Does sentiment matter

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Does Sentiment Matter?*

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Abstract

Whether investor sentiment has any bearing on asset returns has long been a topic of interest in finance. In this paper I examine whether sentiment, as measured by yearly change in the University of Michigan Consumer Sentiment Index, affects stock returns. I find that changes in consumer sentiment reliably predict excess stock market returns at one-month and one-year horizons over 1979-2000 and 1955-2000 periods. Its univariate prediction is stronger than other popular stock return predictors. Change in consumer sentiment performs better than an ARI benchmark model in out-of-sample forecasting tests. Changes in consumer sentiment predict future excess stock returns after controlling for dividend yield, the book-to-market ratio of the Dow Jones Industrial Average, the slope of the term structure, the yield spread between Baa and Aaa bonds, the short rate yield, lagged excess market returns, and the consumption-wealth ratio. The predictability of change in consumer sentiment is mostly unrelated to economic cycles as measured by real GDP growth or consumption growth.

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Introduction

Whether investor sentiment has any bearing on asset returns has long been a topic of interest in finance. Keynes (1936), in a now famous comment, suggests that animal spirits drive the stock market. More recently, Delong, Shleifer, Summers, and Waldman (1990) propose a model of asset pricing based on the idea that irrational investors guided by sentiment misprice stocks, and the unpredictability of investor sentiment impounds resale risk on assets that they trade. In other behavior-based asset-pricing models, investor sentiment or belief distorted by psychological attributes drives stock prices away from their fundamental valuations. When mispriced stocks subsequently correct to fundamental values, variables correlated with mispricing or with investor sentiment predict future stock returns.[1] Shleifer ((2000, p. 24) describes the need to understand whether or not sentiment relates to stock returns, and how as follows:

> Limited arbitrage thus explains why markets may remain inefficient …, but it does not tell us much about the exact form that inefficiency might take. For that we need the second foundation of behavioral finance, namely investor sentiment: the theory of how real-world investors actually form their beliefs and valuations,…

Empirical evidence on the relationship between sentiment and stock return is inconclusive. In the closed-end fund literature, some researchers argue that small investor sentiment can be measured by change in the discount on closed-end fund equity returns.[2] Lee, Shleifer, and Thaler (1991) report empirical evidence that the discount on closed-end fund return is a factor in the stock return-generating process. Elton, Gruber, and Busse (1998) find that the discount on closed-end fund return is not priced and hence is unimportant in the return-generating process, contrary to earlier results.

In the behavioral finance literature, several empirical studies examine other potential proxies for stock price misevaluation as sentiment measures. These are variables that

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[1] A substantial literature in behavioral finance posits that that stock prices are related to both risk and misvaluation by irrational investors affected by psychological attributes such as judgment and decision biases, overconfidence, and self-attribution (see Shleifer (2000) and Hirshleifer (2001) for excellent reviews of this topic).

[2] The closed-end fund discount refers to the empirical finding that closed-end fund shares typically sell at prices lower than the per share market value of assets the fund holds. See, for example, Lee, Shleifer, and Thaler (1991), Chen, Kan, and Miller (1993), and Chopra, Lee, Shleifer, and Thaler (1993).

include prices such as book-to-market (Kothari and Shanken (1997) and Pontiff and Schall, 1998); actions taken to benefit from mispricing such as stock repurchase or the decision to issue stock rather than bonds (Baker and Wurgler, 2000); and environmental measures that affect mood such as the weather (Hirshleifer and Shumway, 2001). Most of these studies find that sentiment affects stock prices. A few other empirical studies have examined direct surveys of investor sentiment and find mixed results.[3]

This paper studies the relationship between innovation in sentiment as measured by yearly changes in the University of Michigan Consumer Sentiment Index and stock market returns. There are several reasons this index is a natural candidate for the study of sentiment. First, both economists and investors agree that the consumer sentiment index, closely watched by economists and individual investors, conveys information relevant to the stock market. It has been claimed by the financial press to move daily market returns.[4] Some economic studies show that consumer sentiment has incremental predictive power relative to other economic variables in predicting consumption and economic cycles.[5] Second, the Michigan Consumer Sentiment Index is based on a direct survey of public perceptions about current and expected economic conditions, and it has a long time series starting in the 1950s. Other survey data related to sentiment represent a significantly shorter time series starting in the late 1970s or 1980s (Brown and Cliff, 2001b). Finally, consumer sentiment conveys beliefs of the general public, which should be more closely aligned with ideas of typical uninformed investors. Behavioral finance theories often attribute irrational beliefs to investors with less knowledge and information about financial markets than professional investors or arbitrageurs (Shleifer, 2000).

In this study I find that change in the consumer sentiment index is negatively related to future value-weighted and equal-weighted excess aggregate stock market returns at one-month and one-year horizons. Other popular predictors of stock returns do not predict aggregate stock returns at both of these horizons. The predictability of change in

[3] See, for example, Brown and Cliff (2001a and 2001b).
[4] In March 2002, for example, stocks and bonds rose on the news that consumer confidence had jumped to its highest level since August (Reuters, March 26, 2002).
[5] Carroll, Fuhrer, and Wilcox (1994) find that consumer sentiment helps predict future household spending. Howrey (2001) finds that consumer sentiment has some incremental predictive power relative to other economic variables for predicting recession and recovery.

consumer sentiment is economically and statistically strong. For example, in the one-year returns sample, a one-standard deviation improvement in consumer sentiment predicts a 6 percentage points a year lower excess return relative to the unconditional mean. Moreover, change in consumer sentiment index performs better than the benchmark ARI model in out-of-sample forecasting.

Change in consumer sentiment index remains a strong and consistent predictor of returns after controlling for other established predictors. These predictors are dividend yield, the book-to-market ratio of the Dow Jones Industrial Average (DJIA), the slope of the term structure, the yield spread between Baa and Aaa bonds, the short rate yield, lagged excess market returns, and the consumption-wealth ratio.

Some researchers raise a concern that a variable may appear to predict market returns due to spurious regression bias.[6] Spurious regression bias can arise when the independent variables are highly persistent, especially in a small sample. Spurious bias does not drive the results here. I find the strongest predictability in the one-year sample where consumer sentiment not persistent. Moreover, the outcomes of a number of robustness tests reinforce the main results.

Sentiment can affect stock prices for reasons inconsistent with a fully rational expectations framework. On the other hand, the relationship between sentiment and stock return can be consistent with a rational expectations framework as well. Investor sentiment or belief relates to future return because it measures time-varying expected economic conditions and time-varying risk aversion levels of investors. In some cases, sentiment itself may drive future economic conditions. For example, Carroll, Fuhrer, and Wilcox (1994) write 'Index of Consumer Sentiment (ICS) fell an unprecedented 24.3 index points, to its lowest level …. This collapse in household confidence became the focus of a great deal of economic commentary and, indeed, frequently was cited as an important – if not the leading – cause of the economic slowdown that ensued.'

The second question this research addresses is whether change in consumer sentiment

[6] See for example, Yule (1926), Granger and Newbold (1974), Stambaugh (1986), Nelson and Kim (1993), Kothari and Shanken (1997), Kirby (1997), Stambaugh (1999), and Ferson, Sarkissian, and Simin (2003)).

predicts future returns because it predicts future economic conditions. Empirical test results here show that the predictability of change in consumer sentiment is unrelated to economic cycles measured by real gross domestic product growth or consumption growth. Moreover, change in consumer sentiment has incremental predictive power for aggregate stock return after controlling for lagged consumption-wealth ratio, which is a strong predictor of business cycles (Lettau and Ludvigson, 2001).

This study contributes to current literature on sentiment in two dimensions. First it uses a direct survey of sentiment instead of proxies such as closed-end fund discounts. It examines yearly change in the University of Michigan Consumer Sentiment Index. I am not aware of other studies of this specific measure of sentiment or studies that examine the relation of consumer sentiment and long-horizon returns.[7] The use of yearly change is important because the consumer sentiment index time series exhibits strong seasonality at the monthly frequency. This study unequivocally documents that change in the consumer sentiment is systematic, and that it predicts aggregate excess stock returns beyond other known predictors. Second, this study contributes to the debate on whether sentiment can cause systematic mispricing in the aggregate stock market — arguably one of the most contentious issues in empirical asset pricing. Although my analysis that tests if change in consumer sentiment predicts future returns because it predicts future economic conditions does not conclusively identify systematic mispricing, it adds to our understanding of this issue. The results suggest that it is premature to reject a behavioral explanation.

The article proceeds as follows. Section I describes the data on consumer sentiment index and other variables employed in the empirical tests. Section II presents the main empirical results. Section III discusses whether change in consumer sentiment predicts stock market return because it predicts future economic conditions. Section IV offers some concluding remarks.

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[7] There is a substantial literature that studies proxies of sentiment such as closed-end fund discounts. A few studies examine other direct surveys of sentiment. Brown and Cliff (2001a and 2001b) study the "bull-bear" spread compiled by the American Association of Individual Investors (AAII) and the "bull-bear" spread investor sentiment compiled by Investors Intelligence from market newsletters. Otto (2000) examines *monthly* log consumer sentiment from 1978 through 2000 and finds that consumer sentiment does not predict one-month-ahead returns. Lemmon and Portniaguina (2002) employ consumer sentiment level as economic conditional variable in the cross-sectional test of the CAPM and CCAPM.

I. Data

Except for the particular consumer sentiment index, the data largely mirror those studied in other research on stock market return predictability.

A. Returns

I examine the predictability of both value-weighted (VWRET) and equal-weighted (EWRET) excess market returns at two horizons: one month and one year. Market returns are calculated using the Center for Research in Security Prices (CRSP) market indices minus the one-month return of the Treasury bill that is closest to 30 days to maturity. All returns are non-overlapping.

B. The Consumer Sentiment Index

The University of Michigan Consumer Sentiment Index (CSI) is an average of scores from five survey questions that ask respondents about their current financial situations; the expected changes in their financial situations over the next year; their views on expected business conditions in the next year and the next five years; and whether they think this is a good time or a bad time to make big-ticket household purchases. The actual survey questions and construction method of the index are presented in the Appendix.

Virtually all published academic research on consumer sentiment focuses on the CSI because of its long history. The Michigan index began as a quarterly survey in the 1950s. An alternative index from the Conference Board began as a bimonthly survey only in 1967. Quarterly CSI survey data begin in November 1952, and monthly data begin in January 1978. Quarterly data are available for months 2, 5, 8, and 11, with some missing quarters in the 1950s. A continuous series of every quarter data is available beginning February 1960. Figure 1 shows the time series of the level of the CSI for the entire sample from November 1952 through December 2000.

Figure 2 shows the monthly averages of the CSI, which reveal some seasonality. The CSI is lower in the last three months of the year. This seasonality motivates using yearly changes in the level of the index rather than monthly changes as the measure of innovation shocks to the CSI. Thus, the change in the Consumer Sentiment Index (CCSI) is defined as CSI of the current month minus CSI of the same month in the previous year over CSI of the same month in the previous year.

[Insert Figure 2 here]

The Center for Survey Research at the University of Michigan releases CSI data twice a month: A preliminary number is released in the middle of the survey month after 250 surveys, and the completed survey is released at the end of the survey month after the completion of 500 surveys. Approximately 10% of the CSI is released one to five days after the end of the survey month according to the available release dates in 1997-2001.

To assure that that CCSI is available before the return period it predicts, current-period returns, both $VWRET_t$ and $EWRET_t$, are matched with lagged the CCSI two months prior to the return period, skipping one month in between. This lagged variable is denoted $CCSI_{t-1}$. For example, the change in consumer sentiment for May of this year is matched with the July return of this year or the one-year compounded return from July of this year to June of next year.[8]

C. Other data

A few other variables documented to predict aggregate market returns are included in the analysis. These known predictors are the short rate yield (Fama and Schwert, 1977); the slope of the term structure (Keim and Stambaugh, 1986); the dividend yield (Campbell and Shiller, 1988, Fama and French, 1988); the yield spread between Aaa and Baa bonds (Fama, 1990); the aggregate book-to-market ratio of the DJIA (Kothari and Shanken, 1997, Pontiff and Schall, 1998); and consumption-wealth ratio (cay) (Lettau and Ludvigson, 2001).

The three-month T-bill rate from the Famabliss file (CRSP database) is used as the short rate yield (YLD3). The term structure slope (TERM) is the difference between the long-term bond yield and the yield on the three-month T-bill. Dividend yield (DIV) is constructed using the same method as in Fama and French (1988). Dividends are

[8] All the main empirical tests are also performed using changes in consumer sentiment matched with returns of the next month (without skipping one month). The results are largely the same, with minor differences in statistical significance levels.

obtained from CRSP value-weighted returns, and the end-of-year market price is used as the denominator. The bond spread (DEF) is the difference between the Baa-rated bond yield and the Aaa-rated bond yield. Long-term bond yields, Aaa-rated bond yields, and Baa-rated bond yields are from data provided by the Federal Reserve Bank of St. Louis.[9] The book-to-market value of the DJIA (BM) is constructed as in Pontiff and Schall (1998).[10] Unlike $CCSI_{t-1}$, the lagged variable subscript t – 1 for these other variables denotes the values of the variables for the month immediately prior to the return period. The quarterly consumption-wealth ratio from 1952 quarter 1 through 2001 quarter 1 is provided by Ludvigson.[11] For monthly return tests, consumption-wealth ratio is constant for the quarter until next consumption-wealth ratio is available.

I later use contemporaneous values of real GDP (Gross Domestic Product) growth (GDPG) and consumption growth (CONG) to test whether change in consumer sentiment predicts market returns because it predicts future economic conditions. Quarterly and annual data of real GDP and monthly and annual data of consumption are obtained from the Federal Reserve Bank of St. Louis. For monthly return tests, GDPG is constant for the quarter until the next GDPG is available.

D. Descriptive statistics

Table 1, Panel A, reports the summary statistics for the one-month returns sample. The return series $VWRET_t$ and $EWRET_t$ are from March 1979 through December 2000. The $CCSI_{t-1}$ series is from January 1979 through October 2000. During this period $CCSI_{t-1}$ has a mean of 2.2% and a standard deviation of 12.9%, and it is positively skewed. Innovations in consumer sentiment are on average more optimistic than pessimistic. The greatest positive and greatest negative fluctuations of the $CCSI_{t-1}$ occur in May 1981 and

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[9] These data can be obtained from http://www.stls.frb.org/fred/. The long-term bond yield is from the series "Long-Term U.S. Government Securities," which is an unweighted average for all outstanding bonds neither due nor callable under 10 years. This series was discontinued in June 2000.

[10] For the DJIA book-to-market, I use the December year-end book value of the DJIA from the Value Line Publication, "A Long Term Perspective." The monthly BM is constructed by dividing the most recent DJIA book value by the contemporaneous monthly DJIA level. To make sure that BM is available before the return period, the book value from December of year t – 1 is matched with the market value of March of year t to February of year t + 1.

[11] I thank Lettau and Ludvigson for providing information. The variable cay is computed from cay = c – 0.2985 a – 0.597 y, where c is log consumption, a is asset wealth, and y is labor income.

in October 1990. The time series of the remaining variables is from February 1979 through November 2000, except for the $TERM_{t-1}$ series, which ends in June 2000.

[Insert Table 1 here]

Panel B of Table 1 reports the autocorrelations. The variable $CCSI_{t-1}$ at monthly intervals is not as persistent as other variables that have been reported to predict the market. The first-order autocorrelation of $CCSI_{t-1}$ is 0.87, dropping off to zero at the tenth lag. The Dickey-Fuller test that includes an intercept term rejects, at a 1% significance level, the hypothesis that $CCSI_{t-1}$ has a unit root. This hypothesis cannot be rejected for dividend yield, book-to-market, the term structure, or the short rate yield. Panel C reports the cross-correlations. $CCSI_{t-1}$ is not contemporaneously correlated with any other predictor variable except for dividend yield. The correlation between $CCSI_{t-1}$ and dividend yield is –0.18, which is low.

Table 2 reports summary statistics, autocorrelations, and cross-correlations for the one-year returns sample. This sample covers years 1955 through 2000. The market excess returns are non-overlapping one-year compounded excess returns from July through June of the following year. $CCSI_{t-1}$ is from May of each year, and the other lagged variables are from June of each year.[12]

The mean of $CCSI_{t-1}$ is 1.3%, and the standard deviation is 13.2%. At the one-year interval, the first-order autocorrelation of $CCSI_{t-1}$ is –0.24. The hypothesis that $CCSI_{t-1}$ has a unit root is rejected. $CCSI_{t-1}$ is not contemporaneously correlated with any other predictor variables.

[Insert Table 2 here]

[12] The May CCSI time series is available continuously starting 1955. In the main tests of this study, I use only non-overlapping time series of continuous non-missing data to avoid any potential biases. However, I also use all the available CCSI data from 1952 through 2000 to test its predictability. The results are presented in Table A1 in the Appendix. The results are qualitatively the same as that reported in the main text. Missing data points during the earlier years from 1952 through 1978 were skipped over. In the one-year return tests, yearly return periods are overlapping, but the results reported are corrected for heteroskedasticity and autocorrelation in the error term up to 12 lags.

II. Predictive Power of the Consumer Sentiment Index

Stock market returns tend to be higher following a worsening in consumer sentiment and tend to be lower following an improvement in consumer sentiment. This is the case for both the month and the year following a change in consumer sentiment. Table 3 illustrates this phenomenon. For the one-month and one-year samples, each sample is ranked by $CCSI_{t-1}$ and then divided into two halves, high and low. The average market return is calculated for each half. The average excess value-weighted one-month returns following a high $CCSI_{t-1}$ month is 0.4% compared to 1.1% following a low $CCSI_{t-1}$ month. The average of the excess value-weighted one-year returns following a high $CCSI_{t-1}$ month is 5.6% compared to 9.0% following a low $CCSI_{t-1}$ month. The same patterns obtain for equal-weighted returns.

[Insert Table 3 here]

A. Univariate regressions

To more formally test the predictive power of change in consumer sentiment, I estimate univariate least squares (LS) regressions of excess market returns on $CCSI_{t-1}$:

$$r_t = a + b\, CCSI_{t-1} + u_t\,, \tag{1}$$

where r_t denotes excess market returns, and u_t is a residual term.

[Insert Table 4 here]

Table 4 reports univariate least square regression estimates of one-month value-weighted and equal-weighted excess market returns on change in consumer sentiment ($CCSI_{t-1}$) and other predictors. The Newey-West (1987) t-statistics reported correct for heteroscedasticity and autocorrelation in the residual terms.

Change in consumer sentiment is negatively related to future excess market returns. The regression coefficient of $CCSI_{t-1}$ is –0.049 [–3.27] for value-weighted returns and –0.64 [–2.79] for equal-weighted returns (t-statistics in brackets). This means that a one-standard deviation rise (drop) in consumer sentiment (12.9% from Table 1) predicts a decline (rise) of 0.63 percentage points (equivalent to 7.56 percentage points annually) in future one-month value-weighted excess market returns from its unconditional mean.

As for the predictability of other predictors, the three-month T-bill rate (YLD3) predicts one-month excess returns, but it is a stronger predictor of value-weighted than equal-weighted returns. Fama and Schwert (1977) report similar findings. Dividend yield, book-to-market, the term structure, the default spread, and the consumption-wealth ratio do not predict one-month value-weighted or equal-weighted one-month returns.

[Insert Table 5 here]

Table 5 reports univariate lease square regression estimates of one-year value-weighted and equal-weighted excess market returns on change in consumer sentiment and other predictors. Change in consumer sentiment is negatively related to both value-weighted and equal-weighted returns. The regression slope coefficient of $CCSI_{t-1}$ is –0.452 [–2.66] for the regression of value-weighted returns and –0.763 [–3.9] for the regression of equal-weighted returns. A one-standard deviation rise (drop) predicts a decline (rise) of 6 percentage points in future one-year value-weighted returns and 10 percentage points in future one-year equal-weighted returns. The R-square is 13.4% for the regression of value-weighted returns and is 18.8% for the regression of equal-weighted returns. Univariate regression results of other variables resemble those reported in earlier studies.

B. Robustness checks

It has been noted that the slope coefficients of an ordinary least square (OLS) regression are subject to small-sample biases when regression disturbances are correlated with future values of the independent variables (See Yule, 1926, Granger and Newbold, 1974, Stambaugh, 1986 and 1999, Nelson and Kim, 1993, Kothari and Shanken, 1997, Kirby, 1997, Stambaugh, 1999, and Ferson, Sarkissian, and Simin, 2003). In the system:

$$r_t = a + b X_{t-1} + u_t , \quad (2)$$

$$X_t = c + d X_{t-1} + v_t , \quad (3)$$

Stambaugh (1986) finds that the bias in the OLS estimate of b depends on the contemporaneous covariance between u and v and the magnitude of d. The fact that I find strong predictability in the one-year-return sample where CCSI is not persistent suggests that spurious regression bias is not driving the results here. Nonetheless, I conduct two robustness checks: one using a correction method proposed in Stambaugh

(1986) and another using a simulation method proposed by Nelson and Kim (1993) and adopted by Kothari and Shanken (1997).

Following Stambaugh (1986) the bias in the OLS estimate is calculated as

$$E[\hat{b}-b]=\frac{\sigma_{uv}}{\sigma_v^2}E[\hat{d}-d], \tag{4}$$

where variables with hats denote OLS estimates. The bias in the OLS estimate of d is calculated as (Kendall, 1954)

$$E[\hat{d}-d]=-(1+3d)/n+O(n^{-2}). \tag{5}$$

The bias term in (4) is calculated substituting (5) into (4). The Stambaugh-bias-adjusted estimate equals the LS estimate subtracted by this bias term. The Stambaugh bias adjusted estimates are reported in Tables 4 and 5. For the regressions of consumer sentiment all the Stambaugh-bias-adjusted estimates of b are virtually identical to their corresponding LS estimates.

I also use the simulation method proposed by Nelson and Kim (1993) to deal with the potential small sample bias. The system begins by randomly selecting a starting value for X from its historical values. Using the OLS estimated model of equations (2) and (3), new time series of returns and values of X are generated by randomly selecting the residual pairs (u, v) with replacement.[13] This procedure creates a series of pseudo-independent variables under the null hypothesis that returns are not predictable, but preserves the distribution structure of residual terms of the original time series. The return series is then regressed on the simulated time series of Xs. The slope estimate and the R-square from this regression are saved. This procedure is iterated 1000 times, each time starting at a randomly selected value of X from its historical time series. In the univariate regressions, X is just CCSI.

The distribution of the parameter estimates from this simulation method accounts for small-sample bias, the correlation between residuals u and v, and for residual terms that are not normally distributed. Tables 4 and 5 present the 5% confidence interval of the

[13] Nelson and Kim (1993) randomly select the residual pairs without replacement, while Kothari and Shanken (1997) select them with replacement.

distribution of the parameter estimates from these simulations. Change in consumer sentiment remains a significant predictor of excess returns at a 5% significance level in every case.

As in Nelson and Kim (1993), the R-square of the simulation is used to evaluate whether the R-square values from LS regressions are due to spurious correlation. Tables 4 and 5 compare the R-square from LS to the R-square at the 95th percentile of the distribution of R-squares from simulations. All R-square values from univariate LS regressions of returns on of $CCSI_{t-1}$ are higher than the corresponding R-square at the 95th percentile of the distribution of R-squares from simulations. Thus, we can reject the argument that the R-squares from LS regressions are due to spurious correlation.

C. Multiple regressions: Controlling for other predictors

The incremental predictive power of change in consumer sentiment is examined in multiple regressions that control for other known predictors. Tables 6, 7, 8, and 9 present results from multiple regressions of return on change in consumer sentiment and other controlling variables. The controlling variables include dividend yield (DIV_{t-1}); yield spread between Baa and Aaa bonds (DEF_{t-1}); the term structure slope ($TERM_{t-1}$); the short rate yield ($YLD3_{t-1}$); book-to-market ratio of the DJIA (BM_{t-1}); the consumption-wealth ratio (cay_{t-1}); and excess market returns (r_{t-1}). The regression is:

$$r_t = a + b_1\, CCSI_{t-1} + b_2\, DIV_{t-1} + b_3\, DEF_{t-1} + b_4\, TERM_{t-1} + b_5\, YLD3_{t-1} + b_6\, BM_{t-1} + b_7\, r_{t-1} + b_8\, cay_{t-1} + u. \quad (6)$$

The lagged value of excess market return is included in the regression to control for autocorrelation in returns.

[Insert Tables 6 and 7 here]

Tables 6 and 7 present the results for one-month returns. I report Newey-west t-statistics, which correct for heteroscedasticity and autocorrelation in the residual term. I also report the 5% confidence interval of the parameter estimate distribution obtained from the simulation method proposed by Nelson and Kim (1993), which accounts for the effects of a small sample and non-normality of the residuals as detailed above.[14]

Columns 1, 2, and 3 in Tables 6 and 7 show that there is a multicollinearity problem in the regression specification in column 1.[15] In column 1, DIV, DEF, TERM, and YLD3 are all highly significant in predicting returns. In column 2, mere exclusion of YLD3 from the regression eliminates the significance of DIV, DEF, and TERM. DIV, DEF, and TERM are not significant in the univariate regressions to begin with. Thus, YLD3 and other variables are tested in separate multiple regressions.

The change in consumer sentiment is a significant predictor of one-month returns after controlling for dividend yield, yield spread, the term structure slope, short rate yield, the book-to-market ratio, the consumption-wealth ratio, and lagged excess market return. This result is expected since these controlling variables by themselves do not predict one-month returns. The slope coefficient of change in consumer sentiment is significant at better than the 1% level in all regressions in Tables 6 and 7. Change in consumer sentiment is economically significant in predicting returns. For example, in column 4 of Table 8, the slope coefficient of $CCSI_{t-1}$ is –0.049, which translates into a 0.66 percentage point change in monthly returns for a one-standard deviation change $CCSI_{t-1}$. The slope coefficients of $CCSI_{t-1}$ range from –0.048 to –0.062 in Tables 8 and 9. The magnitude of the slope coefficient of CCSI is higher for equal-weighted return regressions than for value-weighted return regressions.

[Insert Tables 8 and 9 here]

Tables 8 and 9 present the results for one-year returns. While dividend yield is strongly correlated with book-to-market and default spread (Panel C in Table 2), regression results in columns 1, 2, and 3 in Tables 8 and 9 indicate no multicollinearity problems.

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[14] It should be noted that for an estimation that involves multiple independent variables, the Nelson and Kim (1993) simulation technique produces a 95% confidence interval that is different from a conventional interval in that the 95% confidence interval is computed under the null hypothesis that *all* the independent variables in the regression are unrelated to future returns.

[15] The ratio between the highest Eigen value and the next highest one is more than 5. The short rate yield and book-to-market are highly contemporaneously correlated. Their correlation is 0.82. The short rate yield and dividend yield correlation is 0.73, and short rate yield and yield spread correlation is –0.71.

In all multiple regressions of one-year returns, the slope coefficients of $CCSI_{t-1}$ range between -0.48 an -0.62, and they are all statistically significant at 1% level. A comparison of the same regressions with and without $CCSI_{t-1}$ in Tables 8 or 9 reveals that change in consumer sentiment has incremental power for predicting value-weighted and equal-weighted market returns beyond dividend yield, the term structure slope, or lagged returns. The R-square increases by approximately 5 percentage points when $CCSI_{t-1}$ is included in a regression. Thus, change in consumer sentiment remains a strong predictor of returns after controlling for other variables.

Consistent with results reported elsewhere, dividend yield, the term structure slope, and lagged returns predict future one-year returns. Dividend yield is a better predictor of equal-weighted returns, while the term structure slope is a better predictor of value-weighted returns.

D. Out-of sample predictions

Next, the out-of-sample forecasting power of CCSI is evaluated. Because in the multivariate regressions, other than CCSI, the strongest consistent predictor of future return is lagged return, the ARI model is used as the benchmark model in the out-of-sample forecasting analysis. For the one-month return sample I use 11-year (half of the sample) rolling window regressions to predict one-month-ahead returns. The mean square error (MSE) between the predicted return and realized return is calculated for each model. For the one-year return sample, I use 20-year rolling window regressions to predict one-year-ahead returns. This gives 25 one-year return predictions. Again, the mean square error (MSE) between the predicted return and realized return is calculated for each model. Table 10 reports the MSE of each forecasting model. The CCSI model performs better than the ARI model in predicting future returns in all cases except for the one-month equal-weighted sample.

III. Change in Consumer Sentiment, Economic Cycles, and Consumption Growth

Some researchers find that the index of consumer sentiment has power in predicting economic cycles and consumption growth. For example, Matsusaka and Sbordone (1995) find a causal relationship between the consumer sentiment index and GDP. Howrey (2001) finds that changes in consumer sentiment predict recession and recovery. Under the rational asset pricing paradigm, if different economic conditions relates to time-varying stochastic discount factor, then consumer sentiment may predict excess market returns because it predicts variation in consumption growth, time-variation in the risk aversion level, or economic cycles that affect other aspects of the discount factor. Thus, we might ask whether consumer sentiment predicts market returns because it predicts economic cycles and consumption growth.

Table 11 presents regressions of consumption growth (CONG) and real GDP growth (GDPG) on lagged change in consumer sentiment for the one-month and one-year return samples. Change in consumer sentiment does not predict consumption growth, but it predicts real GDP growth. In the one-month sample, the GDP slope coefficient of $CCSI_{t-1}$ is 0.027, significant at a 1% level. In the one-year sample, the slope coefficient of $CCSI_{t-1}$ is 0.056, significant at a 10% level.

[Insert Table 11 here]

Since $CCSI_{t-1}$ predicts real GDP growth, it may predict stock returns because it predicts changing economic cycles. To examine this hypothesis, I perform two tests. First, I estimate a multiple regression of excess returns on change in consumer sentiment, and other known predictors of return while controlling for contemporaneous values of GDP growth and consumption growth ($GDPG_t$ and $CONG_t$).

Second, I isolate the part of CCSI that relates to GDPG and CONG by estimating

$$CCSI_{t-1} = a + b_1\, GDPG_t + b_2\, CONG_t + e.$$

The estimated $a + b_1\, GDPG_t + b_2\, CONG_t$ is $CCSI_{t-1}$ related to GDPG and CONG, and the residual e is $CCSI_{t-1}$ unrelated to GDPG and CONG. It should be noted that the above regression is an ex-post decomposition $CCSI_{t-1}$ and not a predictive regression. Then I estimate multiple regressions of excess returns on these two variables and other known predictors of return. The regression coefficients of $CCSI_{t-1}$ related and unrelated to GDPG and CONG reveal how $CCSI_{t-1}$ predicts market returns.

[Insert Table 12 here]

Columns 1 through 4 in Panels A and B of Table 12 report multiple regressions of one-month value-weighted ($VWRET_t$) and equal-weighted ($VWRET_t$) excess returns on $CCSI_{t-1}$, and other predictors, controlling for contemporaneous values of $GDPG_t$ and $CONG_t$. In column 4, YLD3 is in a separate regression due to a multicollinearity problem discussed earlier.

$CCSI_{t-1}$ remains a strong predictor of both value-weighted and equal-weighted returns after controlling for $GDPG_t$ and $CONG_t$. The slope coefficients of $CCSI_{t-1}$ in the value weighted return regressions range from –0.05 to –0.044 and are significant at a 1% level. The slope coefficient of $CCSI_{t-1}$ in the equal weighted return regressions range from –0.059 to –0.043, and they are significant at 1% and 5% levels.

Multiple regressions of returns on $CCSI_{t-1}$ related and unrelated to GDPG and CONG are reported in columns 5 and 6 of Panels A and B in Table 12. For both value-weighted and equal-weighted returns, the predictive power of $CCSI_{t-1}$ is driven by the $CCSI_{t-1}$ part that is *unrelated* to GDPG and CONG. The slope coefficient of $CCSI_{t-1}$ unrelated to GDPG and CONG is –0.05 and significant at a 1% level in the regression of value-weighted returns. The slope coefficient of $CCSI_{t-1}$ unrelated to GDPG and CONS is –0.06 and significant at a 1% level in the regression of equal-weighted returns.

[Insert Table 13 here]

Columns 1 through 8 of Panel A in Table 13 present multiple regressions of value-weighted one-year excess return of known predictor variables and $CCSI_{t-1}$, controlling for contemporaneous values of real GDP growth and consumption growth. Contemporaneous GDP growth is not related to returns. Past returns and current consumption growth, however, are negatively related to current returns. A negative relationship between contemporaneous return and consumption growth is expected since investors should demand lower return in good states of nature when consumption growth is high.

$CCSI_{t-1}$ is an economically and statistically significant predictor of value-weighted returns after controlling for $GDPG_t$ and $CONG_t$ (columns 5 through 8 of Panel A in Table 12).

Columns 9 through 16 of Panel A in Table 13 present multiple regressions of equal-weighted one-year excess return of known predictor variables and $CCSI_{t-1}$, controlling for $GDPG_t$ and $CONG_t$. Contemporaneous GDP growth and consumption growth are not related to returns. Past returns, however, are negatively related to current returns. The slope coefficients $CCSI_{t-1}$ overall are slightly lower than the slope coefficient of $CCSI_{t-1}$ in a univariate regression. The $CCSI_{t-1}$ slope coefficient in the regression that includes all variables is significant at a 10% level (column 14).

Panel B presents multiple regressions of value-weighted and equal-weighted excess one-year returns on $CCSI_{t-1}$ unrelated to GDPG and CONG, and $CCSI_{t-1}$ related to GDPG and CONG, and other known predictors. None of the slope coefficients of $CCSI_{t-1}$ related to GDPG and CONS is statistically significant. All the slope coefficients of $CCSI_{t-1}$ unrelated to GDPG and CONG are significant at the 5% or 1% level.

These findings show that change in consumer sentiment predicts market returns due to reasons other than its relation with real GDP growth or consumption growth.

IV. Concluding Remarks

The literature on behavioral finance has resurrected an important and unanswered question: whether there is a systematic investor sentiment that affects stock prices at the aggregate level.

I examine whether innovation in consumer sentiment as measured by the yearly change in the University of Michigan survey of Consumer Sentiment Index predicts aggregate stock returns. I find that change in consumer sentiment predicts value-weighted and equal-weighted excess returns at one-month and one-year horizons. Of the popular forecasting variables tested to date, change in consumer sentiment is the best univariate predictor of returns at these horizons. In multiple regressions, changes in consumer sentiment predict future excess stock returns after controlling for dividend yield, the book-to-market ratio of the Dow Jones Industrial Average, the slope of the term structure, the yield spread between Baa and Aaa bonds, the short rate yield, the consumption-wealth ratio, and lagged excess market returns. In out-of-sample forecasting tests, change in consumer sentiment out performs the benchmark ARI model.

These results are interesting whether they are interpreted under a rational expectations framework or a behavioral finance framework. Under the rational expectations framework, the results suggest that consumers who may also be small investors can predict economic conditions, time-varying aggregate risk aversion, or time-varying marginal rate of substitution better than other variables employed by professionals in the market. The interpretation in this context is surprising and has implications for the vast literature that assumes professionals better understand the stock market than small investors or the average consumer.

Another interpretation under the rational expectations framework is that consumer beliefs affect spending that drives economic conditions, so their beliefs predict the aggregate stock market. Although currently this interpretation is only mildly supported because of the weak link between consumer sentiment and consumer spending, it has an important implication for economic policy. For the economic forecast literature, the results lead us to ask why change in consumer sentiment is a better predictor of stock returns than other macroeconomic variables.

In a behavioral finance framework, the results suggest that change in consumer sentiment is an indicator of a *systematic* mispricing in the stock market. Investors' irrational beliefs drive stock prices away from fundamental values. When mispriced stocks subsequently correct to fundamental values, variables correlated with investor sentiment are negatively related to future stock returns.

Distinguishing whether consumer sentiment predicts stock market returns because of mispricing in the stock market or because sentiment predicts time-varying expected return is essential in the debate on market efficiency. Identifying mispricing, however, is difficult because we lack a precise asset pricing model. I investigate instead a narrower issue of whether change in consumer sentiment predicts stock returns because it predicts economic cycle indicators such as real GDP growth and consumption growth.

I find that the predictability of change in consumer sentiment is unrelated to the ability of sentiment to predict real GDP growth or consumption growth. Moreover, in the multiple regression analysis, change in consumer sentiment predicts stock returns after controlling for lagged consumption-wealth ratio, which is a good predictor of business cycles. Both these outcomes suggest that the predictability of change in consumer sentiment is unrelated to economic or business conditions. This conclusion has implications for the link between sentiment and stock returns and sheds some light on the market efficiency debate. It suggests, for example, that an argument made that the Michigan Consumer Sentiment Index helps explain the cross-section of equity returns because it predicts business cycles is too narrow. It also suggests it is too soon to dismiss the theory that the aggregate stock market may be affected by less than perfectly rational beliefs.

On a tangential note, stock return predictability affects investors' optimal dynamic asset allocation. Thus, identifying a strong predictor of aggregate stock returns has implications on optimal asset allocation and portfolio optimization of investors.

Appendix

Historical data for the University of Michigan Consumer Sentiment Index are available at http://www.athena.sca.isr.umich.edu and http://www.stls.frb.org/fred/. The procedure used to calculate the Index of Consumer Sentiment (ICS) as described in www.athena.sca.isr.umich.edu and in Howrey (2001) is as follows:

To calculate the Index of Consumer Sentiment (ICS), first compute the relative scores (the percent giving favorable replies minus the percent giving unfavorable replies, plus 100) for each of the five index questions. Round each relative score to the nearest whole number. Using the formula shown below, sum the five relative scores; divide by the 1966 base period total of 6.7558; and add 2.0 (a constant to correct for sample design changes since the 1950s).

$$ICS = \frac{COM_1 + COM_2 + COM_3 + COM_4 + COM_5}{6.7558} + 2.0$$

COM denotes the components of the index.

$COM_1 =$ "We are interested in how people are getting along financially these days. Would you say that you (and your family living there) are better off or worse off financially than you were a year ago?"

$COM_2 =$ "Now, looking ahead—do you think that a year from now you (and your family living there) will be better off financially, or worse off, or just about the same as now?"

$COM_3 =$ "Now, turning to business conditions in the country as a whole—do you think that during the next twelve months we'll have good times financially, or bad times, or what?"

$COM_4 =$ "Looking ahead, which would you say is more likely—that in the country as a whole we'll have continuous good times during the next five years or so, or that we will have periods of widespread unemployment or depression, or what?"

$COM_5 =$ "About the big things people buy for their homes—such as furniture, a refrigerator, stove, television, and things like that. Generally speaking, do you think now is a good or a bad time for people to buy major household items?"

Table A1: Predictive regressions using all quarterly and monthly data

This table reports univariate regression of returns on CCSI for the sample that includes all CCSI data. The consumer sentiment index is available at quarterly frequency starting in 1952 with some missing quarterly data. The monthly consumer sentiment index is available starting January 1978. In the regressions, missing data points were skipped. In the regression of one-year return on lagged CCSI return periods are overlapping. This table reports the Newey-West t-statistic correct which corrects for heteroskedasticity and autocorrelations in the residual term. In the one-year return sample, the autocorrelation was corrected up to lagged 12. The 5% simulation interval is the confidence interval obtained from the simulation method proposed by Nelson and Kim (1993) to account for small-sample bias. The 95% point of the R-square distribution is also obtained from this simulation method. ** and *** denote parameter significance levels at 5%, and 1%.

	VWRET t		EWRET t	
	one-month return	one-year return	one-month return	one-year return
Intercept	0.009***	0.093***	0.011***	0.111***
Newey-West t	[3.37]	[5.03]	[3.28]	[4.25]
Simulation 5% interval	(0.003,0.012)	(0.073,0.102)	(0.004,0.015)	(0.079,0.117)
b	-0.043**	-0.298***	-0.059**	-0.636***
Newey-West t	[-2.3]	[-2.55]	[-2.18]	[-4.06]
Simulation 5% interval	(-0.022,0.044)	(-0.082,0.157)	(-0.023,0.061)	(-0.115,0.302)
Adj. R-square	0.01	0.06	0.01	0.13
Adj. R-square simulation	0.01	0.02	0.02	0.03
N	350	339	350	339

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Figure 1: Time Series of Consumer Sentiment Index
Time series of consumer sentiment from November 1952 through December 2000. Quarterly data begin November 1952, and monthly data begin January 1978.

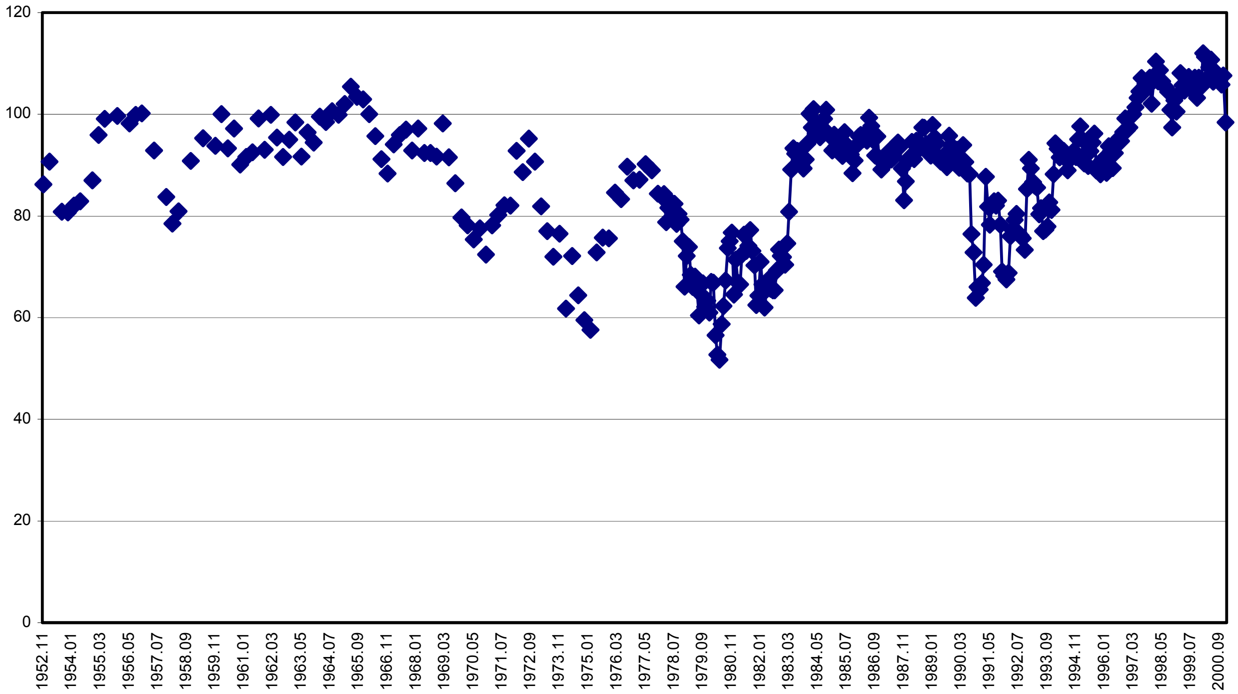

Figure 2: Monthly Averages of Consumer Sentiment Index 11/1956 – 12/2000

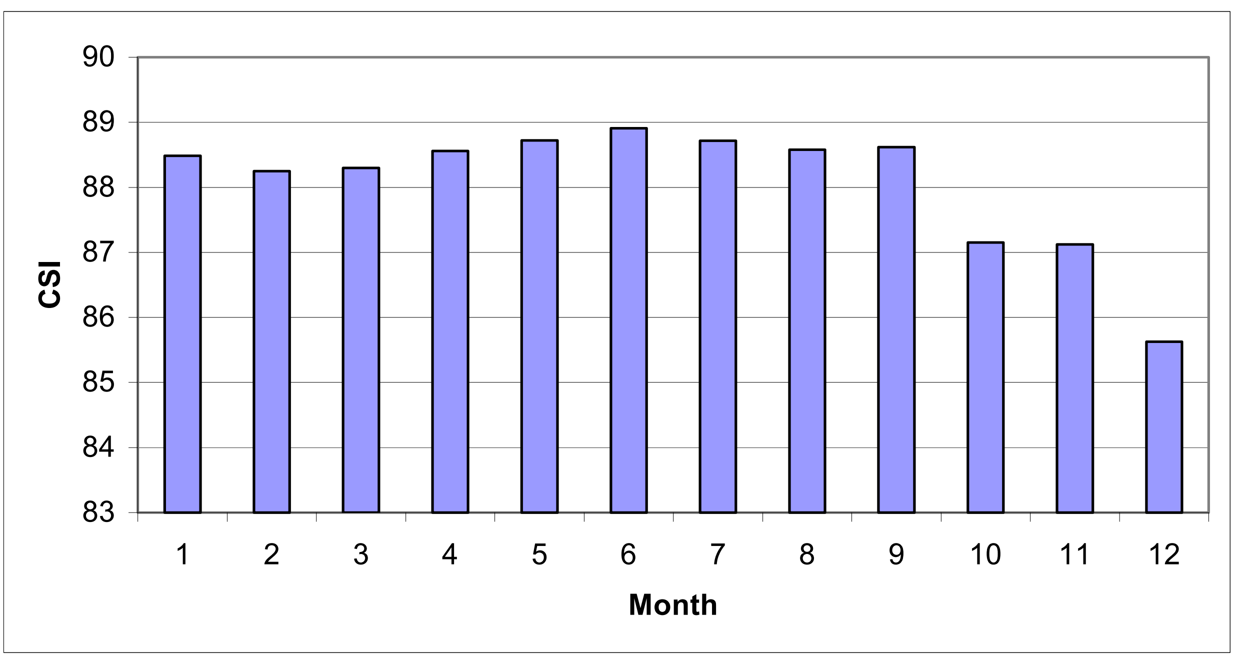

Table 1: Summary Statistics for One-Month Returns Sample

The variables VWRET and EWRET denote excess CRSP value-weighted portfolio returns and excess CRSP equal-weighted portfolio returns. Excess returns are portfolio returns minus one-month T-bill rate. Returns are from March 1979 through December 2000. DIV is the dividend yield payment accruing to the CRSP value-weighted index over the previous 12 months divided by the index level of the previous month. BM is the book-to-market ratio of the DJIA. DEF is the average yield of Baa bonds minus the average yield of Aaa bonds. TERM is the average yield of Treasury bonds with maturity greater than 10 years minus the three-month T-bill rate. YLD3 is the three-month T-bill rate. CCSI denotes yearly change in consumer sentiment index. The variable cay is the consumption-wealth ratio from Lettau and Ludvigson (2001). These variables are through November 2000, except for TERM which is through June 2000. CONG is monthly consumption growth. GDPG is the quarterly real GDP growth. Monthly GDPG is constant for three months within a quarter. CONG and GDPG are contemporaneous with returns. Panel B presents autocorrelations and the Dicky-Fuller unit root test that includes an intercept term. Panel C presents cross-correlations between these variables.

Panel A: Summary statistics

Variables	N	Mean	Std. Dev.	Skewness	Min.	Max.
$VWRET_t$	262	0.007	0.052	-0.949	-0.274	0.146
$EWRET_t$	262	0.008	0.045	-0.847	-0.228	0.124
DIV_{t-1}	262	0.031	0.012	0.016	0.010	0.060
BM_{t-1}	262	0.513	0.297	0.708	0.146	1.207
DEF_{t-1}	262	0.011	0.005	1.150	0.006	0.027
$TERM_{t-1}$	257	0.016	0.016	-0.966	-0.035	0.044
$YLD3_{t-1}$	262	0.071	0.030	1.064	0.027	0.160
$CCSI_{t-1}$	262	0.022	0.129	0.696	-0.319	0.476
cay_{t-1}	262	0.003	0.014	-1.075	-0.040	0.026
$CONG_t$	262	0.006	0.004	0.205	-0.008	0.018

Panel B: Autocorrelations and Dickey-Fuller p value

	1	2	3	4	5	6	7	8	9	10	11	12	DF p value
$VWRET_t$	0.03	-0.04	-0.08	-0.10	0.09	0.01	0.00	-0.08	-0.04	0.08	-0.05	-0.04	0.00
$EWRET_t$	0.27	0.01	-0.10	-0.10	-0.02	0.02	-0.01	-0.07	-0.03	0.02	-0.07	-0.06	0.00
DIV_{t-1}	0.98	0.96	0.94	0.92	0.90	0.87	0.85	0.83	0.81	0.79	0.77	0.75	0.73
BM_{t-1}	0.99	0.97	0.96	0.95	0.93	0.91	0.90	0.88	0.87	0.85	0.83	0.82	0.49
DEF_{t-1}	0.97	0.92	0.89	0.87	0.86	0.83	0.79	0.78	0.77	0.74	0.71	0.69	0.44
$TERM_{t-1}$	0.94	0.87	0.80	0.75	0.71	0.68	0.66	0.64	0.61	0.58	0.53	0.48	0.03
$YLD3_{t-1}$	0.97	0.94	0.91	0.88	0.87	0.85	0.83	0.82	0.81	0.79	0.76	0.73	0.32

Panel B: Autocorrelations and Dickey-Fuller p value

	1	2	3	4	5	6	7	8	9	10	11	12	DF p value
CCSI $_{t-1}$	0.87	0.72	0.58	0.47	0.39	0.34	0.30	0.24	0.16	0.05	-0.07	-0.17	0.00
cay $_{t-1}$	0.95	0.90	0.85	0.81	0.77	0.74	0.70	0.66	0.64	0.62	0.60	0.57	0.84
CONG $_t$	-0.18	0.21	0.22	-0.02	0.17	0.05	0.07	0.16	0.04	0.18	0.05	0.00	0.00
GDPG $_t$	0.79	0.57	0.36	0.31	0.26	0.21	0.18	0.15	0.12	0.09	0.06	0.04	0.00

Panel C: Cross-correlations and corresponding p-values (in italics)

	EWRET$_t$	DIV$_{t-1}$	BM $_{t-1}$	DEF $_{t-1}$	TERM $_{t-1}$	YLD3 $_{t-1}$	CCSI $_{t-1}$	cay $_{t-1}$	CONG $_t$	GDPG $_t$
VWRET$_t$	0.84	0.05	0.01	0.04	0.07	-0.10	-0.14	0.07	0.04	-0.05
	0.00	*0.45*	*0.88*	*0.47*	*0.24*	*0.10*	*0.02*	0.29	*0.55*	*0.42*
EWRET$_t$		0.09	0.05	0.11	0.08	-0.10	-0.16	0.07	0.10	-0.06
		0.16	*0.39*	*0.09*	*0.21*	*0.10*	*0.01*	0.23	*0.09*	*0.30*
DIV$_{t-1}$			0.93	0.78	-0.25	0.73	-0.18	0.27	0.25	-0.31
			0.00	*0.00*	*0.00*	*0.00*	*0.00*	0.00	*0.00*	*0.00*
BM $_{t-1}$				0.82	-0.38	0.82	-0.10	0.09	0.28	-0.30
				0.00	*0.00*	*0.00*	*0.11*	0.14	*0.00*	*0.00*
DEF $_{t-1}$					-0.20	0.68	-0.07	-0.11	0.19	-0.23
					0.00	*0.00*	*0.26*	0.09	*0.00*	*0.00*
TERM $_{t-1}$						-0.71	-0.07	0.23	-0.20	0.15
						0.00	*0.29*	0.00	*0.00*	*0.02*
YLD3 $_{t-1}$							0.06	-0.06	0.24	-0.22
							0.33	0.35	*0.00*	*0.00*
CCSI $_{t-1}$								-0.01	-0.04	0.46
								0.89	*0.53*	*0.00*
cay $_{t-1}$									-0.06	-0.01
									0.30	*0.91*
CONG $_t$										0.06
										0.36

Table 2: Summary Statistics for One-Year Returns Sample

The variables VWRET and EWRET denote excess CRSP value-weighted portfolio returns and excess CRSP equal-weighted portfolio returns. Excess returns are portfolio returns minus the one-month T-bill rate. One-year returns are compounded portfolio returns from July through June of following year. The return series consists of 45 data points from 1955 through 2000. DIV is the dividend yield payment accruing to the CRSP value-weighted index over the previous 12 months divided by the index level of the previous month. BM is the book-to-market ratio of the DJIA. DEF is the average yield of Baa bonds minus the average yield of Aaa bonds. TERM is the average yield of Treasury bonds with maturity greater than 10 years minus the three-month T-bill rate. YLD3 is the three-month T-bill rate. The variable cay is the consumption-wealth ratio from Lettau and Ludvigson (2001). CCSI denotes yearly change in consumer sentiment index. These variables are for June of each year. CONG is yearly consumption growth. GDPG is the yearly real GDP growth. Yearly real GDP and consumption is measured from July through June of the following year. CONG and GDPG are contemporaneous with returns. The variable CCSI denotes yearly change in consumer sentiment index for May of each year. Panel B presents autocorrelations and the Dicky-Fuller unit root test that includes an intercept term. Panel C presents cross-correlations between the variables.

Panel A: Summary statistics

Variables	N	Mean	Std. Dev.	Skewness	Min.	Max.
$VWRET_t$	45	0.073	0.163	0.129	-0.304	0.547
$EWRET_t$	45	0.102	0.234	0.548	-0.425	0.921
DIV_{t-1}	45	0.033	0.009	0.077	0.013	0.056
BM_{t-1}	45	0.593	0.242	0.392	0.154	1.202
DEF_{t-1}	45	0.010	0.004	1.363	0.004	0.021
$TERM_{t-1}$	45	0.012	0.013	-0.074	-0.023	0.041
$YLD3_{t-1}$	45	0.056	0.028	1.118	0.007	0.147
$CCSI_{t-1}$	45	0.013	0.132	1.284	-0.241	0.476
cay_{t-1}	45	0.002	0.013	-0.641	-0.030	0.023
$CONG_t$	45	0.073	0.021	-0.238	0.039	0.120
$GDPG_t$	45	0.033	0.020	0.420	-0.019	0.074

Panel B: Autocorrelations and Dickey-Fuller p value

	1	2	3	4	5	6	7	8	9	10	11	12	DF p value
$VWRET_t$	-0.31	0.00	0.00	0.27	-0.10	-0.07	-0.05	0.20	-0.15	0.01	-0.21	0.42	0.17
$EWRET_t$	-0.31	-0.03	0.04	0.05	-0.09	-0.13	-0.08	0.04	-0.08	-0.01	-0.14	0.29	0.03
DIV_{t-1}	0.69	0.63	0.49	0.42	0.27	0.15	0.05	-0.02	-0.13	-0.17	-0.25	-0.20	0.91
BM_{t-1}	0.85	0.76	0.68	0.57	0.43	0.31	0.21	0.12	0.02	-0.08	-0.17	-0.23	0.87
DEF_{t-1}	0.76	0.56	0.44	0.44	0.42	0.28	0.19	0.10	0.04	-0.05	-0.16	-0.23	0.59
$TERM_{t-1}$	0.48	0.28	0.11	0.00	0.13	0.12	0.23	0.39	0.19	-0.01	-0.14	-0.14	0.09
$YLD3_{t-1}$	0.77	0.61	0.52	0.35	0.34	0.29	0.26	0.24	0.11	-0.01	-0.06	-0.12	0.15

Panel B: Autocorrelations and Dickey-Fuller p value

	1	2	3	4	5	6	7	8	9	10	11	12	DF p value
$CCSI_{t-1}$	-0.24	0.04	-0.20	-0.07	0.12	-0.04	0.05	-0.21	0.08	-0.04	0.01	0.13	0.00
cay_{t-1}	0.43	0.06	-0.02	-0.10	0.02	0.01	-0.05	0.07	0.06	-0.06	-0.05	-0.04	0.06
$CONG_t$	0.87	0.74	0.66	0.60	0.51	0.35	0.22	0.09	0.04	-0.04	-0.15	-0.29	0.59
$GDPG_t$	0.22	-0.18	-0.10	-0.11	-0.04	0.00	-0.02	-0.09	-0.15	0.04	0.11	0.10	0.01

Panel C: Cross-correlations and corresponding p-values (in italics)

	$EWRET_t$	DIV_{t-1}	$YLD3_{t-1}$	BM_{t-1}	DEF_{t-1}	$TERM_{t-1}$	$CCSI_{t-1}$	cay_{t-1}	$CONG_t$	$GDPG_t$
$VWRET_t$	0.83	0.22	-0.04	0.05	0.06	0.31	-0.37	0.32	-0.27	-0.12
	0.00	*0.15*	*0.78*	*0.76*	*0.71*	*0.04*	*0.01*	*0.03*	*0.07*	*0.43*
$EWRET_t$		0.37	-0.03	0.26	0.13	0.19	-0.43	0.21	-0.03	-0.20
		0.01	*0.98*	*0.09*	*0.39*	*0.29*	*0.00*	*0.16*	*0.83*	*0.18*
DIV_{t-1}			0.45	0.88	0.57	-0.20	-0.19	0.15	0.47	-0.33
			0.00	*0.00*	*0.00*	*0.18*	*0.21*	*0.31*	*0.00*	*0.03*
$YLD3_{t-1}$				0.54	0.73	-0.38	0.11	-0.12	0.52	-0.37
				0.00	*0.00*	*0.01*	*0.46*	*0.43*	*0.00*	*0.01*
BM_{t-1}					0.62	-0.39	*0.39*	-0.03	0.69	-0.26
					0.00	*0.01*	*0.38*	*0.82*	*0.00*	*0.09*
DEF_{t-1}						-0.02	0.09	0.12	0.43	-0.23
						0.90	*0.57*	*0.43*	*0.05*	*0.12*
$TERM_{t-1}$							-0.03	0.54	-0.39	0.33
							0.83	*0.00*	*0.01*	*0.03*
$CCSI_{t-1}$								0.03	-0.09	0.36
								0.86	*0.55*	*0.01*
cay_{t-1}									-0.19	0.23
									0.22	*0.12*
$CONG_t$										-0.02
										0.89

Table 3: Average Market Returns Conditioned on Change in Consumer Sentiment

Each sample is divided into two halves based on change in consumer sentiment ($CCSI_{t-1}$). The mean value-weighted excess market returns ($VWRET_t$) and equal-weighted excess market returns ($EWRET_t$) for each half are computed for each segment.

Panel A: One-month returns

$CCSI_{t-1}$	N	$CCSI_{t-1}$ Mean	$VWRET_t$ Mean	$EWRET_t$ Mean
Low	131	-0.068	0.011	0.009
High	131	0.112	0.004	0.005

Panel B: One-year returns

$CCSI_{t-1}$	N	$CCSI_{t-1}$ Mean	$VWRET_t$ Mean	$EWRET_t$ Mean
Low	22	-0.077	0.090	0.129
High	23	0.100	0.056	0.076

Table 4: Univariate Regressions of One-Month Value-Weighted and Equal-Weighted Returns on Change in Consumer Sentiment and Other Variables

This table presents the least square regressions of one-year value-weighted (VWRET) and equal-weighted EWRET) one-month excess returns, r_t, on various lagged independent variables. Excess returns are calculated from CRSP market indices minus the one-month T-bill rate. CCSI denotes change in consumer sentiment. DIV denotes dividend yield. BM denotes the book-to-market value of the DJIA. TERM is the average yield of Treasury bonds with maturity greater than 10 years minus the yield of T-bills that mature in 3 months. DEF is the average yield of Baa bonds minus the average yield of Aaa bonds. YLD3 is the yield of a T-bill that matures in 3 months. The variable cay is the consumption-wealth ratio from Lettau and Ludvigson (2001). Newey-West t-statistic (1987) is reported in brackets. Stambaugh-Bias-adjusted b is the LS regression adjusted for estimation bias using Stambaugh (1986). The 'simulation 5% interval' is the 5% confidence interval obtained from the simulation method proposed by Nelson and Kim (1993) to account for small-sample bias. In panels A and B, * , **, and *** denote parameter significance levels at 10%, 5%, and 1%.

Panel A: Regressions of value-weighted market returns

Dependent variable			$VWRET_t$				
Independent variable	$CCSI_{t-1}$	DIV_{t-1}	BM_{t-1}	$TERM_{t-1}$	DEF_{t-1}	$YLD3_{t-1}$	cay_{t-1}
Intercept a	0.009***	0.002	0.007	0.005	0.007	0.019***	0.007***
Newey-West t	[3.46]	[0.3]	[1.36]	[1.54]	[0.44]	[3.53]	[2.66]
Simulation 5% Interval	(0.003,0.012)	(-0.01,0.019)	(-0.002,0.018)	(0.001,0.016)	(-0.011,0.02)	(-0.005,0.03)	(0.002,0.013)
Slope b	-0.049***	0.177	0.001	0.201	0.414	-0.152**	0.210
Newey-West t	[-3.27]	[0.74]	[0.14]	[1.34]	[0.59]	[-2.14]	[1.16]
Simulation 5% Interval	(-0.034,0.045)	(-0.5,0.756)	(-0.037,0.036)	(-0.38,0.309)	(-0.788,1.6)	(-0.286,0.17)	(-0.427,0.341)
Stambaugh bias adjusted b	-0.049***	0.167	-0.019*	0.196	0.410	-0.164**	0.231
Adj. R-square LS	0.017	-0.0016	-0.0038	0.0016	0.0064	0.0064	0.0004
Simulation R-square 95%	0.012	0.016	0.012	0.013	0.014	0.020	0.014
N	262	262	262	257	262	262	262

Panel B: Regressions of equal-weighted market returns

Dependent variable			$EWRET_t$				
Independent variable	$CCSI_{t-1}$	DIV_{t-1}	BM_{t-1}	$TERM_{t-1}$	DEF_{t-1}	$YLD3_{t-1}$	cay_{t-1}
Intercept a	0.008**	-0.005	0.002	0.004	-0.006	0.019***	0.006*
Newey-West t	[2.35]	[-0.46]	[0.33]	[0.89]	[-0.58]	[2.73]	[1.66]
Simulation 5% Interval	(0.001,0.012)	(-0.014,0.024)	(-0.007,0.021)	(0,0.016)	(-0.013,0.022)	(-0.009,0.028)	(0.001,0.013)
Slope b	-0.064***	0.382	0.009	0.244	1.147	-0.175*	0.275
Newey-West t	[-2.79]	[1.17]	[0.7]	[1.24]	[1.26]	[-1.87]	[1.04]
Simulation 5% Interval	(-0.031,0.062)	(-0.661,0.92)	(-0.05,0.039)	(-0.44,0.36)	(-1.338,1.644)	(-0.325,0.218)	(-0.43,0.398)
Stambaugh bias adjusted b	-0.062***	0.292	-0.010	0.234	1.098	-0.181*	0.299
Adj. R-square LS	0.021	0.004	-0.002	0.002	0.008	0.006	0.002
Simulation R-square 95%	0.017	0.019	0.015	0.013	0.017	0.020	0.011
N	262	262	262	257	262	262	262

Table 5 : Univariate Regressions of One-Year Value-Weighted and Equal-Weighted Returns on Change in Consumer Sentiment and Other Variables

This table presents the least square regressions of one-year value-weighted (VWRET) and equal-weighted EWRET) one-year excess returns, r_t, on various lagged independent variables. Excess returns are calculated from CRSP market indices minus the one-month T-bill rate. CCSI denotes change in consumer sentiment. DIV denotes dividend yield. BM denotes the book-to-market value of the DJIA. TERM is the average yield of Treasury bonds with maturity greater than 10 years minus the yield of T-bills that mature in 3 months. DEF is the average yield of Baa bonds minus the average yield of Aaa bonds. YLD3 is the yield of a T-bill that matures in 3 months. The variable cay is the consumption-wealth ratio from Lettau and Ludvigson (2001). Newey-West t-statistic (1987) is reported in brackets. Stambaugh-Bias-adjusted b is the LS regression adjusted for estimation bias using Stambaugh (1986). The 'simulation 5% interval' is the 5% confidence interval obtained from the simulation method proposed by Nelson and Kim (1993) to account for small-sample bias. In panels A and B, * , **, and *** denote parameter significance levels at 10%, 5%, and 1%.

Panel A: Regressions of value-weighted market returns

Dependent variable				$VWRET_t$			
Independent variable	$CCSI_{t-1}$	DIV_{t-1}	BM_{t-1}	$TERM_{t-1}$	DEF_{t-1}	$YLD3_{t-1}$	cay_{t-1}
Intercept a	0.079***	-0.054	0.055	0.027	0.053	0.087*	0.066***
Newey-West t	[3.47]	[-0.46]	[0.82]	[0.98]	[1.02]	[1.71]	[3.58]
Simulation 5% Interval	(0.035,0.108)	(-0.21,0.135)	(-0.128,0.123)	(0.008,0.106)	(-0.09,0.125)	(0.03,0.254)	(0.04,0.113)
Slope b	-0.452**	3.855	0.031	3.857**	2.083	-0.252	4.113**
Newey-West t	[-2.66]	[1.16]	[0.28]	[2.35]	[0.4]	[-0.27]	[2.29]
Simulation 5% Interval	(-0.221,0.384)	(-2.208,8.674)	(-0.105,0.335)	(-1.824,4.401)	(-4.866,17.734)	(-2.824,0.89)	(-2.852,3.38)
Stambaugh bias adjusted b	-0.449**	2.065	-0.078	3.859**	1.562	-0.429	4.07**
Adj. R-square LS	0.114	0.026	-0.021	0.074	-0.020	-0.021	0.081
Simulation R-square 95%	0.065	0.164	0.122	0.105	0.088	0.161	0.058
N	45	45	45	45	45	45	45

Panel B: Regressions of equal-weighted market returns

Dependent variable				$EWRET_t$			
Independent variable	$CCSI_{t-1}$	DIV_{t-1}	BM_{t-1}	$TERM_{t-1}$	DEF_{t-1}	$YLD3_{t-1}$	cay_{t-1}
Intercept a	0.112**	-0.210	-0.047	0.068	0.035	0.100	0.095**
Newey-West t	[3.45]	[-1.39]	[-0.55]	[1.55]	[0.47]	[1.28]	3.24
Simulation 5% Interval	(0.049,0.157)	(-0.344,0.202)	(-0.199,0.195)	(0.003,0.13)	(-0.153,0.158)	(0.038,0.37)	(0.042,0.161)
Slope b	-0.763***	9.457**	0.251*	2.883	6.985	0.026	3.912
Newey-West t	[-3.9]	[2.17]	[1.73]	[1.31]	[0.91]	[0.02]	[1.6]
Simulation 5% Interval	(-0.263,0.462)	(-3.67,13.808)	(-0.208,0.508)	(-0.785,7.55)	(-6.086,29.917)	(-4.15,1.156)	(-2.658,5.169)
Stambaugh bias adjusted b	-0.758***	7.401*	0.125	2.835	6.651	-0.128	3.829
Adj. R-square LS	0.166	0.119	0.046	0.003	-0.006	-0.023	0.023
Simulation R-square 95%	0.034	0.205	0.151	0.138	0.105	0.166	0.068
N	45	45	45	45	45	45	45

Table 6: Multiple Regressions for Predicting One-Month Value-Weighted Excess Market Returns

This table presents estimates from LS regressions of one-month value-weighted excess market returns on multiple predictors:

$$r_t = a + b_1\, CCSI_{t-1} + b_2\, DIV_{t-1} + b_3\, DEF_{t-1} + b_4\, TERM_{t-1} + b_5\, YLD3_{t-1} + b_6\, BM_{t-1} + b_7\, cay_{t-1} + b_8\, r_{t-1} + u.$$

where r_t denotes one-month value-weighted (VWRET) excess returns calculated from CRSP market indices minus the one-month T-bill rate. CCSI denotes change in consumer sentiment. DIV denotes dividend yield. DEF is the average yield of Baa bonds minus the average yield of Aaa bonds. TERM is the average yield of Treasury bonds with maturity greater than 10 years minus the yield of the three-month T-bills. YLD3 denotes the yield of a T-bill that matures in 3 months. BM denotes the book-to-market value of the DJIA. The variable cay is the consumption-wealth ratio. $VWRET_{t-1}$ denotes lagged one-month value-weighted excess market returns. Newey-West t-statistic (1987) is reported in brackets. The 5% confidence interval from simulation (Nelson and Kim (1993)) that accounts for small-sample bias is reported in parentheses.

Independent variable			$VWRET_t$				
Column number	1	2	3	4	5	6	7
Intercept	0.036***	-0.008	0.019***	-0.002	0.019***	-0.007	0.000
Newey-West t	[2.79]	[-0.74]	[3.53]	[-0.19]	[3.73]	[-0.77]	[0.01]
5% interval	(-0.049,0.067)	(-0.026,0.029)	(-0.005,0.028)	(-0.022,0.029)	(-0.008,0.028)	(-0.024,0.028)	(-0.029,0.03)
$CCSI_{t-1}$				-0.049***	-0.048***		-0.051***
Newey-West t				[-3.14]	[-3.39]		[-3.32]
5% interval				(-0.037,0.048)	(-0.036,0.047)		(-0.033,0.051)
DIV_{t-1}	1.431**	0.781		0.349		0.707	0.127
Newey-West t	[2.38]	[1.07]		[0.55]		[1.16]	[0.19]
5% interval	(-0.837,1.179)	(-0.8,0.887)		(-0.671,0.859)		(-0.859,0.85)	(-0.846,0.972)
DEF_{t-1}	2.282**	0.966		1.079		1.074	1.378
Newey-West t	[2.54]	[0.92]		[1.11]		[0.94]	[1.28]
5% interval	(-1.564,2.159)	(-1.093,2.04)		(-1.065,2.015)		(-0.969,2.174)	(-1.013,2.15)
$TERM_{t-1}$	-0.897***	0.118		0.160		0.108	0.135
Newey-West t	[-2.98]	[0.59]		[0.96]		[0.61]	[0.81]
5% interval	(-0.976,0.604)	(-0.451,0.332)		(-0.518,0.391)		(-0.516,0.368)	(-0.465,0.387)
$YLD3_{t-1}$	-1.062***		-0.152**		-0.14**		
Newey-West t	[-4.57]		[-2.14]		[-2.11]		
5% interval	(-0.698,0.443)		(-0.286,0.169)		(-0.294,0.204)		
BM_{t-1}	-0.015	-0.040		-0.027		-0.039	-0.024
Newey-West t	[-0.56]	[-1.18]		[-0.99]		[-1.38]	[-0.86]
5% interval	(-0.054,0.065)	(-0.054,0.047)		(-0.052,0.046)		(-0.051,0.042)	(-0.047,0.047)
cay_{t-1}						0.056	0.153
Newey-West t						[0.26]	[0.77]
5% interval						(-0.489,0.406)	(-0.507,0.451)
$VWRET_{t-1}$	-0.075	-0.010		-0.020		-0.010	-0.022
Newey-West t	[-1.01]	[-0.15]		[-0.25]		[-0.13]	[-0.27]
5% interval	(-0.123,0.118)	(-0.115,0.116)		(-0.119,0.124)		(-0.115,0.116)	(-0.119,0.119)
R-Square	0.071	0.014	0.010	0.033	0.029	0.014	0.034
Adj.R-Square	0.045	-0.006	0.006	0.010	0.021	-0.010	0.007
N	257	257	262	257	262	257	257

Table 7: Multiple Regressions for Predicting One-Month Equal-Weighted Excess Market Returns

This table presents estimates from LS regressions of one-month equal-weighted excess market returns on multiple predictors:

$$r_t = a + b_1\, CCSI_{t-1} + b_2\, DIV_{t-1} + b_3\, DEF_{t-1} + b_4\, TERM_{t-1} + b_5\, YLD3_{t-1} + b_6\, BM_{t-1} + b_7\, cay_{t-1} + b_8\, r_{t-1} + u.$$

where r_t denotes one-month equal-weighted (EWRET) excess returns calculated from CRSP market indices minus the one-month T-bill rate. CCSI denotes change in consumer sentiment. DIV denotes dividend yield. DEF is the average yield of Baa bonds minus the average yield of Aaa bonds. TERM is the average yield of Treasury bonds with maturity greater than 10 years minus the yield of T-bills that mature in 3 months. YLD3 denotes the yield of a T-bill that matures in 3 months. BM denotes the book-to-market value of the DJIA. The variable cay is the consumption-wealth ratio. $VWRET_{t-1}$ denotes lagged one-month value-weighted excess market returns. Newey-West t-statistic (1987) is reported in brackets. The 5% confidence interval from simulation (Nelson and Kim (1993)) that accounts for small-sample bias is reported in parentheses.

Independent variable			$EWRET_t$				
Column number	1	2	3	4	5	6	7
Intercept	0.047***	-0.011	0.019***	-0.003	0.02***	-0.009	0.000
Newey-West t	[3.17]	[-0.86]	[2.73]	[-0.27]	[2.76]	[-0.81]	[-0.03]
5% interval	(-0.065,0.082)	(-0.03,0.031)	(-0.009,0.028)	(-0.035,0.03)	(-0.01,0.031)	(-0.033,0.032)	(-0.033,0.032)
CCSI $_{t-1}$				-0.059***	-0.061***		-0.062***
Newey-West t				[-2.83]	[-2.79]		[-3.01]
5% interval				(-0.04,0.065)	(-0.032,0.066)		(-0.043,0.065)
DIV$_{t-1}$	0.847	-0.015		-0.532		-0.187	-0.890
Newey-West t	[1.04]	[-0.02]		[-0.66]		[-0.24]	[-1.06]
5% interval	(-1.026,1.398)	(-0.983,0.973)		(-0.88,1.099)		(-1.04,1.022)	(-0.974,1.211)
DEF $_{t-1}$	3.004***	1.262		1.396		1.509	1.878
Newey-West t	[2.75]	[0.96]		[1.13]		[0.97]	[1.29]
5% interval	(-2.15,2.188)	(-1.309,2.02)		(-1.386,2.096)		(-1.237,2.26)	(-1.634,2.244)
TERM $_{t-1}$	-1.082***	0.263		0.313		0.241	0.273
Newey-West t	[-3.3]	[1.34]		[1.62]		[1.19]	[1.39]
5% interval	(-1.113,0.817)	(-0.499,0.439)		(-0.516,0.413)		(-0.504,0.47)	(-0.514,0.475)
YLD3 $_{t-1}$	-1.408***		-0.175*		-0.159*		
Newey-West t	[-5.22]		[-1.87]		[-1.73]		
5% interval	(-0.835,0.587)		(-0.325,0.218)		(-0.344,0.23)		
BM $_{t-1}$	0.031	-0.002		0.013		0.000	0.019
Newey-West t	[0.94]	[-0.05]		[0.37]		[0.01]	[0.52]
5% interval	(-0.048,0.078)	(-0.045,0.058)		(-0.052,0.059)		(-0.054,0.058)	(-0.049,0.068)
cay $_{t-1}$						0.129	0.247
Newey-West t						[0.44]	[0.87]
5% interval						(-0.584,0.517)	(-0.55,0.571)
EWRET$_{t-1}$	0.147**	0.234***		0.222***		0.233***	0.219***
Newey-West t	[2.06]	[3.38]		[3]		[3.36]	[2.96]
5% interval	(-0.083,0.14)	(-0.084,0.142)		(-0.084,0.134)		(-0.078,0.146)	(-0.081,0.146)
R-Square	0.134	0.060	0.010	0.081	0.033	0.06	0.08
Adj.R-Square	0.113	0.042	0.006	0.059	0.026	0.038	0.057
N	257	257	262	257	262	257	257

Table 8: Multiple Regressions for Predicting One-Year Value-Weighted Excess Market Returns

This table presents estimates from LS regressions of one-year value-weighted excess market returns on multiple predictors:

$$r_t = a + b_1\, CCSI_{t-1} + b_2\, DIV_{t-1} + b_3\, DEF_{t-1} + b_4\, TERM_{t-1} + b_5\, YLD3_{t-1} + b_6\, BM_{t-1} + b_7\, cay_{t-1} + b_8\, r_{t-1} + u.$$

where r_t denotes one-year value-weighted (VWRET) excess returns calculated from CRSP market indices minus the one-month T-bill rate. CCSI denotes change in consumer sentiment. DIV denotes dividend yield. DEF is the average yield of Baa bonds minus the average yield of Aaa bonds. TERM is the average yield of Treasury bonds with maturity greater than 10 years minus the yield of T-bills that mature in 3 months. YLD3 denotes the yield of a T-bill that matures in 3 months. BM denotes the book-to-market value of the DJIA. The variable cay is the consumption-wealth ratio. $VWRET_{t-1}$ denotes lagged one-month value-weighted excess market returns. Newey-West t-statistic (1987) is reported in brackets. The 5% confidence interval from simulation (Nelson and Kim (1993)) that accounts for small-sample bias is reported in parentheses.

Independent variable			$VWRET_t$				
Column number	1	2	3	4	5	6	7
Intercept	-0.098	0.005	-0.054	-0.108	-0.011	-0.023	-0.035
Newey-West t	[-0.83]	[0.05]	[-0.46]	[-0.92]	[-0.1]	[-0.17]	[-0.27]
5% Interval	(-0.249,0.366)	(-0.214,0.292)	(-0.21,0.135)	(-0.262,0.378)	(-0.17,0.141)	(-0.299,0.334)	(-0.313,0.356)
$CCSI_{t-1}$				-0.317**	-0.416**		-0.311**
Newey-West t				[-2.37]	[-2.51]		[-2.28]
5% Interval				(-0.219,0.483)	(-0.194,0.493)		(-0.242,0.501)
DIV_{t-1}	9.44*		3.855	8.838*	2.723	7.296	6.776
Newey-West t	[1.93]		[1.16]	[1.78]	[0.83]	[1.44]	[1.33]
5% Interval	(-7.828,11.701)		(-2.208,8.674)	(-8.224,12.135)	(-2.289,7.394)	(-8.156,12.013)	(-7.65,13.202)
DEF_{t-1}	-0.505	-0.844		-0.673		0.821	0.612
Newey-West t	[-0.09]	[-0.15]		[-0.12]		[0.16]	[0.11]
5% Interval	(-8.692,19.81)	(-5.911,21.168)		(-10.102,18.939)		(-8.711,23.354)	(-10.949,21.477)
$TERM_{t-1}$	3.716*	4.903**		3.662**		2.074	2.076
Newey-West t	[1.98]	[2.44]		[2.28]		[1.01]	[1.26]
5% Interval	(-5.548,4.407)	(-4.86,4.426)		(-5.325,4.489)		(-5.116,5.735)	(-5.148,5.744)
$YLD3_{t-1}$	-0.068	-0.043		0.369		-0.233	0.202
Newey-West t	[-0.08]	[-0.05]		[0.38]		[-0.29]	[0.22]
5% Interval	(-4.353,2.013)	(-3.48,2.046)		(-4.705,2.093)		(-4.619,2.117)	(-4.557,2.48)
BM_{t-1}	-0.262	0.074		-0.260		-0.241	-0.240
Newey-West t	[-1.23]	[0.54]		[-1.26]		[-1.15]	[-1.17]
5% Interval	(-0.413,0.502)	(-0.207,0.288)		(-0.483,0.43)		(-0.466,0.486)	(-0.489,0.433)
cay_{t-1}						2.801	2.708
Newey-West t						[1.35]	[1.37]
5% Interval						(-5.337,3.141)	(-5.717,2.892)
$VWRET_{t-1}$	-0.248*	-0.282*		-0.125		-0.313**	-0.19*
Newey-West t	[-1.79]	[-1.88]		[-1.05]		[-2.56]	[-1.77]
5% Interval	(-0.323,0.362)	(-0.343,0.284)		(-0.39,0.334)		(-0.316,0.342)	(-0.38,0.352)
R-Square	0.262	0.207	0.048	0.308	0.157	0.288	0.333
Adj.R-Square	0.145	0.105	0.026	0.177	0.117	0.153	0.184
N	45	45	45	45	45	45	45

Table 9: Multiple Regressions for Predicting One-Year Equal-Weighted Excess Market Returns

This table presents estimates from LS regressions of one-year equal-weighted excess market returns on multiple predictors:

$$r_t = a + b_1\, CCSI_{t-1} + b_2\, DIV_{t-1} + b_3\, DEF_{t-1} + b_4\, TERM_{t-1} + b_5\, YLD3_{t-1} + b_6\, BM_{t-1} + b_7\, cay_{t-1} + b_8\, r_{t-1} + u.$$

where r_t denotes one-year equal-weighted (EWRET) excess returns calculated from CRSP market indices minus the one-month T-bill rate. CCSI denotes change in consumer sentiment. DIV denotes dividend yield. DEF is the average yield of Baa bonds minus the average yield of Aaa bonds. TERM is the average yield of Treasury bonds with maturity greater than 10 years minus the yield of T-bills that mature in 3 months. YLD3 denotes the yield of a T-bill that matures in 3 months. BM denotes the book-to-market value of the DJIA. The variable cay is the consumption-wealth ratio. $VWRET_{t-1}$ denotes lagged one-month value-weighted excess market returns. Newey-West t-statistic (1987) is reported in brackets. The 5% confidence interval from simulation (Nelson and Kim (1993)) that accounts for small-sample bias is reported in parentheses.

Independent variable			$EWRET_t$				
Column number	1	2	3	4	5	6	7
Intercept	-0.138	-0.026	-0.210	-0.152	-0.142	-0.098	-0.102
Newey-West t	[-0.71]	[-0.2]	[-1.39]	[-0.8]	[-0.98]	[-0.47]	[-0.51]
5% Interval	(-0.43,0.51)	(-0.384,0.399)	(-0.344,0.202)	(-0.403,0.502)	(-0.271,0.209)	(-0.438,0.462)	(-0.403,0.476)
$CCSI_{t-1}$				-0.47**	-0.661***		-0.373**
Newey-West t				[-2.67]	[-3.29]		[-2.01]
5% Interval				(-0.301,0.697)	(-0.279,0.649)		(-0.329,0.689)
DIV_{t-1}	10.256		9.457**	9.363	7.657*	7.039	6.707
Newey-West t	[1.14]		[2.17]	[1.06]	[1.79]	[0.78]	[0.77]
5% Interval	(-12.69,16.3)		(-3.67,13.808)	(-11.429,15.419)	(-3.607,11.286)	(-11.828,17.3)	(-11.169,18.166)
DEF_{t-1}	3.565	3.196		3.315		3.177	3.426
Newey-West t	[0.48]	[0.45]		[0.43]		[0.48]	[0.51]
5% Interval	(-13.09,26.51)	(-9.604,26.969)		(-16.245,25.372)		(-15.108,28.469)	(-15.875,25.106)
$TERM_{t-1}$	3.365	4.654*		3.285		1.566	1.601
Newey-West t	[1.34]	[1.79]		[1.53]		[0.46]	[0.54]
5% Interval	(-7.08,6.88)	(-6.156,7.616)		(-6.299,7.999)		(-6.972,9.614)	(-6.735,9.209)
$YLD3_{t-1}$	-1.582	-1.555		-0.934		-1.818	-1.278
Newey-West t	[-1.15]	[-1.15]		[-0.69]		[-1.33]	[-0.93]
5% Interval	(-6.43,3.1)	(-5.144,3.198)		(-6.384,3.28)		(-6.18,3.483)	(-6.365,3.067)
BM_{t-1}	-0.080	0.285*		-0.077		0.097	0.054
Newey-West t	[-0.22]	[1.8]		[-0.22]		[0.26]	[0.15]
5% Interval	(-0.612,0.662)	(-0.296,0.491)		(-0.634,0.633)		(-0.632,0.67)	(-0.681,0.639)
cay_{t-1}						3.609	3.286
Newey-West t						[1.11]	[1.05]
5% Interval						(-7.666,4.625)	(-7.552,5.243)
$EWRET_{t-1}$	-0.448**	-0.486**		-0.266*		-0.397***	-0.284***
Newey-West t	[-2.46]	[-2.63]		[-1.76]		[-4.16]	[-2.78]
5% Interval	(-0.46,0.42)	(-0.29,0.244)		(-0.574,0.424)		(-0.227,0.284)	(-0.367,0.257)
R-Square	0.293	0.261	0.139	0.342	0.272	0.284	0.329
Adj.R-Square	0.181	0.167	0.119	0.218	0.238	0.149	0.180
N	45	45	45	45	45	45	45

Table 10: Out-of-sample forecast

The out-of-sample predictive power of change in consumer sentiment is compared to the benchmark ARI model (Autoregressive I). For monthly returns, an estimation period of 132 months (11 years) is used to forecast one-month-ahead returns in a rolling window forecast. For yearly returns, an estimation period of 20 years is used to forecast one-year-ahead returns in a rolling window forecast. This table reports the mean square error (MSE) between the predicted returns and realized returns for the change in consumer sentiment model and ARI model. Panel A reports MSE of forecasts of value-weighted market returns and Panel B reports the MSE of forecasts of equal-weighted returns.

Panel A: Value-weight market returns

	MSE of out of sample prediction	
Model	$VWRET_t = a + b1\ CCSI_{t-1}$	$VWRET_t = a + b1\ VWRET_{t-1}$
Monthly returns	0.00166	0.00167
Yearly returns	0.01955	0.02428

Panel B: Equal-weight market returns

	MSE of out of sample prediction	
Model	VWRET t = a + b1 CCSI t-1	VWRET t = a + b1 VWRET t-1
Monthly returns	0.0024	0.0022
Yearly returns	0.0402	0.0486

Table 11: Regressions of Consumption Growth and Real GDP Growth on Lagged Change in Consumer Sentiment

Panel A presents the regressions of monthly consumption growth ($CONG_t$) and monthly real GDP growth ($GDPG_t$) on lagged change in consumer sentiment ($CCSI_{t-1}$). The data span the period from January 1979 through December 2000. Monthly Real GDP growth is constant for 3 months until new data are available since GDP is available quarterly.
Panel B presents the regressions of yearly consumption growth ($CONG_t$) and yearly real GDP growth ($GDPG_t$) on lagged change in consumer sentiment ($CCSI_{t-1}$). The data span the period from 1955 through 2000.

*** denotes statistical significance level at 1% or lower. * denotes statistical significance at 10% or lower. Newey-West t statistic is reported in brackets.

Panel A: One-month sample regression of consumption growth and GDP growth on lagged change in consumer sentiment

Independent variable	$CONG_t$	$GDPG_t$
Intercept	0.006***	0.007***
Newey-West t	[20.08]	[8.8]
$CCSI_{t-1}$	-0.001	0.027***
Newey-West t	[-0.43]	[4.02]
R-Square	0.002	0.211
Adj.R-Square	-0.002	0.208
N	262	262

Panel A: One-year sample regression of consumption growth and GDP growth on lagged change in consumer sentiment

Independent variable	$CONG_t$	$GDPG_t$
Intercept	0.073***	0.032***
Newey-West t	[17.2]	[11.02]
$CCSI_{t-1}$	-0.01	0.056*
Newey-West t	[-0.56]	[1.73]
R-Square	0.009	0.132
Adj.R-Square	-0.015	0.112
N	45	45

Table 12: Change in Consumer Sentiment, One-Month Market Returns, and Economic Business Cycles

Panel A presents multiple least square regressions of value-weighted excess one-month return (VWRET) on a number of predictors. Panel B presents multiple least square regressions of equal-weighted excess one-month return (EWRET) on these same predictors. The excess returns are from CRSP market indices minus the one-month T-bill rate. CCSI denotes change in consumer sentiment. DIV denotes dividend yield. DEF is the average yield of Baa bonds minus the average yield of Aaa bonds. TERM is the average yield of Treasury bonds with maturity greater than 10 years minus the yield of T-bills that mature in 3 months. YLD3 denotes the yield of a T-bill that matures in 3 months. BM denotes the book-to-market value of the DJIA. The variable cay is the consumption wealth ratio from Lettau and Ludvigson (2001). $VWRET_{t-1}$ denotes lagged one-year value-weighted excess market returns. $EWRET_{t-1}$ denotes lagged one-year equal-weighted excess market returns. CONG is monthly consumption growth. GDPG is the monthly real GDP growth. Monthly GDPG is constant for three months within a quarter since GDP is reported quarterly. Variables CONG and GDPG are contemporaneous with returns.

To measure how much of the predictability of CCSI is due to the predictability of CCSI on business cycles as measured by real GDP growth and consumption growth, the following regression is performed to separate CCSI that is directly related to GDPG and CONG and CCSI that is unrelated:

$$CCSI_{t-1} = a + b_1\, GDPG_t + b_2\, CONG_t + e$$

The predicted part of this regression, $= a + b_1\, GDPG_t + b_2\, CONG_t,$ is $CCSI_{t-1}$ related to consumption and GDP growth and the error term e is the $CCSI_{t-1}$ unrelated to consumption and GDP growth. Columns 5 and 6 of Panels A and B present the regressions of excess returns on $CCSI_{t-1}$ related and unrelated to consumption and GDP growth and other predictors.

Panel A: Mutiple regressions of value-weighted one-month

Independent variable	VWRET$_t$					
column number	1	2	3	4	5	6
Intercept	-0.007	-0.005	-0.002	0.018**	-0.003	0.000
Newey-West t	[-0.77]	[-0.51]	[-0.26]	[2.52]	[-0.35]	[0.05]
CCSI $_{t-1}$			-0.05***	-0.044***		
Newey-West t			[-2.76]	[-2.6]		
DIV$_{t-1}$	0.707	0.514	0.075		0.558	0.124
Newey-West t	[1.16]	[0.83]	[0.11]		[0.9]	[0.19]
DEF $_{t-1}$	1.074	1.297	1.527		1.157	1.380
Newey-West t	[0.94]	[1.1]	[1.36]		[1.01]	[1.28]
TERM $_{t-1}$	0.108	0.136	0.148		0.125	0.136
Newey-West t	[0.61]	[0.77]	[0.87]		[0.72]	[0.82]
YLD3 $_{t-1}$				-0.174**		
Newey-West t				[-2.26]		
BM $_{t-1}$	-0.039	-0.041	-0.027		-0.038	-0.024
Newey-West t	[-1.38]	[-1.42]	[-0.94]		[-1.34]	[-0.86]
cay $_{t-1}$	0.056	0.106	0.189		0.072	0.153
Newey-West t	[0.26]	[0.49]	[0.92]		[0.34]	[0.77]
VWRET$_{t-1}$	-0.010	-0.022	-0.031	-0.015	-0.012	-0.022
Newey-West t	[-0.13]	[-0.27]	[-0.37]	[-0.21]	[-0.16]	[-0.27]
CONG $_t$		0.801	0.723	0.732		
Newey-West t		[1.03]	[0.95]	[1.09]		
GDPG $_t$		-0.437	-0.062	-0.122		
Newey-West t		[-0.98]	[-0.13]	[-0.25]		
CCSI $_{t-1}$ related to consumption and GDP growth					-0.054	-0.056
Newey-West t					[-0.94]	[-1.02]
CCSI $_{t-1}$ unrelated to consumption and GDP growth						-0.05***
Newey-West t						[-2.78]
R-Square	0.014	0.022	0.038	0.033	0.019	0.034
Adj.R-Square	-0.010	-0.010	0.003	0.014	-0.009	0.003
N	257	257	257	262	257	257

Panel B: Mutiple regressions of equal-weighted one-month

Independent variable	EWRET$_t$					
column number	1	2	3	4	5	6
Intercept	-0.009	-0.007	-0.004	0.014	-0.005	-0.001
Newey-West t	[-0.81]	[-0.57]	[-0.34]	[1.41]	[-0.48]	[-0.1]
CCSI $_{t-1}$			-0.059***	-0.043**		
Newey-West t			[-2.74]	[-2.14]		
DIV$_{t-1}$	-0.187	-0.475	-0.990		-0.065	-0.572
Newey-West t	[-0.24]	[-0.61]			[-0.09]	[-0.77]
DEF $_{t-1}$	1.509	1.886	2.155		1.394	1.648
Newey-West t	[0.97]	[1.19]	[1.44]		[0.98]	[1.25]
TERM $_{t-1}$	0.241	0.284	0.298		0.243	0.257
Newey-West t	[1.19]	[1.45]	[1.52]		[1.32]	[1.43]
YLD3 $_{t-1}$				-0.188*		
Newey-West t				[-1.92]		
BM $_{t-1}$	0.000	-0.004	0.013		-0.009	0.007
Newey-West t	[0.01]	[-0.1]	[0.34]		[-0.29]	[0.22]
cay $_{t-1}$	0.129	0.215	0.311		0.084	0.177
Newey-West t	[0.44]	[0.47]	[1.08]		[0.31]	[0.68]
EWRET$_{t-1}$	0.233***	0.213***	0.201**	0.204***	0.244***	0.235***
Newey-West t	[3.36]	[2.85]	[2.57]	[3.05]	[4.92]	[4.47]
CONG $_t$		1.437*	1.345	1.449*		
Newey-West t		[1.72]	[1.63]	[1.96]		
GDPG $_t$		-0.615	-0.175	-0.301		
Newey-West t		[-1.17]	[-0.32]	[-0.55]		
CCSI $_{t-1}$ related to consumption and GDP growth					-0.074	-0.076
Newey-West t					[-1.13]	[-1.22]
CCSI $_{t-1}$ unrelated to consumption and GDP growth						-0.056***
Newey-West t						[-2.98]
R-Square	0.061	0.076	0.092	0.080	0.089	0.104
Adj.R-Square	0.038	0.046	0.059	0.062	0.063	0.075
N	257	257	257	262	257	257

Table 13: Change in Consumer Sentiment, One-Year Market Returns, and Economic Business Cycles

Panel A presents multiple least square regressions of value-weighted (VWRET) and equal-weighted (EWRET) excess one-year return cay, consumption growth (CONG), real GDP growth (GDPG), and other predictors. The excess returns are from CRSP market indices minus the one-month T-bill rate. CCSI denotes change in consumer sentiment. DIV denotes dividend yield. DEF is the average yield of Baa bonds minus the average yield of Aaa bonds. TERM is the average yield of Treasury bonds with maturity greater than 10 years minus the yield of T-bills that mature in 3 months. YLD3 denotes the yield of a T-bill that matures in 3 months. BM denotes the book-to-market value of the DJIA. . The variable cay is the consumption wealth ratio from Lettau and Ludvigson (2001). $VWRET_{t-1}$ denotes lagged one-year value-weighted excess market returns. $EWRET_{t-1}$ denotes lagged one-year equal-weighted excess market returns. CONG is monthly consumption growth. GDPG is the monthly real GDP growth. Variables CONG and GDPG are contemporaneous with returns.

To measure how much of the predictability of CCSI is due to the predictability of CCSI on business cycles as measured by real GDP growth and consumption growth, the following regression is performed to separate CCSI that is directly related to GDPG and CONG and CCSI that is unrelated:

$$CCSI_{t-1} = a + b_1\, GDPG_{\,t} + b_2\, CONG_t + e$$

The predicted part of this regression, $a + b_1\, GDPG_{\,t} + b_2\, CONG_{t,}$, is $CCSI_{t-1}$ related to consumption and GDP growth and the error term e is the $CCSI_{t-1}$ unrelated to consumption and GDP growth. Panel B presents the regressions of excess returns on $CCSI_{t-1}$ related and unrelated to consumption and GDP growth and other predictors.

Panel A

Independent variable	$VWRET_t$								$EWRET_t$							
column number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Intercept	0.120	0.227***	0.169	0.252***	0.090	0.2***	0.139	0.232***	0.001	0.145	-0.066	0.098	-0.009	0.135	-0.067	0.102
Newey-West t	[0.74]	[2.81]	[1.49]	[3.55]	[0.61]	[2.83]	[1.21]	[3.44]	[0]	[1.1]	[-0.46]	[0.99]	[-0.04]	[1.07]	[-0.48]	[1.01]
$CCSI_{t-1}$					-0.457**	-0.452**	-0.369***	-0.378**					-0.464*	-0.385	-0.486**	-0.508**
Newey-West t					[-2.48]	[-2.26]	[-2.88]	[-2.55]					[-1.72]	[-1.42]	[-2.61]	[-2.39]
DIV_{t-1}	3.583		4.511		3.623		5.147				9.392*		4.422		9.715*	
Newey-West t	[0.67]		[1.24]		[0.67]		[1.31]		[0.48]		[1.81]		[0.49]		[1.82]	
DEF_{t-1}	-2.510	4.716			-1.890	5.540			0.793	16.797			1.599	16.994		
Newey-West t	[-0.5]	[0.75]			[-0.39]	[0.88]			[0.11]	[1.49]			[0.23]	[1.55]		
$TERM_{t-1}$	2.679	1.164			2.082	0.526			2.241	-1.562			1.756	-1.845		
Newey-West t	[1.16]	[0.5]			[1.22]	[0.27]			[0.65]	[-0.46]			[0.56]	[-0.55]		
$YLD3_{t-1}$	0.596	-0.006			1.509	0.879			-1.425	-2.853**			-0.449	-2.001		
Newey-West t	[0.64]	[-0.01]			[1.56]	[0.9]			[-0.87]	[-2.05]			[-0.24]	[-1.23]		
BM_{t-1}	0.089			0.160	0.093			0.199	0.289			0.391	0.273			0.415*
Newey-West t	[0.35]			[1]	[0.38]			[1.15]	[0.61]			[1.66]	[0.59]			[1.69]
cay_{t-1}	2.300	3.659**	3.436*	4.092**	1.827	3.222*	2.827	3.512**	3.395	6.336*	4.039*	5.243*	2.712	5.7*	3.125	4.292
Newey-West t	[1.09]	[2.04]	[1.98]	[2.41]	[0.92]	[1.93]	[1.6]	[2.15]	[1.03]	[1.97]	[1.7]	[1.96]	[0.83]	[1.8]	[1.22]	[1.59]
$VWRET_{t-1}$	-0.283**	-0.384**	-0.328***	-0.343***	-0.153*	-0.258**	-0.205**	-0.216***	-0.365***	-0.54***	-0.399***	-0.415***	-0.257**	-0.446***	-0.269**	-0.277**
Newey-West t	[-2.53]	[-2.62]	[-2.95]	[-3.01]	[-1.74]	[-2.55]	[-2.62]	[-2.87]	[-2.75]	[-2.89]	[-2.97]	[-3.08]	[-2.04]	[-2.81]	[-2.09]	[-2.37]
$CONSUMG_t$	-3.359*	-2.537*	-3.259***	-3.556**	-4.321**	-3.462**	-3.457***	-3.925**	-1.642	0.592	-1.722	-2.754	-2.754	-0.404	-2.216	-3.396
Newey-West t	[-1.96]	[-1.87]	[-3.11]	[-2.24]	[-2.43]	[-2.45]	[-3.21]	[-2.34]	[-0.59]	[0.31]	[-1.09]	[-1.19]	[-0.87]	[-0.16]	[-1.25]	[-1.34]
$GDPG_t$	0.146	-0.080	0.408	0.172	1.406	1.164	0.984	0.765	-0.510	-0.623	0.603	0.257	0.671	0.353	1.218	0.911
Newey-West t	[0.9]	[-0.07]	[0.4]	[0.17]	[1.02]	[0.78]	[0.96]	[0.7]	[-0.24]	[-0.3]	[0.31]	[0.13]	[0.29]	[0.15]	[0.68]	[0.47]
R-Square	0.361	0.327	0.342	0.332	0.441	0.405	0.407	0.399	0.300	0.197	0.264	0.258	0.354	0.250	0.338	0.337
Adj.R-Square	0.196	0.199	0.258	0.246	0.277	0.273	0.314	0.304	0.120	0.045	0.170	0.163	0.164	0.083	0.234	0.232
N	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45

Panel B

Independent variable	VWRET$_t$								EWRET$_t$							
Column number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Intercept	0.036	-0.060	0.079	0.041	0.072	0.047	0.13**	0.110	-0.110	-0.149	0.144	0.081	-0.119	-0.126	0.000	-0.007
Newey-West t	[0.27]	[-0.43]	[1.44]	[0.62]	[0.62]	[0.38]	[2.02]	[1.62]	[-0.53]	[-0.73]	[1.51]	[0.78]	[-0.84]	[-0.87]	[0]	[-0.08]
DIV$_{t-1}$	5.815	7.959			0.589	1.124			6.867	7.905			7.465*	7.349		
Newey-West t	[1.09]	[1.43]			[0.18]	[0.31]			[0.76]	[0.88]			[1.73]	[1.64]		
DEF $_{t-1}$	-0.427	1.882	0.545	0.383					-0.215	1.289	13.712	12.265				
Newey-West t	[-0.08]	[0.3]	[0.08]	[0.06]					[-0.03]	[0.16]	[1.39]	[1.32]				
TERM $_{t-1}$	0.868	1.488	2.578	2.363					2.819	2.211	-0.332	-0.156				
Newey-West t	[0.44]	[0.87]	[1.31]	[1.35]					[1]	[0.82]	[-0.12]	[-0.06]				
YLD3 $_{t-1}$	-0.450	0.359	-0.325	0.282					-1.592	-0.760	-2.334*	-1.246				
Newey-West t	[-0.58]	[0.39]	[-0.35]	[0.27]					[-1.23]	[-0.54]	[-1.92]	[-1]				
BM $_{t-1}$	-0.220	-0.291					-0.059	-0.037	0.125	0.023					0.220	0.214
Newey-West t	[-1.01]	[-1.28]					[-0.56]	[-0.32]	[0.35]	[0.06]					[1.43]	[1.3]
cay $_{t-1}$	3.758*	2.501	3.777*	3.471*	4.953**	4.396**	5.201***	4.745**	3.041	2.410	5.314*	4.456	4.545*	3.694	5.846**	4.977*
Newey-West t	[1.84]	[1.22]	[1.9]	[1.74]	[2.68]	[2.32]	[2.79]	[2.55]	[0.94]	[0.77]	[1.82]	[1.52]	[1.77]	[1.41]	[2.04]	[1.77]
VWRET$_{t-1}$	-0.222*	-0.216*	-0.333**	-0.228*	-0.347**	-0.229*	-0.375***	-0.262**	-0.275*	-0.160	-0.341*	-0.198	-0.317*	-0.172	-0.337*	-0.191
Newey-West t	[-1.82]	[-1.84]	[-2.07]	[-1.71]	[-2.5]	[-2.01]	[-2.72]	[-2.4]	[-1.8]	[-1.16]	[-1.96]	[-1.47]	[-2.01]	[-1.27]	[-2.01]	[-1.36]
CCSI $_{t-1}$ related to consumption and GDP growth	-0.120	0.070	-0.223	-0.197	0.114	-0.005	-0.018	-0.135	-0.465	-0.449	-0.743	-0.749	0.060	-0.197	-0.154	-0.412
Newey-West t	[-0.28]	[0.15]	[-0.55]	[-0.46]	[0.26]	[-0.01]	[-0.04]	[-0.34]	[-0.56]	[-0.54]	[-0.89]	[-0.89]	[0.07]	[-0.27]	[-0.19]	[-0.54]
CCSI $_{t-1}$ unrelated to consumption and GDP growth		-0.361**		-0.34**		-0.356***		-0.34***		-0.49**		-0.566***		-0.562***		-0.561***
Newey-West t		[-2.27]		[-2.09]		[-2.72]		[-2.73]		[-2.31]		[-2.72]		[-3.23]		[-3.22]
R-Square	0.262	0.340	0.261	0.308	0.229	0.289	0.234	0.289	0.296	0.338	0.225	0.285	0.256	0.324	0.235	0.303
Adj.R-Square	0.098	0.170	0.144	0.177	0.152	0.198	0.158	0.198	0.139	0.168	0.102	0.149	0.182	0.238	0.158	0.213
N	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45