.e., satisfaction-enhancing) marketing. Pauwels et al. (2004) made a similar observation: Although innovations increased the long-run financial valuation of car manufacturers, promotional incentives (as zero-percent financing) were found to have a negative impact on company capitalization, in spite of the sales increase.

From a theoretical point of view, our findings contribute to a growing empirical literature that provides evidence against the Permanent Income Hypothesis and the related Life-Cycle Hypothesis in aggregate data, and suggests that there is another fundamental factor at play in explaining why consumers spend: a search for gratification, or the satisfaction derived from consumption. From a practical point of view, economic forecasters might benefit from paying closer attention to marketing-related variables when predicting consumer spending growth.

Our study has several limitations and suggests areas for future inquiry. First, our findings are confined to the United States, and one should be prudent in generalizing them to other countries. Consumers are not the same in all countries. They differ in propensity to save, risk attitude, long-run orientation, etc. and it is not clear how consumption utility and debt service interact with respect to spending growth. Similarly, we examined discretionary expenditures. It might be useful to also consider other potential marketing drivers of non-discretionary spending.

In addition to the obvious relevance for the economy in general, the implications for marketing are considerable. A better understanding of consumer spending growth should result in better marketing plans and better sales forecasts, which in turn should lead to superior decisions in all major areas of marketing, including products, pricing, promotion, distribution, capacity planning and staffing decisions. Also, recent research has emphasized the value of many marketing metrics to stock-market analysts (e.g., Lehmann 2004; Rust et al. 2004). The findings of this study suggest that macro-economists might also benefit from a closer monitoring of marketing metrics.

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Footnotes

¹ The ACSI and the ICS differ in a number of ways. First, the ACSI is only administered to recent buyers of a *specific* product or service (whose responses are subsequently aggregated), while the target population for the ICS is the general public. The ICS measures individuals' *overall* perception about their current and future economic condition. Second, the ACSI includes variables regarding the *previous* encounter with a brand or service, the ICS is about capturing *current* and *future* economic conditions as interpreted by the public at large. We refer to Ludvigson (2004) for a detailed discussion on the ICS. Over the time span considered, the correlation between $\Delta \ln(\text{Sat})_t$ and $\Delta \ln(\text{ICS})_t$ is close to zero ($r=0.05$).

Table 1: Summary statistics^{1,2}

	Mean	Standard Deviation	Minimum	Maximum
DCE	3,671.54	537.97	2774.40	4492.80
SAT	72.86	0.96	70.70	74.40
DSR	0.127	0.008	0.111	0.141
CPI	172.49	14.10	149.63	198.93
Credit	1,653,090	404, 118	982,399	2,297,759
Income	8,192	1,360	5,997	10,782
ICS	95.89	7.90	80.00	110.10

¹ The summary statistics for the discretionary expenditures (DCE) are computed over the period Q4, 1994 to Q2, 2006. For the other variables, which enter in lagged form in the model, the considered time span is Q4, 1994 to Q1, 2006.

² DCE refers to Discretionary Consumer Expenditures, SAT to the ACSI scores, DSR to the Debt Service Ratio, CPI to the Consumer Price Index, Credit to Real Consumer Credit, Income to Real Disposable Income, and ICS to the Index of Consumer Sentiment. PCE and Income are expressed in billions of dollars, while Credit is expressed in millions of dollars.

Table 2: Parameter Estimates of the Asymmetric Growth Model

	Base model	Credit	Income	ICS
Intercept	0.02 ^a (0.00)	0.01 ^a (0.00)	0.02 ^a (0.00)	0.02 ^a (0.00)
$\Delta \ln(\text{SAT})_{t-1}$	0.35 ^b (0.03)	0.41 ^a (0.01)	0.35 ^b (0.03)	0.34 ^b (0.03)
$\Delta \ln(\text{DSR}^+)_{t-1}$	-0.29 ^b (0.02)	-0.40 ^a (0.01)	-0.27 (0.14)	-0.26 ^b (0.03)
$\Delta \ln(\text{SAT})_{t-1} * \Delta \ln(\text{DSR}^+)_{t-1}$	-40.50 ^a (0.01)	-42.14 ^b (0.03)	-41.41 ^a (0.01)	-38.69 ^b (0.01)
$\Delta \ln \text{CPI}_{t-1}$	-0.60 ^b (0.03)	-0.66 ^b (0.03)	-0.62 ^b (0.02)	-0.55 (0.08)
$\Delta \ln(\text{Credit})_{t-1}$		0.22 (0.07)		
$\Delta \ln(\text{Income})_{t-1}$			0.05 (0.84)	
$\Delta \ln(\text{ICS})_{t-1}$				0.02 (0.53)
R ²	0.30	0.35	0.31	0.32
R ² adjusted	0.23	0.27	0.22	0.23

The dependent variable in all models is $\Delta \ln(\text{DCE})$. DCE refers to Discretionary Consumer Expenditures, SAT to the ACSI scores, DSR to the Debt Service Ratio, CPI to the Consumer Price Index, Credit to Real Consumer Credit, Income to Real Disposable Income, and ICS to the Index of Consumer Sentiment. $\Delta \ln(\text{DSR}^+)_{t-1} = \max\{0, \Delta \ln(\text{DSR})_{t-1}\}$.

^a: $p < 0.01$ (two-sided); ^b: $p < 0.05$ (two-sided). Values between parentheses are the two-sided p-values. Significance levels are determined based on heteroscedasticity consistent standard errors using HC3.

Table 3: Robustness of the insights to the housing crisis

Sample	Base model	Base model	Model with crisis dummy
	1994Q4-2006Q2	1994Q4-2006Q2	1994Q4-2006Q2
Intercept	0.02 ^a (0.00)	0.01 ^a (0.00)	0.01 ^a (0.00)
$\Delta \ln(\text{SAT})_{t-1}$	0.35 ^b (0.03)	0.36 ^b (0.04)	0.39 ^b (0.01)
$\Delta \ln(\text{DSR}^+)_{t-1}$	-0.29 ^b (0.02)	-0.16 (0.21)	-0.22 (0.09)
$\Delta \ln(\text{SAT})_{t-1} * \Delta \ln(\text{DSR}^+)_{t-1}$	-40.50 ^a (0.01)	-38.41 ^b (0.04)	-34.96 ^b (0.05)
$\Delta \ln \text{CPI}_{t-1}$	-0.60 ^b (0.03)	-0.41 ^b (0.04)	-0.33 (0.08)
Step dummy for 2006, Q3			-0.006 ^b (0.03)
R ²	0.30	0.21	0.30
R ² adjusted	0.23	0.14	0.23

The dependent variable in all models is $\Delta \ln(\text{DCE})$. DCE refers to Discretionary Consumer Expenditures, SAT to the ACSI scores, DSR to the Debt Service Ratio, CPI to the Consumer Price Index, Credit to Real Consumer Credit, Income to Real Disposable Income, and ICS to the Index of Consumer Sentiment. $\Delta \ln(\text{DSR}^+)_{t-1} = \max \{0, \Delta \ln(\text{DSR})_{t-1}\}$. The step dummy controls for the impact of the housing crisis.

^a: $p < 0.01$ (two-sided); ^b: $p < 0.05$ (two-sided). Values between parentheses are the two-sided p-values. Significance levels are determined based on heteroscedasticity consistent standard errors using HC3.

Figure 1. Lagged Growth in Satisfaction versus Consumer Spending Growth

