

# Consumer Confidence and Asset Prices: Some Empirical Evidence

**Michael Lemmon**  
University of Utah

**Evgenia Portniaguina**  
University of Oklahoma

We explore the time-series relationship between investor sentiment and the small-stock premium using consumer confidence as a measure of investor optimism. We estimate the components of consumer confidence related to economic fundamentals and investor sentiment. After controlling for the time variation of beta, we study the time-series variation of the pricing error with sentiment. Over the last 25 years, investor sentiment measured using consumer confidence forecasts the returns of small stocks and stocks with low institutional ownership in a manner consistent with the predictions of models based on noise-trader sentiment. Sentiment does not appear to forecast time-series variation in the value and momentum premiums. (*JEL* G10, G12, G14)

In this article, we explore the time-series relationship between investor sentiment and stock returns using consumer confidence as a measure of investor optimism. Our goal is to assess the extent to which sentiment affects the prices of different stocks in times of optimistic or pessimistic assessment of market conditions by investors. Our analysis examines both behavioral and rational channels through which sentiment might be manifested in asset prices.

The behavioral hypothesis suggests that when arbitrage is limited, noise-trader sentiment can persist in financial markets and affect asset prices. For example, Delong et al. (1990) show that if the sentiment of noise traders is correlated, then the prices of assets that are predominantly held by these investors may deviate from their fundamental values for extended periods of time. This hypothesis thus predicts a negative relationship between the level of investor sentiment and the future returns of stocks widely held by noise traders as the mispricing is eventually corrected. Alternatively, Jagannathan and Wang (1996) argue that firms on

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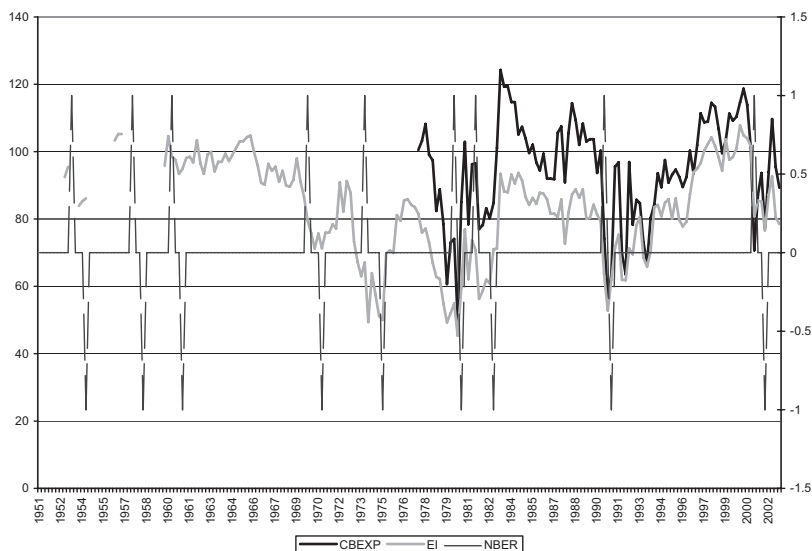
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the fringe and firms with a higher likelihood of financial distress will have conditional market betas that are more sensitive to changes in the business cycle. Under this view, investor sentiment is related to time variation in the expected returns of these firms, because sentiment rationally forecasts future macroeconomic conditions.

Following prior literature, we focus primarily on differences between small and large firms. Firm size represents a natural variable to use for examining the relationship between investor sentiment and stock returns. Lee, Shleifer, and Thaler (1991) identify noise traders with individual investors and show that small stocks are disproportionately held by individuals as opposed to institutions. More recent evidence by Nagel (2005) also shows a strong positive correlation between ownership by institutions and firm size. Chan and Chen (1991) show that small firms are also associated with higher levels of financial distress risk and other characteristics that are likely to affect their conditional covariances with the market over the business cycle, while Jagannathan and Wang (1996) provide evidence that accounting for time variation in expected returns related to changing macroeconomic conditions helps to explain the size premium in returns.

As measures of investor sentiment, we use the two surveys of consumer confidence that have been conducted in the United States. One is collected by the Conference Board [the Index of Consumer Confidence (CBIND)] and the other is independently conducted by the University of Michigan Survey Research Center [the Index of Consumer Sentiment (ICS)]. These surveys poll a large number of households on their personal financial situation, their expectations regarding the US economy, and their propensity to consume major household items. CBIND is included in the list of 10 major leading economic indicators by the Conference Board, having proven useful in predicting past recessions. Several papers [Acemoglu and Scott, (1994), Carroll, Fuhrer, and Wilcox (1994), Bram and Ludvigson (1998), Ludvigson (2004)] find that consumer confidence predicts future household spending. According to the University of Michigan Survey Research Center, consumers also anticipate changes in interest rates, unemployment, inflation, real gross domestic product (GDP), and house sales. Figure 1 shows that consumer expectations are good predictors of business cycle peaks and troughs.

Consumer sentiment has also received some attention in the literature as a potential measure of investor optimism. Fisher and Statman (2002) report positive correlations between the measures of consumer confidence and a direct measure of investor sentiment compiled by the American Association of Individual Investors over the period 1987–2000. There is also evidence of the presence of an irrational element in consumer confidence. Doms and Morin (2004) find, after controlling for economic



**Figure 1**

The indexes of consumer expectations from the University of Michigan (EI) and the Conference Board (CBEXP), left scale, versus the NBER indicator of economic cycle peaks and troughs, right scale.

fundamentals, that the measures of consumer confidence respond to the *tone and volume* of economic news reports rather than economic content.

The methodology we adopt is as follows. First, we regress consumer confidence on a set of macroeconomic variables. Although the regression has a high  $R^2$  (around 0.8), a substantial portion of confidence remains unexplained. We treat the residual from this regression as our measure of excessive sentiment (optimism or pessimism) unwarranted by fundamentals. One general criticism that applies to our approach is that we have to take a stand on the information set used to separate the fundamental and sentiment components. Hence, we try to make our information set as large as feasible given the number of observations in our sample.<sup>1</sup>

We employ lagged measures of the fundamental and sentiment components of consumer confidence to explore the time-series behavior of the conditional betas and the pricing errors for the returns on a portfolio long stocks in the smallest Center for Research in Security Prices (CRSP) size decile and short stocks in the largest size decile. Consistent with the

<sup>1</sup> Ludvigson and Ng (2005) apply dynamic factor analysis to forecast quarterly excess stock market index returns. Their methodology offers a possible remedy to the problem of having to restrict the information set to parsimonious set of variables. Exploring this approach in our context is a direction for future research.

rational view, we find that the conditional market betas of this portfolio increase following quarters of low confidence. However, consistent with the behavioral view, after we allow for time variation in the conditional market betas, we still find that the pricing errors are negatively correlated with the sentiment component of confidence—small stocks earn low returns relative to large stocks following quarters when the sentiment component of consumer confidence is high. The relationship between the sentiment component of confidence and the size premium is robust to allowing the conditional market beta to vary with additional macro variables and to the inclusion of returns on the book-to-market and momentum factors.

Our evidence is consistent with the idea that investors appear to over-value small stocks relative to large stocks during periods when consumer confidence is high and vice versa. When we perform analysis on different subperiods, we find that the predictive power of consumer confidence is present only in the most recent 25-year subsample. One potential explanation for this result is that the influence of individual investors in financial markets has risen over time, thus creating a stronger link between sentiment and stock returns in the latter part of the sample.

We also compare the sentiment component of confidence extracted from the various confidence indexes to both the closed-end fund discount (CEFD) [e.g., Lee, Shleifer, and Thaler (1991) and Swaminathan (1996)] and the overall sentiment measure developed by Baker and Wurgler (2005). Over the period from 1962 to 1977, the sentiment component of confidence and the Baker and Wurgler index are negatively correlated. Over the period 1978–2002, we find that the two measures align better than in the earlier period but that the correlations are relatively small. The correlations of the sentiment component of confidence with CEFD are weak in both subperiods, and the signs of the correlations are not consistent across the different confidence indexes. More interestingly, in the post-1977 period, CEFD exhibits essentially no forecasting power for the size premium after controlling for the the sentiment measure based on consumer confidence.

A key assumption behind the focus of the sentiment literature on the size premium is that small stocks are disproportionately held by individual investors (as opposed to institutions) and that individual investors are more likely to be affected by sentiment. We test this hypothesis directly and perform the same time-series analysis using the returns on a portfolio of stocks with low institutional ownership less the returns on a high institutional ownership portfolio. We find that stocks with low institutional ownership exhibit low (high) returns following periods of high (low) residual confidence. The results provide additional support for the view that stocks held predominantly by individual investors are more prone to mispricing arising from changes in sentiment.

Finally, we also examine whether the sentiment component of consumer confidence is related to time-series variation of returns to value and momentum strategies. The results show that the confidence-based sentiment measures do not exhibit any significant predictive power for either the book-to-market or the momentum factors. Exploring further, we find evidence that high levels of sentiment forecast lower future returns on value stocks, but no evidence that sentiment forecasts the returns on growth stocks. Our result differs from that reported by Baker and Wurgler (2005), who find a U-shaped relationship between their measure of sentiment and the returns on portfolios sorted by book to market. For portfolios sorted on past returns, we find no evidence that our measure of sentiment forecasts the subsequent returns on either past winner or past loser stocks.

Our analysis contributes to several strands of the literature. The existing studies of the effect of sentiment on asset prices have largely relied on the use of the discount on closed-end funds as a sentiment measure. For example, Lee, Shleifer, and Thaler (1991) find that CEFDs are contemporaneously correlated with small stock returns, whereas Chen, Kan, and Miller (1993) and Doukas and Milonas (2002) provide evidence to the contrary. Swaminathan (1996) finds that the CEFD forecasts the size premium and that information in discounts is related to expectations of future earnings growth and inflation. Neal and Wheatley (1998) find that CEFDs and net mutual fund redemptions forecast the size premium, especially at long horizons. Baker and Wurgler (2005) design a measure of investor sentiment based on the CEFD and several other market-based variables, such as the number of IPOs, NYSE turnover, and so on. They show that the returns on equity portfolios with different “salient” (e.g., age, size, dividend payout, distress) investment characteristics are prone to speculation and are difficult to arbitrage making their prices sensitive to changes in investor sentiment. Consistent with this argument, they report that periods of low sentiment are followed by high returns on small, young, unprofitable, and dividend-nonpaying stocks.

In contrast to these studies that rely predominantly on the use of market prices to measure sentiment, we focus on a direct measure of sentiment compiled from survey data. Some recent papers provide additional evidence that complements the findings that we report. Charoenrook (2002) finds that changes in consumer confidence help to forecast aggregate market returns in the United States. Brown and Cliff (2004) use data on investor sentiment from a survey conducted by the American Association of Individual Investors and did not find evidence that fund discounts reflect investor sentiment. Qiu and Welch (2004) find that the measures of consumer confidence that we use and CEFD do not correlate well and that only the confidence measures are correlated with a measure of investor sentiment derived from UBS/Gallup. Moreover, they also found that only the consumer confidence measures yield robust

contemporaneous correlations with the small-firm premium and with the spread in returns between stocks held by individuals and those predominantly held by institutions. Kumar and Lee (2005) find direct evidence of correlated trading by individual investors and provide evidence that a factor capturing the buy–sell imbalance of individual traders helps to explain the return comovements of stocks with a high concentration of retail investors (including small stocks). In comparison, we focus on the ability of the confidence measures to forecast the size premium and attempt to separate out the effects of confidence that are related to economic fundamentals from those potentially associated with behavioral biases.

The rest of this article is organized as follows. In the next section, we give a detailed description of the consumer confidence survey data along with the other data used in our study. In Section 2, we present initial evidence on the link between consumer confidence and the size premium. In Section 3, we discuss the ability of consumer confidence to predict macroeconomic activity. In Section 4, we describe the decomposition of consumer confidence into components related to economic fundamentals and to investor sentiment and compare the confidence-based measure of sentiment to other measures of investor sentiment in the literature. In Section 5, we revisit the link between the consumer confidence and the size premium using the fundamental and sentiment-based components of consumer confidence. In Section 6, we discuss the relationship between the consumer confidence and the book-to-market and momentum factors. We conclude in Section 7.

## **1. Data**

As measures of investor sentiment, we employ data from two surveys. One is the University of Michigan survey of consumer sentiment and the other is the Conference Board survey of consumer confidence.

The University of Michigan survey of consumer sentiment started in 1947 on a quarterly basis for months 2, 5, 8, and 11. Beginning in 1978, the index is available on a monthly basis. The main reason for increasing the sampling frequency in 1978, according to the University of Michigan Survey Research Center, was the increased frequency in the reporting of other macroeconomic data around that time. The final survey results for each month become available either at the end of that month or at the beginning of the following month. The survey is sent to 500 households, and the respondents are asked the following questions: (1) Would you say that you (and your family living there) are better off or worse off financially than you were a year ago? (2) Do you think that a year from now, you (and your family living there) will be better off financially, or worse off, or about the same as now? (3) Now turning to business conditions in the country as a whole—do you think that during the next 12 months, we

will have good times financially or bad times or what? (4) Looking ahead, which would you say is more likely—that in the country as a whole we will have continuous good times during the next five years or so or that we will have periods of widespread unemployment or depression, or what? and (5) Do you think now is a good or bad time for people to buy major household items?

The relative score for each question is then calculated as the percent of favorable replies minus the percent of unfavorable replies, plus 100, rounded to the nearest whole number. The relative scores for questions (1) and (5) compose the Index of Current Economic Conditions (CI), the relative scores for questions (2)–(4) compose the Index of Consumer Expectations (EI), and all five questions compose the overall ICS.

The Conference Board survey is available over a shorter time interval. The survey began on a bimonthly basis in 1967 and turned into a monthly poll in 1977.<sup>2</sup> The survey is mailed to 5000 households; a much larger pool of respondents compared with the University Michigan survey. The survey is similar in spirit to that of the University of Michigan, although the questions are somewhat different. Respondents are asked the following five questions: (1) How would you rate present general business conditions in your area? (2) What would you say about available jobs in your area right now? (3) Six months from now, do you think business conditions in your area will be better, same, or worse? (4) Six months from now, do you think there will be more, same, or fewer jobs available in your area? and (5) Would you guess your total family income to be higher, same, or lower six months from now?

The scores for each question are calculated as the percent of favorable replies divided by the sum of favorable and unfavorable replies. The scores for questions (1) and (2) compose the Current Index, the scores for questions (3)–(5) compose the Expectations Index (CBEXP), and all five questions compose the overall CBIND. The final results for each survey month become available on the last Tuesday of the following month. For this survey, we have the data on the overall CBIND and CBEXP. All our tables report the results for the major confidence indexes and omit those for the individual survey questions in the interest of parsimony.

Despite the obvious similarities in the two survey methodologies, we should mention several differences important for our study. First, the Current Index of the University of Michigan is somewhat backward looking, because the respondents are asked to compare their present situation with that one year before. Second, the University of Michigan survey asks specifically about current buying conditions, whereas the

<sup>2</sup> Note that both surveys of consumer confidence switched to monthly sampling frequency in 1977–1978. Even though the survey questions stayed exactly the same as before (we could not find any evidence to the contrary), still the increase in sampling frequency may have indicated that the indexes of consumer confidence have become more meaningful and more closely followed indicators.

Conference Board survey does not. Third, the expectations index of the University of Michigan measures expectations over a longer term (one to five years) than the similar index from the Conference Board (six months). Fourth, the Conference Board index (CBIND) is considerably more focused on job availability, whereas the other survey asks generally about the individual's financial situation. Fifth, the University of Michigan survey asks about the economic conditions in the country as a whole, whereas the Conference Board survey focuses on the respondent's specific area of residence. These differences substantiate the need to test the robustness of our results to the use of either survey.<sup>3</sup>

Regressing the consumer confidence indexes on monthly dummies does not reveal significant seasonality in any index. In addition, none of the indexes exhibit noticeable trends. Confidence is only reported bimonthly (the Conference Board) or for months 2, 5, 8, and 11 (the University of Michigan) before 1978, whereas other macroeconomic variables available on a quarterly basis are reported as of months 3, 6, 9, and 12. Our final sample uses quarterly values of the confidence indexes from 1956 (1967 for the Conference Board) through 2002. We begin the sample in 1956, because the University of Michigan data are only available sporadically before this date. In our empirical tests, we use observations for months 2, 5, 8, and 11 for the confidence indices and months 3, 6, 9, and 12 for the macroeconomic variables. For example, in our forecasting regressions, we use the consumer confidence level reported for November to forecast returns over the first quarter of the following year (January through March).

Other studies have argued that investor sentiment is reflected in the discounts on closed-end funds. To compare and contrast our findings with those of other studies, we control for the information in CEFD in some of our empirical tests. The monthly CEFD data were provided by Brown and Cliff for 1965–1998 and updated through 2002 using Bloomberg data on all diversified domestic equity closed-end funds.<sup>4</sup> The correlation between our extension with the Brown and Cliff (2004) original series over the 12 months of 1998 is 0.92.

We employ several macroeconomic variables drawn from the literature either as controls or as dependent variables, observed quarterly, and measured in percent: default spread (DEF), measured as the difference between the yields to maturity on Moody's Baa-rated and Aaa-rated bonds; the yield on three-month Treasury bills (YLD3); dividend yield (DIV) measured as the total cash ordinary dividend of the CRSP

<sup>3</sup> See Bram and Ludvigson (1998) and Charoenrook (2002) for additional details regarding the surveys.

<sup>4</sup> For the Bloomberg QSRC search criteria, country = United States, security type = mutual fund, industry group = closed-end fund. For search display, asset class focus = equity, geographical focus = United States. We did not exclude based on trading status. During 1998, our CEFD measure is the average between the Bloomberg data and the original data from Brown and Cliff. After 1998, we switch to the Bloomberg data.



value-weighted index over the last four quarters and divided by the value of the index at the end of the current quarter (as in Fama and French, 1988); GDP growth (GDP) measured as 100 times the quarterly change in the natural logarithm of chained (1996 dollars) GDP; consumption growth (CONS) measured as 100 times the quarterly change in the natural logarithm of personal consumption expenditures; labor income growth (LABOR) measured as 100 times the quarterly change in the natural logarithm of labor income, computed as total personal income minus dividend income, per capita, and deflated by the PCE deflator; unemployment rate (URATE), seasonally adjusted, as reported by the Bureau of Labor Statistics and averaged over the most recent three months; growth in URATE (URCHG) measured as the difference between the end-of-quarter and the beginning-of-quarter levels of the URATE; the inflation rate (CPIQ), from CRSP, cumulated over the most recent three months; and the consumption-to-wealth ratio (CAY) from Lettau and Ludvigson (2001).<sup>5</sup>

As our measure of the size premium, we use the difference between the returns on the smallest and the largest size decile portfolios (M110). We also consider the difference between the return on the lowest decile and the highest decile of institutional ownership (IO110). The data on institutional ownership portfolio sorts are from Phalippou (2005). The returns on the difference portfolios are holding-period returns measured in percent. Our main analysis uses nonoverlapping quarterly observations. In addition, we report some results using quarterly overlapping forecasts of 6- and 12-month holding period returns.

Tables 1 and 2 summarize the descriptive statistics and the correlations. We break the sample into two subperiods for analysis. The first subperiod covers 1956–1977, and the second subperiod covers 1978–2002. The break point corresponds to the dates that both surveys began reporting data on a monthly basis.

The overall CBIND has a mean value of 101.34 in the pre-1977 period and a mean value of 97.71 in the post-1977 period. The corresponding values for the overall University of Michigan index (ICS) are 88.64 and 87.81 in the two subperiods. In both subperiods, the standard deviation of the the Michigan index is about half that of the CBIND. CEFD decreases substantially across the two subperiods. The average discount is –30.04% in the first subperiod and declines to –9.09% in the second subperiod. The standard deviation in the discount is comparable across the two periods however.

The mean value of the size premium (M110) is 1.18% per quarter in the pre-1977 period and falls to 0.61% per quarter in the post-1977 period. The reduction in the size premium over time is consistent with the

<sup>5</sup> See, e.g., Chen, Roll, and Ross (1986), Nelson (1976), Lee (1992), Chen (1991), Fama and French (1988), Baker and Wurgler (2005), and Lewellen and Nagel (2005).

**Table 1**  
Descriptive statistics

	Pre-1977					Post-1977				
	NOBS	Mean	SD	Minimum	Maximum	NOBS	Mean	SD	Minimum	Maximum
CBIND	21	101.34	24.88	54.50	138.20	102	97.71	23.54	47.30	144.70
CBEXP	21	101.02	18.80	53.90	123.70	102	94.77	15.04	50.00	124.30
ICS	85	88.64	10.51	57.60	105.40	102	87.81	12.92	51.70	111.30
CI	85	90.70	8.66	69.30	109.00	102	99.43	12.46	61.70	121.10
EI	85	87.91	13.45	49.40	105.20	102	80.34	14.00	45.30	107.80
CEFD	49	-30.04	7.72	-41.86	-13.88	102	-9.09	7.74	-31.26	1.23
DIV	85	3.44	0.69	2.57	5.49	102	3.09	1.25	1.10	5.54
DEF	85	0.81	0.35	0.32	1.98	102	1.09	0.45	0.55	2.61
YLD3	85	4.25	1.81	0.72	8.33	102	6.53	3.01	1.17	15.02
CAY	85	0.00	0.01	-0.03	0.02	102	0.00	0.01	-0.04	0.03
GDP	85	0.90	1.06	-1.61	3.26	102	0.74	0.81	-2.06	3.78
CONS	85	1.00	0.83	-1.65	3.46	102	0.79	0.63	-2.30	2.14
LABOR	85	0.69	0.78	-1.65	3.26	102	0.45	0.77	-2.20	1.95
URATE	85	5.26	1.37	2.70	8.87	102	6.28	1.45	3.93	10.67
CPIQ	85	0.87	0.80	-0.37	3.46	102	1.08	0.90	-0.90	4.43
M110	85	1.18	10.38	-18.05	25.97	102	0.61	9.19	-16.06	26.58
IO110	85	NA	NA	NA	NA	86	1.11	14.02	-36.59	55.20
MKT	85	2.83	8.51	24.66	24.75	102	3.38	8.50	-22.98	21.66
SMB	85	0.35	6.12	-12.82	15.19	102	0.67	5.32	-11.03	17.52
HML	85	1.31	4.77	-10.26	14.68	102	0.68	6.76	-26.59	23.71
MTM	85	2.75	6.33	-17.65	26.34	102	2.95	7.05	-16.59	26.09

CAY, consumption-to-wealth ratio; CEFD, closed-end fund discount; CI, the Index of Current Economic Conditions; CONS, 100 times the change in the natural log of personal consumption expenditures; CPIQ, inflation rate, CRSP, cumulated over three months; DEF, the difference between Baa- and Aaa-rated bond yields; DIV, dividend yield on the CRSP value-weighted index; EI, Index of Consumer Expectations; GDP, 100 times the change in the natural log of chained gross domestic product; ICS, the Index of Consumer Sentiment; IO110, difference in returns between the smallest and the largest institutional ownership deciles; LABOR, 100 times the change in the natural log of labor income, measured as total personal income net of dividend income, per capita, deflated by the PCE deflator; M110, difference in returns between the smallest and the largest size deciles; MKT, SMB, HML, MTM, the Fama-French factors and the momentum factor; URATE, unemployment rate, averaged over three months; YLD3, yield on three-month Treasury bill. The sample is from 1956 to 2002. All data are as of months 3, 6, 9, 12, except confidence (2, 5, 8, 11). The Conference Board Index of Consumer Confidence and its Expectations component (CBIND and CBEXP) are observed for months 2 and 8 pre-1977. All returns are holding period, quarterly.

**Table 2**  
**Correlations between confidence indicators and macroeconomic variables**

	CBIND	CBEXP	ICS	CI	EI	CEFD	DIV	DEF	YLD3	CAY	GDP	CONS	LABOR	URATE	CPIQ	M110	IO110
Pre-1977																	
CBIND	1.00																
CBEXP	0.73	1.00															
ICS	0.84	0.89	1.00														
CI	0.74	0.72	0.83	1.00													
EI	0.84	0.91	0.97	0.69	1.00												
CEFD	0.45	0.17	0.21	0.02	0.27	1.00											
DIV	-0.50	-0.36	-0.41	-0.68	-0.27	-0.30	1.00										
DEF	-0.58	-0.10	-0.70	-0.55	-0.69	-0.30	0.25	1.00									
YLD3	-0.20	-0.66	-0.49	-0.12	-0.61	0.19	-0.26	0.35	1.00								
CAY	-0.31	-0.04	-0.06	-0.27	0.06	-0.03	0.50	0.16	-0.40	1.00							
GDP	0.39	0.75	0.47	0.47	0.41	-0.10	-0.32	-0.26	-0.16	-0.23	1.00						
CONS	0.31	0.66	0.40	0.32	0.37	0.00	-0.21	-0.21	-0.21	-0.18	0.73	1.00					
LABOR	0.65	0.83	0.50	0.51	0.43	0.01	-0.43	-0.27	0.01	-0.38	0.70	0.68	1.00				
URATE	-0.71	-0.16	-0.36	-0.19	-0.36	-0.57	0.10	0.62	-0.07	0.34	-0.02	-0.01	-0.16	1.00			
CPIQ	-0.37	-0.67	-0.65	-0.27	-0.75	-0.13	0.00	0.48	0.85	-0.22	-0.33	-0.36	-0.24	0.14	1.00		
M110	-0.33	-0.22	0.07	0.07	0.06	0.02	-0.12	-0.03	-0.03	-0.05	0.20	0.24	0.01	0.03	-0.07	1.00	
IO110	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Post-1977																	
CBIND	1.00																
CBEXP	0.74	1.00															
ICS	0.85	0.78	1.00														
CI	0.84	0.63	0.94	1.00													
EI	0.81	0.82	0.98	0.85	1.00												
CEFD	-0.06	0.09	0.36	0.28	0.39	1.00											
DIV	-0.51	-0.25	-0.69	-0.66	-0.66	-0.48	1.00										
DEF	-0.47	-0.22	-0.54	-0.65	-0.45	-0.08	0.63	1.00									
YLD3	-0.16	-0.02	-0.42	-0.46	-0.37	-0.53	0.76	0.62	1.00								

**Table 2**  
(continued)

	CBIND	CBEXP	ICS	CI	EI	CEFD	DIV	DEF	YLD3	CAY	GDP	CONS	LABOR	URATE	CPIQ	M110	IO110
CAY	-0.48	-0.33	-0.39	-0.26	-0.44	-0.08	0.35	-0.07	0.01	1.00							
GDP	0.30	0.50	0.40	0.36	0.41	-0.00	-0.10	-0.25	-0.05	-0.03	1.00						
CONS	0.31	0.53	0.47	0.41	0.48	0.14	-0.18	-0.16	-0.14	-0.17	0.63	1.00					
LABOR	0.38	0.53	0.40	0.35	0.40	-0.08	-0.03	-0.15	0.11	-0.25	0.63	0.53	1.00				
URATE	-0.75	-0.20	-0.57	-0.69	-0.47	0.07	0.67	0.67	0.40	0.29	-0.04	0.03	-0.10	1.00			
CPIQ	-0.15	-0.23	-0.47	-0.40	-0.49	-0.66	0.58	0.28	0.64	0.08	-0.05	-0.29	-0.02	0.10	1.00		
M110	-0.17	-0.16	-0.17	-0.21	-0.14	-0.16	-0.01	-0.01	-0.07	-0.11	-0.09	0.16	-0.07	0.11	0.15	1.00	
IO110	-0.07	-0.12	-0.02	-0.02	-0.03	0.00	-0.15	-0.15	-0.13	-0.07	0.00	0.19	0.06	-0.04	0.24	0.70	1.00

CAY, consumption-to-wealth ratio; CEFD, closed-end fund discount; CI, the Index of Current Economic Conditions; CONS, 100 times the change in the natural log of personal consumption expenditures; CPIQ, inflation rate, CRSP, cumulated over three months; DEF, the difference between Baa- and Aaa-rated bond yields; DIV, dividend yield on the CRSP value-weighted index; EI, Index of Consumer Expectations; GDP, 100 times the change in the natural log of chained gross domestic product; ICS, the Index of Consumer Sentiment; IO110, difference in returns between the smallest and the largest institutional ownership deciles; LABOR, 100 times the change in the natural log of labor income, measured as total personal income net of dividend income, per capita, deflated by the PCE deflator; M110, difference in returns between the smallest and the largest size deciles; URATE, unemployment rate, averaged over three months; YLD3, yield on 3-month Treasury bill.

The sample is from 1956 to 2002. All data are as of months 3, 6, 9, 12, except confidence (2, 5, 8, 11). The Conference Board Index of Consumer Confidence and its Expectations component (CBIND and CBEXP) are observed for months 2 and 8 pre-1977. All returns are holding period, quarterly.

evidence in Fama and French (1992). Nevertheless, in both subperiods, there is substantial time-series variation in the size premium. The returns to the difference portfolio of firms with low institutional ownership less those with high institutional ownership (IO110) are only available beginning in 1980. The average return on the IO110 portfolio is 1.11% per quarter, with a quarterly standard deviation of 14.02%.

Despite the differences in the consumer confidence surveys conducted by the Conference Board and the University of Michigan, their respective indexes are highly correlated. The correlations between the indexes range from 0.69 to 0.97 in the pre-1977 period and from 0.63 to 0.98 in the post-1977 period. Most of the macroeconomic variables exhibit strong contemporaneous correlations with consumer confidence, suggesting that consumer confidence is connected to overall economic activity. The CEFD is generally positively correlated with the various consumer confidence indexes, indicating that discounts on closed-end funds tend to widen when confidence is low (recall that the discount is measured as a negative number). The correlations between the size premium and the University of Michigan confidence indexes are all positive but small in the first subperiod and become negative in the second subperiod. A similar pattern is found in the correlations with the fund discounts. The discount is positively correlated with the size premium in the first subperiod and negatively correlated with the size premium in the second subperiod.

## **2. Consumer Confidence and the Size Premium**

Both the rational and the behavioral hypotheses suggest a negative relationship between the lagged levels of consumer confidence and the size premium. To test whether consumer confidence forecasts time-series variation in the size premium, we estimate OLS regressions in which the returns on the M110 portfolio computed over various holding periods are regressed on lagged measures of consumer confidence and control variables. The forecasting regressions are similar to those employed by Swaminathan (1996) to forecast the size premium using the discount on closed-end funds. We consider holding periods of one, two, and four quarters. The quarterly regressions use nonoverlapping periods, whereas the longer horizon returns exhibit overlaps of three and six months for the two- and four-quarter holding periods, respectively. Statistical significance is assessed using Newey West standard errors. As control variables, the regressions include the lagged size premium, and lags of DIV, DEF, YLD3, and CAY. The results are reported for each forecasting horizon and each subperiod separately in Table 3.

Panel A of the table reports the results of the three-month forecast horizon. In the pre-1977 period, there is a positive but statistically insignificant relation between the size premium and the lagged measures of

**Table 3**  
**Forecasting regressions for size premium**

	Intercept	CONF	LAGDEP	DIV	DEF	YLD3	CAY	$R^2$	Incremental $R^2$
<hr/>									
Panel A: 3-month forecasts									
Pre-1977									
ICS	-3.26 (-0.15)	0.06 (0.36)	-0.12 (-0.73)	-0.29 (-0.16)	4.23 (1.19)	-0.49 (-0.54)	33.99 (0.28)	-0.04	-0.01
CI	-1.98 (-0.07)	0.05 (0.25)	-0.12 (-0.73)	-0.27 (-0.12)	3.76 (0.98)	-0.61 (-0.84)	28.69 (0.22)	-0.04	-0.01
EI	-4.21 (-0.21)	0.05 (0.36)	-0.12 (-0.76)	0.40 (0.22)	3.69 (1.12)	-0.50 (-0.47)	10.36 (0.09)	-0.04	-0.02
Post-1977									
CBIND	16.79 (2.75)	-0.14 (-3.16)	-0.04 (-0.33)	1.78 (0.97)	-1.02 (-0.37)	-0.99 (-1.80)	244.57 (-2.66)	0.10	0.05
CBEXP	19.56 (3.22)	-0.20 (-4.15)	-0.03 (-0.21)	2.39 (1.34)	0.83 (0.30)	-1.20 (-2.15)	-217.33 (-2.35)	0.13	0.08
ICS	37.90 (4.36)	-0.35 (-4.77)	-0.06 (-0.57)	0.87 (0.47)	-0.34 (-0.13)	-1.25 (-2.55)	-229.57 (-2.61)	0.15	0.10
CI	47.80 (4.55)	-0.40 (-4.86)	-0.09 (-0.85)	1.34 (0.83)	-2.42 (-0.91)	-1.34 (-3.10)	-217.30 (-2.44)	0.16	0.11
EI	26.51 (3.60)	-0.27 (-4.14)	-0.03 (-0.30)	1.00 (0.53)	1.18 (0.43)	-1.25 (-2.39)	-219.76 (-2.50)	0.12	0.07
Panel B: 6-month forecasts									
Pre-1977									
ICS	-36.00 (-1.29)	0.26 (1.14)	0.10 (0.66)	2.52 (1.06)	6.44 (1.28)	0.66 (0.52)	163.08 (0.98)	-0.02	-0.00
CI	-60.09 (-1.61)	0.45 (1.54)	0.11 (0.70)	4.68 (1.50)	6.27 (1.16)	0.38 (0.40)	137.30 (0.80)	-0.00	0.02
EI	-22.16 (-0.85)	0.13 (0.67)	0.12 (0.76)	2.58 (1.06)	3.99 (0.83)	0.55 (0.36)	134.84 (0.82)	-0.03	-0.01
Post-1977									
CBIND	13.62 (1.40)	-0.13 (-1.85)	0.03 (0.31)	1.85 (0.58)	5.99 (1.00)	-1.78 (-1.84)	-245.70 (-1.60)	0.10	0.01
CBEXP	24.17 (2.71)	-0.26 (-3.47)	0.06 (0.64)	2.11 (0.68)	7.02 (1.31)	-1.82 (-1.93)	-237.36 (-1.60)	0.15	0.06
ICS	50.99 (3.58)	-0.49 (-4.05)	-0.01 (-0.08)	-0.03 (-0.01)	5.45 (1.02)	-1.90 (-2.17)	-261.21 (-1.78)	0.17	0.08
CI	63.60 (3.17)	-0.54 (-3.52)	-0.04 (-0.39)	0.77 (0.26)	2.49 (0.43)	-2.03 (-2.50)	-247.53 (-1.60)	0.18	0.09
EI	35.96 (3.24)	-0.38 (-3.88)	0.02 (0.20)	0.10 (0.03)	7.58 (1.42)	-1.90 (-2.08)	-248.58 (-1.72)	0.15	0.06

Panel C: 12-month forecasts

Pre-1977

ICS	-5.53 (-0.14)	-0.05 (-0.18)	0.33 (2.10)	4.11 (0.99)	-6.01 (-0.83)	1.72 (0.77)	480.95 (2.01)	0.09	-0.01
CI	-54.27 (-0.99)	0.32 (0.76)	0.33 (1.98)	7.13 (1.52)	-3.56 (-0.39)	2.22 (1.32)	467.29 (1.92)	0.11	-0.00
EI	0.82 (0.02)	-0.12 (-0.40)	0.36 (2.37)	5.18 (1.17)	-9.46 (-1.28)	1.43 (0.53)	455.85 (2.02)	0.11	-0.01

Post-1977

CBIND	44.05 (2.59)	-0.39 (-3.25)	0.03 (0.19)	-0.72 (-0.13)	6.36 (0.60)	-1.33 (-0.82)	-657.66 (-2.08)	0.23	0.07
CBEXP	65.95 (5.65)	-0.70 (-8.52)	0.08 (0.71)	-0.24 (-0.06)	11.28 (1.65)	-1.53 (-1.07)	-586.79 (-2.17)	0.37	0.21
ICS	117.25 (5.63)	-1.12 (-6.41)	-0.01 (-0.11)	-4.49 (-0.93)	8.60 (1.17)	-1.98 (-1.50)	-622.16 (-2.35)	0.36	0.20
CI	116.58 (3.82)	-1.00 (-4.36)	-0.03 (-0.23)	-1.13 (-0.22)	4.39 (0.45)	-2.57 (-1.90)	-570.29 (-1.97)	0.29	0.13
EI	93.09 (5.76)	-0.97 (-6.91)	0.03 (0.29)	-5.27 (-1.11)	13.47 (1.98)	-1.87 (-1.39)	-603.94 (-2.34)	0.36	0.10

CAY, consumption-to-wealth ratio; CBEXP, the Expectations Index; CBIND, the Conference Board Index of Consumer Confidence; CI, the Index of Current Economic Conditions; DEF, the difference between Baa- and Aaa-rated bond yields; DIV, dividend yield on the CRSP value-weighted index; EI, Index of Consumer Expectations; ICS, the Index of Consumer Sentiment; YLD3, yield on three-month Treasury bill; CONF, confidence measure; LAGDEP, lagged dependent variable.

Regressions of size premium on lagged confidence control for lagged values of: dependent variable, DIV, DEF, YLD3, and CAY. Confidence is lagged additionally by one month because of data availability: month 2 confidence (along with month 3 controls) forecasts premium over months 4–6, 4–9, or 4–3. CBIND and CBEXP are available bimonthly pre-1977, thus they do not appear in the pre-1977 quarterly regressions. Adjusted  $R^2$  and incremental adjusted  $R^2$  relative to the base regression that includes no confidence are reported. Newey–West  $t$ -statistics for lag =  $2(K - 1)$ , where  $K$  is data overlap are in parentheses.  $K = 3, 3$  and  $9$  for the nonoverlapping three-month forecasts (A) and the overlapping 6-month (B) and 12-month (C) forecasts, respectively.

consumer confidence from the University of Michigan survey. None of the other forecasting variables are statistically significant, and all of the adjusted  $R^2$  values in the regressions are negative. We do not report results using the Conference Board data, because we have only 21 quarterly observations in the pre-1977 period. After 1977, we consistently observe a strong negative relationship between consumer confidence and the subsequent quarter's size premium. Both YLD3 and CAY also exhibit some forecasting power for the size premium. Neither DIV nor DEF exhibit any evidence of consistent forecasting ability. The overall adjusted  $R^2$  of the regressions ranges from 0.10 for the overall index from the Conference Board to 0.16 for the index of current conditions from the University of Michigan. The incremental increase in the adjusted  $R^2$  of the regressions including consumer confidence as an additional predictor ranges from 0.05 to 0.11. The values of the regression coefficients indicate that a one standard deviation increase in the confidence measure implies a corresponding decrease in the size premium of 3–5% over the subsequent quarter depending on the confidence index.

Panels B and C summarize quarterly forecasting regressions for the 6- and the 12-month holding periods, respectively. The results are qualitatively similar to those for the quarterly holding periods presented in Panel A. Before 1977, consumer confidence has no forecasting power for the size premium. After 1977, however, all of the confidence indices exhibit strong forecasting power for the size premium over the different forecasting horizons, the only exception being CBIND for the 6-month holding period. As additional robustness checks, we perform the analysis on the post-1977 subsample using the average confidence levels over the quarter instead of quarter-end levels and without lagging confidence indicators by one additional month. The results are similar to our base results and are not reported.

Overall, the results in the post-1977 period are consistent with both the rational and the behavioral views that predict a link between current levels of investor sentiment and the size premium. In the pre-1977 period, however, we find no evidence that consumer confidence is linked to the size premium. The results are strikingly different for the two subperiods in terms of sign, statistical significance and  $R^2$ . In the remainder of the article, we attempt to distinguish between the rational and the behavioral views and to better understand the differences across the two subperiods.

### **3. Forecasting Future Economic Activity**

In this section, we examine whether consumer confidence forecasts future macroeconomic conditions in a manner that is consistent with its forecasting power for the size premium. Previous evidence suggests that consumer confidence indicators forecast future economic activity. For



example, Bram and Ludvigson (1998) and Ludvigson (2004) perform a detailed comparison between the two US consumer sentiment surveys and report that consumer sentiment forecasts various categories in future household spending, with the Conference Board indicator generally doing a better job overall. Garrett, Hernandez-Murillo, and Owyang (2005) find that consumer confidence adds explanatory power for future changes in retail spending in different states. The University of Michigan Survey Research Center reports that consumers assess future economic conditions rather accurately. The corresponding correlation coefficients are 0.74 for changes in interest rate (six months ahead), 0.80 for URATE (nine months ahead), 0.90 for CPI (three months ahead), 0.90 for real GDP growth (contemporaneous), 0.77 for house sales (six months ahead), and 0.73 for vehicle sales (six months ahead).<sup>6</sup>

In Table 4, we test the forecasting ability of consumer confidence for quarterly GDP growth, CONS, LABOR, and the change in URATE. In addition to the lagged level of consumer confidence, the regressions also include lagged values of the dependent variable, DEF, DIV, and YLD3. Following Bram and Ludvigson (1998), lagged growth in labor income is included as an additional control. The table reports the coefficient estimates and *t*-statistics on the lagged confidence measures and the incremental adjusted  $R^2$  of the regressions due to the inclusion of confidence. The coefficient estimates for the control variables are not reported. In the pre-1977 period, the ability of consumer confidence to forecast changes in future macroeconomic variables is generally weak with the exception that two of the three University of Michigan indexes are statistically significant predictors of GDP growth. For example, the relationship between the University of Michigan ICS and GDP growth over the next quarter is negative, indicating that GDP growth declines following periods of high confidence. This finding is potentially consistent with a precautionary savings argument—if higher confidence is associated with lower uncertainty about the future and therefore a reduction in precautionary saving, then high confidence will be associated with a higher level of current consumption relative to future consumption and lower consumption growth going forward. The coefficient estimates when using CONS as the dependent variable, however, are not statistically significant.

The forecasting power of consumer confidence for future macroeconomic conditions improves significantly in the post-1977 period. The components of consumer confidence that measure expectations (EI and CBEXP) do a particularly good job predicting future economic activity,

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<sup>6</sup> This information is from the University of Michigan Survey Research Center Website. The reported correlations are based on separate questions asked specifically about inflation, interest rates, and so on, which are not a part of the ICS.

**Table 4**  
**Consumer confidence as a predictor of economic activity**

	GDP		CONS		LABOR		URCHG	
	Slope	Incremental $R^2$	Slope	Incremental $R^2$	Slope	Incremental $R^2$	Slope	Incremental $R^2$
A. Pre-1977								
ICS	-0.0433 (-2.25)	0.04	-0.0090 (-0.58)	-0.00	-0.0008 (-0.05)	-0.01	0.0063 (0.98)	-0.00
CI	-0.0357 (-1.79)	0.03	-0.0069 (-0.50)	-0.01	-0.0028 (-0.20)	-0.01	0.0074 (1.01)	0.00
EI	-0.0313 (-2.27)	0.03	-0.0105 (-0.83)	-0.00	-0.0066 (-0.50)	-0.00	0.0054 (1.24)	0.00
B. Post-1977								
CBIND	0.0046 (0.95)	-0.00	0.0050 (1.63)	0.01	0.0071 (1.62)	0.01	0.0009 (0.47)	-0.00
CBEXP	0.0249 (3.48)	0.13	0.0188 (3.69)	0.11	0.0230 (3.48)	0.13	-0.0069 (-2.46)	0.04
ICS	0.0206 (2.33)	0.03	0.0219 (3.54)	0.06	0.0312 (2.96)	0.10	-0.0066 (-2.17)	0.01
CI	0.0033 (0.35)	-0.01	0.0050 (0.59)	-0.00	0.0154 (1.52)	0.02	0.0005 (0.10)	-0.00
EI	0.0253 (3.06)	0.07	0.0259 (4.36)	0.11	0.0327 (3.75)	0.14	-0.0089 (-2.69)	0.04

CBEXP, the Expectations Index; CBIND, the Conference Board Index of Consumer Confidence; CI, the Index of Current Economic Conditions; CONS, 100 times the change in the natural log of personal consumption expenditures; EI, Index of Consumer Expectations; LABOR, 100 times the change in the natural log of labor income, measured as total personal income net of dividend income, per capita, deflated by the PCE deflator; ICS, the Index of Consumer Sentiment; URCHG, growth in unemployment rate.

The table reports the results of the regression of macroeconomic variables on lagged confidence indicators, controlling for the lagged dependent variable, labor income growth, default spread, dividend yield, and three-month Treasury bill yield. All variables are as defined in Table 1, except URCHG, the difference between end-of-quarter and beginning-of-quarter unemployment rate. Newey-West  $t$ -statistics are in parentheses. The incremental adjusted  $R^2$  is reported relative to the base regression that includes only lagged dependent variable and other controls but no confidence.

especially for CONS and LABOR, as measured by the incremental adjusted  $R^2$  of the regressions.<sup>7</sup> Moreover, the relationship between lagged consumer confidence and the macroeconomic variables changes signs compared with the earlier period. In contrast, the components of confidence related to current conditions (CI and CBIND) exhibit poor predictive ability for future economic activity, both in terms of statistical significance and in terms of the incremental  $R^2$  of the regressions. The positive relationship between confidence and growth in consumption and labor income is not consistent with the precautionary savings argument but is consistent with the results of prior research in this area [see, e.g., Carroll, Fuhrer, and Wilcox (1994), Bram and Ludvigson (1998), and Ludvigson (2004)].

Overall, the evidence indicates that consumer confidence contains information regarding future macroeconomic conditions, at least in the post-1977 period. The difference in the results across the two sub-periods suggests that consumer confidence has become a much better barometer of future economic activity in the last 25 years of our sample period.

#### 4. Fundamental and Sentiment Components of Confidence

The fact that consumer confidence has forecasting power for both the size premium and for future macroeconomic activity in the post-1977 period provides some suggestive evidence consistent with a rational link between sentiment and stock returns, particularly for small firms. However, the behavioral and rational hypotheses are not mutually exclusive, and it is possible that consumer confidence also reflects investor sentiment that is unrelated to economic fundamentals. To explore this possibility, we separate confidence into two components; one rooted in fundamentals and one reflecting sentiment. To separate consumer confidence into the two components, we regress the various consumer confidence indexes on contemporaneous and lagged values of a number of macro variables as shown below:

$$\begin{aligned} CONF_t = & a + b_1 DIV_t + b_2 DEF_t + b_3 YLD3_t + b_4 GDP_t + b_5 CONS_t \\ & + b_6 LABOR_t + b_7 URATE_t + b_8 CPI_t + b_9 CAY_t \\ & + b_{10} DIV_{t-1} + b_{11} DEF_{t-1} + b_{12} YLD3_{t-1} + b_{13} GDP_{t-1} \\ & + b_{14} CONS_{t-1} + b_{15} LABOR_{t-1} + b_{16} URATE_{t-1} \\ & + b_{17} CPI_{t-1} + b_{18} CAY_{t-1} + \eta_t \end{aligned} \quad (1)$$

The predicted value from the regression is our measure of the fundamental component of confidence, and the residual represents sentiment. The regression has an adjusted  $R^2$  of about 0.8–0.85

<sup>7</sup> We used our data to run tests similar to Bram and Ludvigson (1998). Our results are similar to theirs. Adding four lags of confidence improves forecasting ability for future consumption substantially when we use the CBIND and insignificantly if we use the University of Michigan index.

depending on the confidence index used as the dependent variable (not reported), indicating that a large part of the variation in consumer confidence can be explained by economic fundamentals. As an alternative, we also augment regression (1) by including the leading values of the macroeconomic variables in addition to the contemporaneous and lagged values. The regression's adjusted  $R^2$  increases only slightly by about 5% from including the additional regressors. Although not reported, the correlations between the predicted and the residual components obtained under the two alternative regression specifications are closely aligned for all of the confidence measures. The correlations between the predicted components range from 0.95 to 0.97, and the correlations between the residual components of confidence range between 0.82 and 0.89.

Table 5 compares our measure of the sentiment component of confidence with two other measures of investor sentiment from the literature. One widely used indicator of investor sentiment is the discount on closed-end funds. The finding that closed-end fund shares tend to sell at prices difference from NAV (i.e., the "closed-end fund puzzle") has motivated the argument that discounts on closed-end funds reflect individual investor sentiment. In many papers, researchers, including Lee, Shleifer, and Thaler (1991), Neal and Wheatley (1998), and Swaminathan (1996), find a relationship between fund discounts and small stock returns. Recent evidence, however, suggests that closed-end fund discounts may not be a good measure of investor sentiment. Qiu and Welch (2004) show that fund discounts do not align particularly well

**Table 5**  
Correlations between confidence residuals and other sentiment measures

		Pre-1977					Post-1977				
	CBIND	CBEXP	ICS	CI	EI		CBIND	CBEXP	ICS	CI	EI
SENT	NA	NA	-0.47	-0.62	-0.30		0.32	0.29	0.30	-0.06	0.46
CEFD	-0.05	0.14	-0.13	-0.36	0.00		-0.11	-0.01	0.06	-0.04	0.12

CAY, consumption-to-wealth ratio; CBEXP, the Expectations Index; CBIND, the Conference Board Index of Consumer Confidence; CI, the Index of Current Economic Conditions; CONS, 100 times the change in the natural log of personal consumption expenditures; CPI, inflation rate, CRSP, cumulated over three months DEF, the difference between Baa- and Aaa-rated bond yields; DIV, dividend yield on the CRSP value-weighted index; DIV, dividend yield on the CRSP value-weighted index; EI, Index of Consumer Expectations; GDP, 100 times the change in the natural log of chained gross domestic product; ICS, the Index of Consumer Sentiment; LABOR, 100 times the change in the natural log of labor income, measured as total personal income net of dividend income, per capita, deflated by the PCE deflator; URATE, unemployment rate, averaged over three months; YLD3, yield on three-month Treasury bill. Correlations of confidence residuals with the sentiment measure (SENT) of Baker and Wurgler (2005) and closed-end fund discounts (CEFD) from Brown and Cliff (2004). Confidence residuals estimated from regressing confidence on contemporaneous and lagged [regression (1)] values of DIV, DEF, YLD3, GDP, CONS, LABOR, URATE, CPI, and CAY.

with either the consumer confidence indicators or the UBS/Gallup investor sentiment data, and Brown and Cliff (2004) detect only a weak relationship between fund discounts and the measure of investor sentiment from the American Association of Individual Investors survey.

In a recent paper, Baker and Wurgler (2005) create an index of investor sentiment based on several commonly used sentiment variables: the value-weighted dividend premium, the number of IPOs, the average first-day IPO return, the value-weighted CEFD, the equity share in new issues, and NYSE turnover. They extract the first principal component of these sentiment measures and regress it on several macroeconomic variables, including the industrial production index, personal consumption expenditures, and a recession indicator as defined by the NBER data. The residual from the regression is their primary measure of investor sentiment unwarranted by economic fundamentals.

Table 5 reports correlations among our measure of residual confidence based on regression (1), CEFD, and the Baker and Wurgler sentiment measure (SENT). We use quarter-end values of the CEFD that correspond to the reporting of our consumer confidence data and year-end values of the Baker and Wurgler measure as their data are only available on an annual basis.<sup>8</sup>

In the case of the Baker and Wurgler measure, the difference between the two subperiods is rather striking. Before 1977, the correlations between SENT and residual consumer confidence are negative for all of the indexes, indicating that low levels of residual confidence are associated with higher levels of sentiment as measured by the Baker and Wurgler measure. After 1977, the correlations mostly have the expected positive sign, the exception being the correlation of SENT with the residual measure of confidence computed from the index of current conditions from the University of Michigan survey. For CEFD, the correlations are generally weak in both of the subperiods and the signs of the correlations are not consistent across the different residual confidence measures. The results show that sentiment as measured by the component of consumer confidence unrelated to macroeconomic conditions is only weakly correlated with measures of sentiment based on stock market variables. The evidence is consistent with the findings of Qiu and Welch (2004), who also find relatively small correlations between changes in CEFD's and the overall confidence measures.

## **5. Consumer Confidence and the Size Premium (Revisited)**

In this section, we revisit the link between consumer confidence and the size premium based on our decomposition of consumer confidence

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<sup>8</sup> For robustness, we estimated confidence residuals using year-end observations of macroeconomic variables, such that our residual data were available on the annual basis to begin with. Comparing those residuals to the measures used by Baker and Wurgler (2005) yields similar results.

into fundamental and residual components. To do so, we estimate the following time-series regression for the portfolio long in stocks representing the smallest size decile and short in stocks representing the largest size decile (M110).

$$R_t = (a_1 + a_2 RES_{t-1}) + (b_1 + b_2 CONF_{t-1})R_{mt} + \varepsilon_t, \quad (2)$$

where  $R_t$  is the three-month holding period return on the M110 portfolio for quarter  $t$ , and where  $RES_{t-1}$  and  $CONF_{t-1}$  are the lagged values of the residual (sentiment) component of consumer confidence and the raw level of confidence respectively, and  $R_{m,t}$  is the excess return on the CRSP value-weighted index. In this regression, we allow the conditional market beta to be a function of consumer confidence and allow the pricing error to depend on the residual component of confidence. To the extent that consumer confidence rationally forecasts changes in the business cycle that are correlated with changes in the market betas of small stocks, we expect that the coefficient  $b_2$  will be negative. If, however, variation in the size premium is also affected by noise-trader sentiment that is unrelated to fundamentals, we expect the coefficient  $a_2$  to be negative. The results are reported in Table 6. Based on our prior evidence, we report results only for the post-1977 period.

As seen in the table, the results provide some support for both hypotheses. For all of the confidence measures, the coefficient estimate on the residual component of confidence and the estimate for the interaction between the confidence measure and the return on the market index are negative and statistically significant. The coefficient estimates on the residual component of confidence are all significant at the 0.01 level, and the coefficient estimates on the interaction of lagged confidence with the market return are all significant at the 0.10 level or better. The overall adjusted  $R^2$  of the regressions ranges from 0.09 to 0.17.

In terms of economic significance, as summarized in the table, the incremental adjusted  $R^2$  of the regressions because of residual confidence is between 0.05 and 0.10 depending on the confidence index. For comparison (not reported), the incremental adjusted  $R^2$  because of the interaction term between confidence and the market excess return is between 0.02 and 0.06. The table also reports the value of the average pricing errors  $\alpha = a_1 + a_2 RES_{t-1}$  over all the observations where the confidence residual is below its median value ( $\alpha_{\text{low}}$ ) and over all the observations where the confidence residual is above median value ( $\alpha_{\text{high}}$ ). The difference between the two is the quarterly return difference in the size premium in periods of low versus high confidence. The magnitude of this difference is quite large ranging from 2.98 to 4.93% per quarter. For comparison, although not reported, the difference in returns that can be accounted for by changes in

Table 6

Size premium regressed on the sentiment component of consumer confidence, controlling for the business cycle variations of the conditional market beta

	CBIND		CBEXP		ICS		CI		EI	
Intercept	-0.19 (-0.18)	-2.11 (-1.27)	-0.14 (-0.13)	-2.15 (-1.29)	-0.21 (-0.23)	-1.30 (-0.89)	-0.05 (-0.06)	-1.09 (-0.76)	-0.26 (-0.27)	-1.57 (-1.02)
$RES_{t-1}$	-0.24 (-3.66)	-0.27 (-3.52)	-0.25 (-3.33)	-0.27 (-3.43)	-0.61 (-5.51)	-0.66 (-4.72)	-0.61 (-4.57)	-0.57 (-3.48)	-0.44 (-4.86)	-0.49 (-4.36)
$CEFD_{t-1}$		-0.23 (-2.04)		-0.20 (-1.58)		-0.10 (-0.89)		-0.11 (-1.18)		-0.12 (-1.04)
$R_{m,t}$	1.06 (2.35)	2.16 (1.83)	1.26 (2.36)	1.04 (1.04)	2.13 (3.48)	3.93 (3.98)	2.23 (3.29)	3.40 (2.75)	1.79 (3.53)	2.80 (2.92)
$CONF_{t-1}R_{m,t}$	-0.01 (-1.83)	-0.02 (-2.00)	-0.01 (-1.99)	-0.01 (-1.41)	-0.02 (-2.95)	-0.04 (-4.24)	-0.02 (-2.86)	-0.03 (-2.98)	-0.02 (-2.89)	-0.03 (-3.30)
$DIV_{t-1}R_{m,t}$		0.18 (1.13)		0.32 (2.03)		0.16 (1.21)		0.18 (1.24)		0.20 (1.34)
$DEF_{t-1}R_{m,t}$		-0.85 (-2.69)		-0.54 (-1.95)		-0.78 (-3.19)		-0.68 (-2.57)		-0.68 (-2.48)
$YLD3_{t-1}R_{m,t}$		0.05 (1.21)		0.00 (0.07)		0.02 (0.46)		0.01 (0.36)		0.01 (0.18)
$CAY_{t-1}R_{m,t}$		-24.23 (-2.47)		-19.40 (-2.13)		-25.17 (-2.82)		-19.59 (-1.80)		-25.24 (-2.79)
$HML_t$		0.23 (0.93)		0.24 (0.97)		0.28 (1.20)		0.22 (0.92)		0.28 (1.21)
$MTM_t$		-0.03 (-0.27)		0.04 (0.28)		0.10 (0.90)		0.04 (0.31)		0.09 (0.70)
$R^2$	0.10	0.14	0.09	0.12	0.17	0.20	0.17	0.18	0.14	0.17
Incremental $R^2$	0.05	0.05	0.05	0.06	0.10	0.11	0.10	0.08	0.07	0.08
$\alpha_{low}$	1.29	-0.48	1.44	-0.43	2.07	1.15	2.38	1.20	1.67	0.57
$\alpha_{high}$	-1.69	-3.78	-1.75	-3.91	-2.53	-3.80	-2.44	-3.42	-2.22	-3.75
$\alpha_{low} - \alpha_{high}$	2.98	3.30	3.20	3.48	4.60	4.95	4.93	4.62	3.89	4.33

Size premium M110 regressed over 1978–2002 on lagged confidence residual RES with the market beta conditioned on lagged confidence and other macroeconomic variables, controlling for lagged closed-end fund discounts (CEFD), value factor (HML), and momentum factor (MTM):

$$R_t = a_1 + a_2 RES_{t-1} + (b_1 + b_2 CONF_{t-1})R_{m,t}.$$

$$R_t = a_1 + a_2 RES_{t-1} + a_3 CEFD_{t-1} + (b_1 + b_2 CONF_{t-1} + b_3 DIV_{t-1} + b_4 DEF_{t-1} + b_5 YLD3_{t-1} + b_6 CAY_{t-1})R_{m,t} + c_1 HML_t + c_2 MTM_t$$

Confidence residuals are estimated at the first stage from regressing confidence on contemporaneous and lagged [regression (1)] values of DIV, DEF, YLD3, GDP, CONS, LABOR, URATE, CPI, and CAY. Also reported are adjusted  $R^2$ ; incremental adjusted  $R^2$  relative to the base regression that includes all independent regressors above but no confidence residual; pricing error  $\alpha = a_1 + a_2 RES_{t-1}$  for the observations where lagged confidence residuals are below median (low) and above median (high); the difference between  $\alpha$ (low) and  $\alpha$ (high). Newey–West  $t$ -statistics for lag =  $2(K-1)$ ,  $K=3$  are in parentheses.

the market betas across periods of low and high confidence is between 0.73 and 1.09%.

To assess the robustness of our results, we report in Table 6 the results from regressions that allow the market betas to vary directly with other variables (DIV, DEF, YLD3, and CAY) in addition to consumer confidence and that also include the returns on the book-to-market (HML) and momentum (MTM) factors as additional explanatory variables. We do not include the size factor (SMB), because our dependent variable is highly correlated with SMB by construction. Finally, the regressions also include CEFD as an additional measure of investor sentiment. As seen in the table, the basic results are unchanged. The residual component of consumer confidence continues to be statistically significant in all of the regressions. In contrast, CEFD is only statistically significant in one of the regressions, indicating that fund discounts are not consistently related to variation in the size premium after controlling for the sentiment component of consumer confidence. The incremental adjusted  $R^2$  of the regressions because of residual confidence is between 0.05 and 0.11 depending on the confidence index. The incremental adjusted  $R^2$  because of the interaction term of the market return with the macroeconomic variables (not reported) is between 0.03 and 0.09, indicating that time variation in market beta is also an important component of the time-series variation in the size premium. In addition, although not reported in the table, we also re-estimate all of the regressions using the residual confidence measure based on the augmented version of regression (1) that also includes leading observations of the macro variables. The results are qualitatively identical to those reported, although the statistical significance is slightly weaker.<sup>9</sup>

The noise-trader hypothesis proposed by Lee, Shleifer, and Thaler (1991) argues that sentiment should affect stock returns for assets predominantly held by noise traders. Furthermore, they suggest that individual traders are more likely to be affected by sentiment and provide evidence that small firms are more widely held by individuals. Therefore, to provide additional evidence on whether the forecasting ability of the residual component of consumer confidence is consistent with the noise-trader hypothesis, we perform the same regression analysis in Table 6 but using the difference in returns between the lowest and the highest institutional ownership deciles (IO110) as the dependent variable. The results for the post-1977 period are reported in Table 7. In addition, we also

<sup>9</sup> We also performed simultaneous estimation of the decomposition of confidence into its fundamental and sentiment components from equation (1) and the forecasting regressions in equation (2) using GMM. To do so, however, we had to eliminate the lagged macro variables from Equation (1) to have sufficient degrees of freedom to estimate the system. The sentiment component of confidence remained statistically significant in all of the regressions.



Table 7

Institutional ownership premium regressed on the sentiment component of consumer confidence, controlling for the business cycle variations of the conditional market beta

	CBIND		CBEXP		ICS		CI		EI	
Intercept	0.91 (0.77)	1.41 (0.58)	1.29 (0.99)	1.13 (0.44)	1.23 (1.09)	2.83 (1.17)	1.24 (1.07)	3.76 (1.41)	1.18 (1.03)	2.15 (0.92)
$RES_{t-1}$	-0.41 (-2.73)	-0.38 (-2.15)	-0.41 (-2.96)	-0.38 (-2.34)	-0.85 (-2.85)	-0.84 (-2.61)	-0.69 (-2.68)	-0.73 (-2.61)	-0.71 (-2.65)	-0.66 (-2.32)
$CEFD_{t-1}$		-0.06 (-0.22)		-0.13 (-0.42)		0.10 (0.38)		0.16 (0.61)		0.04 (0.14)
$R_{m,t}$	0.10 (0.15)	0.24 (0.12)	-0.98 (-0.93)	-1.79 (-1.06)	0.20 (0.23)	-0.57 (-0.26)	0.61 (0.66)	-2.17 (-0.78)	-0.10 (-0.12)	-0.65 (-0.36)
$CONF_{t-1}R_{m,t}$	-0.00 (-0.01)	-0.01 (-0.67)	0.01 (0.97)	0.01 (0.62)	-0.00 (-0.12)	-0.00 (-0.20)	-0.01 (-0.54)	0.01 (0.43)	0.00 (0.21)	-0.00 (-0.14)
$DIV_{t-1}R_{m,t}$		0.15 (0.32)		0.29 (0.72)		0.36 (0.84)		0.28 (0.63)		0.40 (0.92)
$DEF_{t-1}R_{m,t}$		-0.97 (-1.13)		-0.74 (-1.08)		-1.06 (-1.34)		-0.67 (-0.75)		-1.11 (-1.43)
$YLD3_{t-1}R_{m,t}$		0.15 (1.69)		0.10 (1.33)		0.11 (1.32)		0.14 (1.39)		0.10 (1.26)
$CAY_{t-1}R_{m,t}$		-41.07 (-1.93)		-35.18 (-1.71)		-44.10 (-2.09)		-38.99 (-1.71)		-44.09 (-2.12)
$SMB_t$		1.15 (2.52)		1.18 (2.67)		1.10 (2.40)		1.21 (2.63)		1.12 (2.47)
$HML_t$		0.06 (0.15)		-0.01 (-0.02)		0.05 (0.12)		-0.04 (-0.09)		0.08 (0.20)
$MTM_t$		0.38 (1.91)		0.38 (1.69)		0.43 (2.11)		0.38 (1.79)		0.42 (1.98)
$R^2$	0.03	0.17	0.03	0.17	0.05	0.19	0.03	0.18	0.04	0.18
Incremental $R^2$	0.05	0.04	0.05	0.04	0.07	0.07	0.05	0.05	0.06	0.05
$\alpha_{low}$	3.37	3.74	3.89	3.56	4.42	5.98	4.01	6.69	4.27	5.02
$\alpha_{high}$	-1.59	-0.97	-1.37	-1.34	-2.01	-0.37	-1.58	0.77	-1.97	-0.77
$\alpha_{low} - \alpha_{high}$	4.96	4.70	5.26	4.90	6.43	6.35	5.58	5.91	6.24	5.78

Institutional ownership premium IO110 regressed over 1978–2002 on lagged confidence residual  $RES$  with the market beta conditioned on lagged confidence and other macroeconomic variables, controlling for lagged closed-end fund discounts ( $CEFD$ ), size factor ( $SMB$ ), value factor ( $HML$ ), and momentum factor ( $MTM$ ):

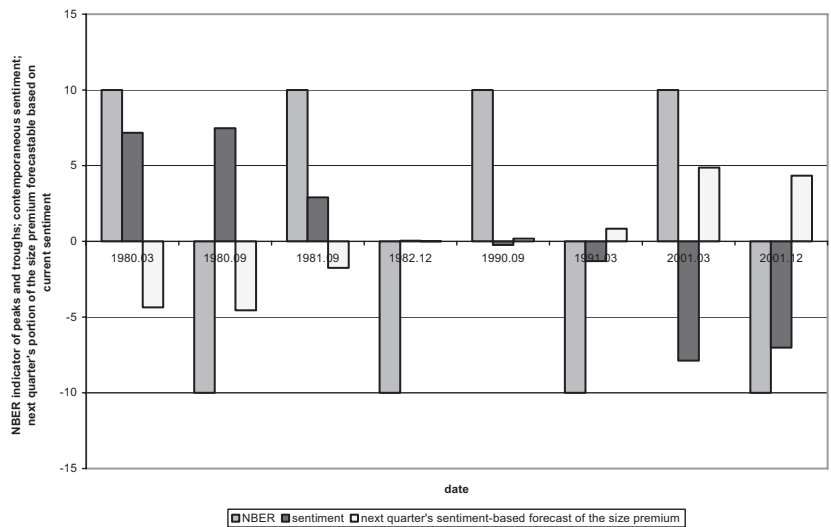
$$R_1 = a_1 + a_2 RES_{t-1} + (b_1 + b_2 CONF_{t-1}) R_{m,t}.$$

$$R_t = a_1 + a_2 RES_{t-1} + a_3 CEFD_{t-1} + (b_1 + b_2 CONF_{t-1} + b_3 DIV_{t-1} + b_4 DEF_{t-1} + b_5 YLD_{t-1} + b_6 CAY_{t-1}) R_{m,t} + c_1 SMB_t + c_2 SMB_t + c_2 HML_t + c_2 HML_t + c_3 MTM_t.$$

Confidence residuals are estimated at the first stage from regressing confidence on contemporaneous and lagged [regression (1)] values of  $DIV$ ,  $DEF$ ,  $YLD3$ ,  $GDP$ ,  $CONS$ ,  $LABOR$ ,  $URATE$ ,  $CPI$ , and  $CAY$ . Also reported are adjusted  $R^2$ ; incremental adjusted  $R^2$  relative to the base regression that includes all independent regressors above but no confidence residual; pricing error  $\alpha = a_1 + a_2 RES_{t-1}$  for the observations where lagged confidence residuals are below median (low) and above median (high); the difference between  $\alpha_{low}$  and  $\alpha_{high}$ . Newey–West  $t$ -statistics for lag =  $2(K - 1)$ ,  $K = 3$  are in parentheses.

include the returns on the SMB factor to ensure that our results are not driven by the correlation between institutional ownership and firm size [e.g., Nagel (2005)]. The pattern observed is similar to that found for the size premium. The coefficient estimate on the residual component of confidence is negative and statistically significant at the 0.05 level in all of the regressions indicating that, similar to the results for the size premium, the returns on stocks with low institutional ownership decline relative to the returns on stocks with high institutional ownership following periods when sentiment is high.

Overall, the results generally support the view that sentiment unrelated to macroeconomic fundamentals can affect the prices of assets that are predominantly held by noise traders (i.e., small stocks and stocks with low levels of institutional ownership). Nevertheless, a caveat is in order. Although we allow the market beta to vary with a variety of macroeconomic variables and also include other factors that have been shown to help explain the cross-section of expected stock returns in other studies, the possibility remains that our measure of sentiment is a proxy for an omitted risk factor. To provide some evidence on this possibility, Figure 2



**Figure 2**  
This graph presents the result of a two-stage regression. On the first stage, the size-premium M110 is regressed on the market return (with the market beta conditioned on a set of lagged macroeconomic variables), HML, and MTM over 1978–2002. In the second stage, the first-stage size-premium residual is regressed on lagged consumer “sentiment” component (the University of Michigan index is taken for this graph). The predicted value from the second-stage regression is plotted here against the sentiment component and against the NBER peaks (NBER = 10) and troughs (NBER = -10). Sentiment is contemporaneous with the NBER indicator. The predicted value of the size premium is for the quarter following the peak (recession).

plots the peaks and troughs of the business cycle as defined by the NBER data along with the *contemporaneous* sentiment level computed using the ICS measure of confidence and along with the portion of the *following quarter's* size premium that is forecastable based on sentiment.<sup>10</sup> To the extent that investor-sentiment proxies for an omitted macroeconomic risk factor, one would expect sentiment to be procyclical. As seen in the figure, however, this does not appear to be the case. Specifically, the sentiment component of confidence is essentially unrelated to the state of the economy over the eight reported business cycle peaks and troughs during our sample period. Furthermore, the sentiment-based forecast of the following quarter's size premium is negatively related to sentiment but not to the business cycle.<sup>11</sup>

## 6. Consumer Confidence and the Value and Momentum Premiums

Based on arguments in the prior literature, our analysis focuses on the link between the consumer confidence and the returns on small stocks and stocks held primarily by individuals. In this section, we explore whether the sentiment component of consumer confidence is also related to the time-series variation of returns to value and momentum strategies. Baker and Wurgler (2005) suggest that both extreme growth and distressed firms are prone to speculation and are also difficult to arbitrage and so should be most affected by investor sentiment. Using their measure of investor sentiment, they find that both extreme growth and value stocks earn high returns following periods of low sentiment and earn low returns following periods when sentiment is high. Cooper, Gutierrez, and Hameed (2004) find that momentum profits conditional on positive past market returns are significantly larger than momentum profits following negative market returns. They view their results as being consistent with an extended version of the behavioral theory developed by Daniel, Hirshleifer, and Subrahmanyam (1998) in which overconfidence of investors in the aggregate increases following market gains, resulting in higher momentum profits following periods of positive market returns. We re-examine these findings using our residual confidence measure as an alternative measure of investor sentiment.

To do so, we estimate the extended version of regression (2) that allows for time variation in market beta with confidence as well as the other

<sup>10</sup> The forecastable portion of the size premium based on sentiment is computed in two stages. First, we estimate the regression in column 6 of Table 6 for ICS, which allows for time variation in market beta and also includes the HML and MTM factors, but we exclude the confidence residual and CEFD from the regression. Second, the residual size premium from that regression is regressed on the lagged sentiment component of confidence. The predicted value of the second-stage regression is retained.

<sup>11</sup> Interestingly, when we plot the NBER indicator against the *lagged* quarterly sentiment level, the correlation is negative. In other words, the sentiment component of confidence tends to be low before the peak of an expansion, resulting in a positive contemporaneous correlation between the sentiment-based forecast of the size premium and the state of the economy.

macroeconomic variables and with the difference between the returns on portfolios in the highest and lowest deciles of stocks sorted on either book-to-market or past returns as dependent variables instead of the size premium.<sup>12</sup> The results (not reported) show that the confidence-based sentiment measures do not exhibit any significant predictive power for either of the high minus low portfolios. The result for the book-to-market portfolio is similar to that reported by Swaminathan (1996), who finds that the CEFD forecasts the size premium but not the returns to the book-to-market factor of Fama and French (1993).<sup>13</sup> The fact that our residual confidence measure does not forecast the momentum premium suggests that it captures different information about investor sentiment than what is contained in past market returns.

To explore further, we re-estimate the regressions using excess returns on value and growth and past winner and loser stocks separately as the dependent variables. We find evidence (not reported) that value stocks tend to respond to changes in sentiment. Specifically, the subsequent returns on value stocks are higher following periods of low sentiment and lower following periods of high sentiment. We find no evidence, however, that growth stocks respond to changes in sentiment. This finding differs from the U-shaped pattern between sentiment and the returns on portfolios sorted by book-to-market reported in Baker and Wurgler (2005). Providing some support for our result, however, Kumar and Lee (2005) find that retail investors tend to overweight value stocks relative to growth stocks in their portfolios. They also report a positive contemporaneous correlation between the buy-sell imbalance of retail traders and the returns on high book-to-market stocks, but no correlation between the buy-sell imbalance and the returns on stocks with low book to market, suggesting that sentiment shifts of individual investors are more important for value stocks. With respect to portfolios sorted on past returns, we find no evidence that our measure of sentiment forecasts the subsequent returns on either past winner or past loser stocks. In sum, understanding what factors drive time-series variation in the value and momentum premiums and the role that investor sentiment plays in explaining this variation remains an unresolved question in our opinion.

## **7. Concluding Remarks**

We find evidence that over the last two decades consumer confidence exhibits forecasting power for the returns on small stocks and for future

<sup>12</sup> The regressions also include the returns on the small-minus-big (SMB) and momentum (MTM) factors in the case where the book-to-market premium is used as the dependent variable and the SMB and high-minus-low (HML) factors when the momentum premium is used as the dependent variable.

<sup>13</sup> Baker and Wurgler (2005) also find that their measure of sentiment does not forecast returns to a portfolio long high book-to-market stocks and short low book-to-market stocks.

macroeconomic activity. We estimate the components of consumer confidence related to economic fundamentals and investor sentiment and model the size premium, allowing market beta to vary with consumer confidence and other macro variables. Our evidence indicates that the sentiment component of confidence forecasts time-series variation in the size premium after allowing for time-series variation in market beta. We view our results as consistent with the predictions of models in which limits of arbitrage and correlated trading by noise traders (individual investors) can cause prices of assets predominantly held by these investors to deviate from economic fundamentals. Consistent with this view, we find that the sentiment component of confidence also forecasts returns on stocks primarily held by individuals (i.e., stocks with low institutional ownership).

We also find that the sentiment component of consumer confidence is not strongly related to either the closed-end fund discount or the composite measure of sentiment constructed by Baker and Wurgler (2005). This evidence suggests that the different measures either capture some unrelated components of investor sentiment or perhaps fail altogether to capture some important aspects of sentiment. Finally, we find no evidence that the confidence-based measure of sentiment forecasts the time-series variation in returns to value and momentum strategies.

One puzzling feature of our results is that the relationship between consumer confidence and subsequent stock returns and macroeconomic activity is nonexistent in the period before 1977. For whatever reason, consumer confidence appears to have become a much better barometer of economic activity and of investor attitudes in the last 25 years. One possible explanation is that the dynamics of the participation of households in the equity markets has changed over time. For example, Schlarbaum, Lewellen, and Lease (1978) study common stock trades of individual retail investors at a full-service brokerage firm during 1964–1970 and provide evidence of prudent security selection decisions made by these investors. In contrast, Barber and Odean (2000) study a sample of individual households' common stock positions held directly through discount brokerage accounts during 1991–1996 and find strong evidence of irrational biases that affect individual trading. Obtaining a more thorough understanding of the information contained in the consumer confidence data and its link to stock returns remains a topic for future research.

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