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Investor Sentiment and Short-Term Returns for Size-Adjusted Value and Growth Portfolios

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Investor Sentiment and Short-Term Returns for Size-Adjusted Value and Growth Portfolios

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We examine the sentiment levels of individual investors relative to subsequent short-term market returns for 1992–2010. We find that sentiment, proxied by percentage of investors who are "bullish" on the market, is significantly negatively related to the subsequent three- and six-month performance of the market. The negative relationship is consistent with the contrarian notion of sentiment. In other words, high (low) levels of bullishness tend to be followed by subsequent low (high) returns. This is true even with the inclusion of standard control explanatory variables (Fama-French [1993]). While the significant results hold for the overall market, they are clearly driven by growth, rather than value stocks. Contrary to some earlier studies, we also note significant explanatory power for sentiment when looking at returns of small-, mid-, and large-cap growth stocks. We also noted that the long-term moving average of monthly bullishness increased from 33.3% to 39.0% over the last 18 years. In our study period, about 5% of the total sentiment observations are above 56% (very bullish) and about 5% are below 27% (quite bearish). Finally, we find some strength in the lagged autocorrelation structure for the sentiment variable that lasts for just about three to nine months.

Keywords: Investor sentiment, Bullish returns behavioral, Value growth behavioral, Lagged autocorrelation, Size capitalization

INTRODUCTION

Individual investor sentiment is widely considered to be a contrarian indicator. Per contrarian logic, investors should buy when sentiment levels are exceedingly bearish and sell when they are very bullish. Extreme levels of bullishness (bearishness) may be associated with market highs (lows) and may be associated with investor overreaction to events.[1] Tests of the predictive powers of sentiment levels have, however, provided mixed results. In this article, we look at the sentiment levels of individual investors over the 1992–2010 period to see if they can offer insights into subsequent short-term market returns. Our sentiment measure is the percentage of investors who respond to the American Association of Individual Investor's (AAII) ongoing survey, by indicating that they are "bullish" on the market for the coming six months. We also include the Fama-French [1993] and other explanatory variables to see if sentiment levels truly provide any unique information that can be subsequently utilized for generating portfolio excess returns.

Solt and Statman [1988] and Clarke and Statman [1998] looked at sentiment levels relative to the subsequent returns of just large-capitalization stock measures, the Dow Jones Industrial Average (DJIA) and S&P 500®, respectively. Fisher and Statman [2000, 2003], and Brown and Cliff [2004] added to the analysis by considering the relationship between investor sentiment and the subsequent returns of both small- and large-cap stocks. We take this a step further and examine indexes across market capitalization levels (large, mid, and small) and broken down by value and growth. Examining various market capitalization levels and the value and growth categories allows us to find

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explanatory power that was obscured through the averaging effect of looking solely at broad measures such as the S&P 500. Baker and Wurgler [2007] postulate that the more speculative and difficult to arbitrage the stock is, the more it will be impacted when sentiment is high. They make a theoretical argument that low capitalization and growth stocks are likely to be more sensitive to sentiment than other categories. In our empirical tests, we do find that growth is important, but we also find that size is actually less meaningful than Baker and Wurgler [2007] expected.

Investors have long been interested in using sentiment measures of one type or another to predict future stock price directions. Indirect sentiment measures such as the put/call ratio, mutual fund cash flow levels, odd-lot purchases to sales, discounts on closed-end funds, and mutual fund purchases and redemptions have been widely cited. Neal and Wheatley [1998], Baker and Wurgler [2006], Peltomaki [2009], and Feldman [2010], for example, performed examinations with indirect measures of investor sentiment. Lemmon and Portniaguina [2006] examined broad consumer confidence levels and market performance. They employed survey results from the University of Michigan and The Conference Board to see if confidence in the economy provided information about future market returns. The Internet is also spawning new sentiment measures, with social communication from Twitter feeds being used to measure investor sentiment (Bollen, Mao, and Zeng [2011]). The American Association of Individual Investors survey has an advantage in that it is a direct measure of investor sentiment. Instead of estimating sentiment based on proxy measures, the survey provides details about whether investors are bullish, bearish, or neutral on the market over the coming six months.

This paper proceeds as follows: In the next section, we describe some related studies on sentiment levels and market performance. After that we discuss the sentiment data and the extra explanatory variables that we use. In the Methodology section, we describe the basic setup of our examination. We then describe our results and finish with our conclusions.

RELATED LITERATURE

The literature on sentiment indicates that cognitive biases are embedded in investor reactions to release of new information (Shefrin and Statman [1999]) which contribute to price formation. Solt and Statman [1988], Clarke and Statman [1998], and Brown and Cliff [2005] all examined the usefulness of the sentiment index prepared by *Investors Intelligence* in predicting future stock prices. *Investors Intelligence* surveys newsletter writers to determine their opinions regarding the future direction of the market. Writers are classified as bullish, bearish, or expecting a short-term correction. Presumably, investment newsletter writers would, or should, be somewhat more informed than the average investor, but the sentiment index is still considered a contrarian indicator. Solt and Statman [1988] found that the sentiment index provided no significant explanatory power for subsequent 4-week, 26-week, or 52-week returns of the DJIA. Clarke and Statman [1998] noted that since *Investors Intelligence* considers their sentiment index to be useful only when the measure is very high or very low, they examined subsequent market returns of the S&P 500 for the lowest 30% and highest 30% of sentiment readings. They, however, found no significant differences between the returns of the two groups when looking at subsequent 4-week, 26-week, and 52-week periods. Brown and Cliff [2005] attempted to capture the irrational component of the sentiment index by including numerous additional explanatory variables. They examined portfolios sorted based on size and book-to-market ratios. They did not find sentiment to be significant in explaining subsequent six-month returns, but they did observe that higher levels of bullish sentiment were related to significantly lower return levels over the next two or three years. The effect held for the overall stock market, but was primarily related to large-cap growth stocks.

Fisher and Statman [2000] examined sentiment measures of Wall Street strategists, *Investors Intelligence*, and the AAII. The Wall Street strategist sentiment measure is based on the average allocation to stocks in recommended portfolios and computed by Merrill Lynch. Fisher and Statman [2000] found a statistically significant negative relationship between the sentiment of the strategists and individuals. They tested the predictive ability of each of the three measures against the next month small and large cap-stock returns. None of the measures provided significant explanations of the small-cap stocks, but the sentiment levels of both individuals and strategists did offer significant explanatory power with the negative (contrarian) sign for large-cap stocks.

Brown and Cliff [2004] examined the relationship between investor sentiment, as measured by both the AAII investor sentiment survey and the *Investors Intelligence* survey, and subsequent performance of the large-cap S&P 500 and small-cap Russell 2000 indexes. They concluded that the sentiment measures would not be useful for predicting the subsequent one week or one month returns. They also showed that numerous indirect factors are significantly related to the sentiment measures.

Fisher and Statman [2003] examined two measures of consumer confidence and compared them with the AAII measure of individual investor sentiment and the Merrill Lynch strategist sentiment measure. The consumer confidence measures reviewed were the University of Michigan Index of Consumer Sentiment and The Conference Board Consumer Confidence Index. They found positive and significant relationships between changes in the consumer confidence measures and changes in the AAII sentiment

measure, but there was no significant relationship with the Wall Street strategists' measure. Schmeling [2009] also used consumer confidence as a proxy for investor sentiment. He looked at the relationship between sentiment and subsequent 1-month, 6-month, 12-month, and 24-month return periods in markets for 18 countries, including the United States. Schmeling [2009] examined the performance of the overall market, value stocks, and growth stocks and found that consumer confidence was a significant explanatory variable for most countries.

Ray [2006] discusses the emergence and accuracy of online "prediction" markets. Bollen et al. [2011] tracked about 9.8 million tweets from 2.7 million people in 2008 and reported that the crowds appear to predict the daily up and down changes in closing values of the DJIA 87.6% of the time. While they do not claim that directional predictions equates to a profitable strategy, the British firm Derwent Capital Markets has started a fund on the Twitter model.

Verma and Soydemir [2006] examined the impact of sentiment in the United States on foreign stock markets. They considered both individual and investor sentiment, finding that the response varied by market.

SENTIMENT DATA AND EXPLANATORY VARIABLES

The study spans the period from 1992 to 2010. The data utilized in this study include sentiment data from the AAII, market capitalization and style index data from MSCI, bond yield spreads, inflation rates, Fama-French [1993] factors, and market returns and risk-free returns from the Ken French databases. A description of the data follows. The AAII conducts a weekly survey of their members asking whether they are bullish, bearish, or neutral on the market over the coming six months.[2] We employ the monthly averages of the AAII survey results from May 1992 through November 2010 and consider the percentage of survey respondents who are bullish, calculated as bullish/(bullish + bearish + neutral), as our direct sentiment measure. Figure 1 shows the percentage of investors by month who stated that they had a bullish outlook on the market. The average percentage of bullish investors over the 18-year period was 40.4%, with a minimum of 20.5% bullish in October 1992 and a maximum of 64.5% bullish in February 2004. It is also noteworthy that the AAII survey

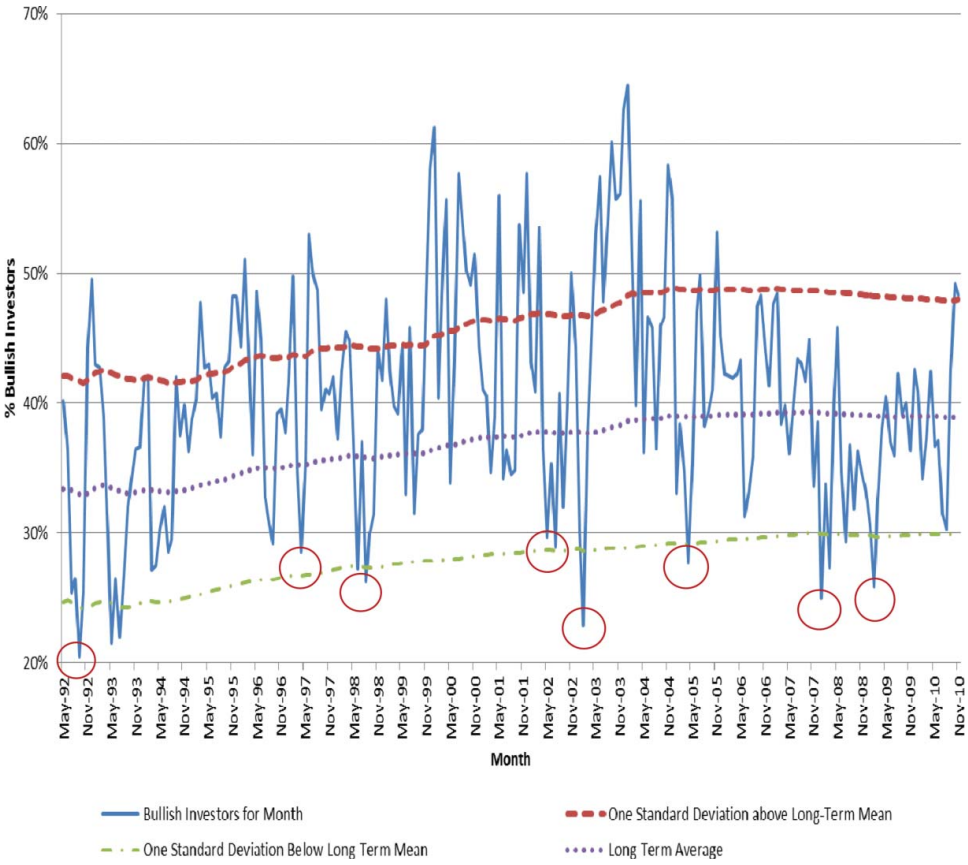

FIGURE 1 Average Bullish Investors by Month, May 1992 to November 2010. *Note*. Figure 1 shows the percentage of investors by month with a bullish outlook on the market. The red circles indicate major market events that had a negative impact and very low bullish sentiment. In reverse order: March 2009 market low, 2008 Financial crisis, Oil tops $50/barrel 2004, market low of 2003, corporate governance crisis 2002, Dotcom bust of 2000, LTCM/Russian Ruble crisis of 1998, Thai Bhat crisis of 1997, and Fed cuts the discount rate in 1992 following the 1991 recession.

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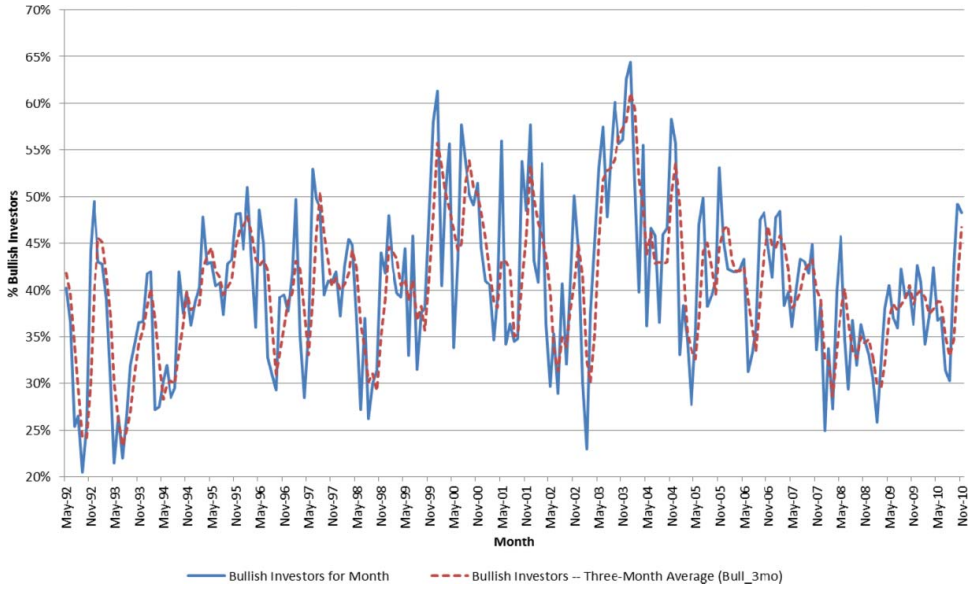

FIGURE 2 Bullish Monthly Average vs. Three-Month Average (Bull_3mo) for May 1992 to November 2010

respondents have become noticeably more bullish over time. The long-term moving average of monthly bullishness, beginning with AAII data going back to September 1987, increased from 33.3% bullish at the end of May 1992 all the way up to 39.0% bullish by the end of 2010.

To compensate for noise in the investor surveying, we use the three-month moving average of the investor sentiment survey results in our testing rather than the monthly average. Figure 2 shows that the three-month average moderates the frequent transitory shifts in sentiment. Periods of very low bullish sentiment are indicated by the small circles in Figure 1. We use the variable name *Bull_3mo* to reflect the percentage of respondents who were bullish over a given three-month period. We examine the relationship of investor sentiment, as proxied by *Bull_3mo*, for three market performance periods—the following one, three, and six-month periods. The longer six-month return period is consistent with the six-month investor outlook that the AAII asks for in their survey. In Figure 3, we show the distribution of the sentiment readings and some numerical measures of central tendencies. In the two tails of the distribution, we note that the level of bullish investors exceeds 56% (very bullish) and falls below 27% (quite bearish) for about 5% of the observations for each.

MSCI-US stock market indexes are utilized to look at the sentiment measure relative to the subsequent total returns of a cross section of size and style indexes, with a particular focus on value versus growth stocks.[3] We examine the broad market (all stocks), large-capitalization stocks, mid-capitalization stocks, and small-capitalization stocks, along with value and growth stocks in each category. A list of these market segments, our abbreviated variable names, and the MSCI descriptions can be seen in Table 1.

We utilize the Fama and French [1993] control variables and some other explanatory factors to determine if the *Bull_3mo* variable provides information above and beyond what these factors are known to intrinsically generate. A description of the three Fama and French [1993] factors follows. The first factor is market excess return, $R_{m,t} - R_{f,t}$, measured as the value-weighted return on all NYSE, AMEX, and NASDAQ stocks, less the one-month Treasury bill rate for month t. This excess return of the market is the foundation of the single-factor Capital Asset Pricing Model

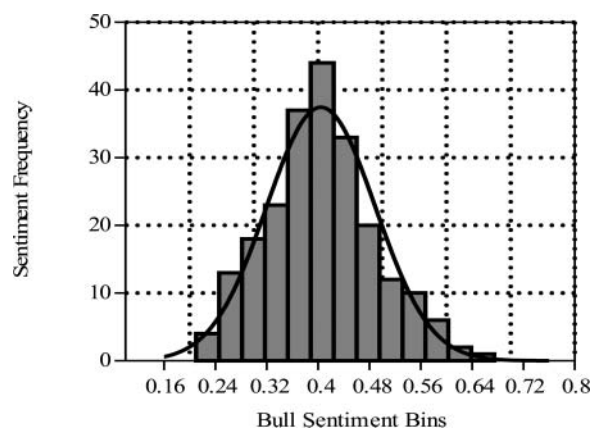

FIGURE 3 Histogram of Bullish Sentiment from 1992 to 2010. *Note*. This is the distribution of sentiment, proxied by the percentage of investors who are "bullish"—it ranges from a minimum of about 20% to a maximum of 65%, with a mean of 40%. These are 223 monthly observations with a skewness of 24.8% and a kurtosis of minus 6.8%. About 5% of the observations are above 56% (very bullish) or below 27% (quite bearish), each.

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TABLE 1
MSCI Variable Descriptions

Variable Name	Description
Market	MSCI US Investable Market 2500 Index, captures approximately 98% of the capitalization of investible securities
Value	MSCI US Investable Market Value Index, includes the value subset of the Market 2500 Index
Growth	MSCI US Investable Market Growth Index, includes the value subset of the Market 2500 Index
Large Cap	MSCI US Large Cap 300 Index, includes 300 of the largest market capitalization stocks
Large Value	MSCI US Large Cap Value Index, includes the value subset of the US Large Cap 300 Index
Large Growth	MSCI US Large Cap Growth Index, includes the growth subset of the US Large Cap 300 Index
Mid Cap	MSCI US Mid Cap 450 Index, includes 450 companies with medium market capitalizations
Mid Value	MSCI US Large Cap Value Index, includes the value subset of the US Mid Cap 450 Index
Mid Growth	MSCI US Large Cap Growth Index, includes the growth subset of the US Mid Cap 450 Index
Small Cap	MSCI US Small Cap 1750 Index, includes 1750 companies with small market capitalizations
Small Value	MSCI US Small Cap Value Index, includes the value subset of the US Small Cap 1750 Index.
Small Growth	MSCI US Small Cap Growth Index, includes the growth subset of the US Small Cap 1750 Index

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(CAPM). SMB_t is the difference in average returns on a portfolio of small and large stocks for month t, and is included to capture the size effect. Small firms generally have higher levels of risk and have historically had higher returns. HML_t is the difference in returns of between a value and growth portfolio, where the portfolio composition is determined by book-to-market ratios.[4] We add two extra explanatory variables, the yield spread and the inflation rate, as an additional check on the robustness of the AAII investor sentiment measure. The yield spread, Yld_Spread_t, is the return on Moody's Baa-rated corporate bonds less the yield on Aaa-rated corporate bonds and is commonly associated with bond market sentiment. A widening of yield spreads is typically associated with periods of market stress. This bond data were obtained from the Federal Reserve at www.federalreserve.gov. The inflation rate, $Inflation_t$, is the percentage change in the Consumer Price Index (CPI) versus the prior year. The inflation information was obtained from the Bureau of Labor Statistics at www.BLS.gov. In Table 2 we present the summary statistics for smoothed *Bull_3mo* and the other explanatory variables. The maximum *Bull_3mo* value is 61.1%, and the minimum is 23.3%. Table 3 shows the correlation matrix for *Bull_3mo* and the other five explanatory variables. *Bull_3mo* is positively correlated with *SMB*, which suggests that as the differential between the returns of small and large firms increases, investors become more bullish. *Bull_3mo* is negatively correlated with *Yld_Spread*. The spread between risky and low-risk bonds tends to increase during negative market environments, and difficult markets would tend to lead to more bearishness. The −0.31 correlation between *Inflation* and *Yld_Spread* has the highest absolute value of any of the observations, possibly indicative of a deflationary environment during spread widening periods.

METHODOLOGY

We begin with a simple check to see if investor sentiment is significantly related to subsequent returns of the various market indexes, as shown in Equation 1:

$$R_{Index,t+w} = \alpha \ + iBull_3mo_t + \epsilon_t \tag{1}$$

$R_{Index,t+w}$ is the subsequent one, three, or six-month return on a particular MSCI Index, and *i* (for investor sentiment) is the regression coefficient on the independent variable *Bull_3mo*. The subscript *t* refers to a current point in time and *w* refers to the additional one, three, or six-month return window that is added to observations taken at *t*. The

TABLE 2
Summary Statistics for Investor Sentiment (Bull_3mo) and Other Explanatory Variables

	Bull_3mo	Rm_Rf	SMB	HML	Yld_Spread	Inflation
Average	0.404	0.005	0.003	0.002	0.009	0.025
Standard Deviation	0.069	0.045	0.032	0.042	0.005	0.011
Minimum	0.233	−0.172	−0.116	−0.208	0.005	−0.021
Maximum	0.611	0.102	0.146	0.197	0.034	0.056

Note. Statistics for the explanatory variables are based on a total of 223 months of data from May 1992 to November 2010. *Bull_3mo* is the average bullish sentiment of individual investors over the prior three months.SMB (size effect) is the difference in returns on a portfolio of small and large size stocks. HML (book-to-market ratios) is the difference in returns between a value and growth portfolio. Yld_Spread, is the return on Moody's Baa-rated corporate bonds less the yield on Aaa-rated corporate bonds (associated with investor sentiment). Inflation, is the percentage change in the Consumer Price Index versus the prior year.

TABLE 3
Correlation Matrix of Investor Sentiment (Bull_3mo) and Other Explanatory Variables

	Bull_3mo		Rm_Rf		SMB		HML	Yld_Spread		Inflation
Bull_3mo	1.00									
Rm_Rf	0.06		1.00							
SMB	0.11	*	0.27	***	1.00					
HML	0.09		−0.04		−0.20	***	1.00			
Yld_Spread	−0.20	***	−0.13		0.09		0.02	1.00		
Inflation	−0.01		−0.21	***	−0.05		−0.02	−0.31	***	1.00

Note. The table shows the Pearson correlation coefficients based on a total of 223 months of data from May 1992 to November 2010. *Bull_3mo* is the average bullish sentiment of individual investors over the prior three months. Coefficients that are significant at the 0.10, 0.05, and 0.01 levels are noted by ***, **, or *, respectively.

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unexplained error is ϵ_t. This first step will tell us whether investor sentiment, considered in isolation, has any potential explanatory power related to market returns. The sign of the *Bull_3mo* coefficient is also of interest. A positive sign would indicate that individual investors' bullish (bearish) sentiment is related to subsequent market increases (decreases). A negative sign on the *Bull_3mo* coefficient, on the other hand, would support the contrarian notion that investors should sell when bullish levels are high, and vice versa.

We look further to see if investor sentiment levels convey any useful information beyond what is provided by common control variables. To this end, we first add Fama and French's [1993] three factors to our model examining the relationship between investor sentiment and the subsequent total return performance of various market indexes. This is shown in Equation 2:

$$R_{Index,t+w} = \alpha + iBull_3mo_t + \beta\left(R_{m,t} - R_{f,t}\right) + sSMB_t + hHML_t + \epsilon_t \quad (2)$$

It is important to note that the index returns are examined for the period after the sentiment measure and the other factors are observed. We subsequently add two extra control variables to this picture, the yield spread and the inflation rate, as an additional check on the robustness of the AAII investor sentiment measure, as shown in Equation 3:

$$R_{Index,t+w} = \alpha + iBull_3mo_t + \beta\left(R_{m,t} - R_{f,t}\right) + sSMB_t + hHML_t + yYld_Spread_t + iInflation_t + \epsilon_t \quad (3)$$

Our May 1992 to November 2010 sample period includes 223 monthly observations, 221 three-month periods, and 218 six-month periods. Since these are overlapping time periods, we employ the methodology supported by Newey and West [1987] to correct the OLS covariance matrix for serial correlation. Absent the Newey-West methodology or something similar, we could constrain our data and only look at non-overlapping periods. As Harri and Brorsen [2009] point out, this would eliminate the issue with serial correlation, but the non-overlapping approach is highly inefficient since it does not consider all of the available time periods. Using the Newey-West adjustment to the covariance matrix increases the power of the statistical testing. Harri and Brorsen examined empirical articles with potentially overlapping data in the *Journal of Finance, American Economic Review*, and the *Journal of Futures Markets* in both 1996 and 2004. The majority of the older articles used non-overlapping time periods while the majority of the more recent articles use overlapping time periods. The Newey-West adjustment is the method most commonly employed to correct for serial correlation, and we include it in our methodology.

RESULTS

We find that individual investor sentiment, as measured by *Bull_3mo*, does not have significant explanatory power related to the subsequent one-month market performance. This is true across the different market capitalization levels and with the growth versus value categories. Our findings relative to sentiment and one-month returns differ from those of Fisher and Statman [2000] but are consistent with those of Solt and Statman [1988], Clarke and Statman [1998], and Brown and Cliff [2004]. Fisher and Statman [2000] found that investor sentiment, as proxied by the last weekly AAII survey of the month, was negatively correlated with the subsequent month's S&P 500 returns. Solt and Statman [1988] and Clarke and Statman [1998] used *Investors Intelligence* survey results and found no explanatory power for subsequent four-week performance of the DJIA. Likewise, Brown and Cliff [2005] found that the AAII investor sentiment measure was not useful in predicting subsequent weekly or monthly returns of either large- or small-cap stocks. We also performed an additional check and used the average monthly sentiment level, instead of the three-month average, as an explanatory variable. Sentiment was not significant in this case, either. We do not

TABLE 4
Bullish Sentiment versus Subsequent Three-Month Market Performance of Overall Market Indexes

Dependent Variable	Constant	Bull_3mo	Rm_Rf	SMB	HML	Yld_Spread	Inflation
Market	0.091	−0.178					
	0.006	***0.027***					
	0.087	−0.166	0.222	−0.350	−0.057		
	0.089	*0.154*	*0.229*	*0.098*	*0.649*		
	0.226	−0.223	−0.004	−0.236	−0.044	−4.410	−2.928
	0.000	***0.020***	*0.975*	*0.168*	*0.695*	*0.088*	*0.009*
Value	0.026	−0.002					
	0.401	*0.975*					
	0.026	−0.004	0.192	−0.156	0.040		
	0.574	*0.969*	*0.282*	*0.447*	*0.761*		
	0.146	−0.059	0.003	−0.050	0.055	−4.159	−2.304
	0.007	*0.484*	*0.984*	*0.776*	*0.651*	*0.153*	*0.036*
Growth	0.168	−0.359					
	0.000	***0.000***					
	0.159	−0.333	0.251	−0.533	−0.170		
	0.010	*0.025*	*0.214*	*0.031*	*0.345*		
	0.315	−0.391	−0.009	−0.414	−0.160	−4.572	−3.511
	0.000	***0.002***	*0.952*	*0.044*	*0.341*	*0.059*	*0.004*

The dependent variable is the subsequent three-month total returns of the stated market indexes. *Bull_3mo* is the average bullish sentiment of individual investors over the prior three months. Observations are based on a total of 221 three-month periods using OLS regression and adjusted per Newey and West [1987]. Regression coefficients are noted with related *p-values in italics*. Sentiment p-values of 0.10 or lower are additionally noted in bold print.

present the results of any of our OLS regressions on one-month returns here, but they are available from the authors upon request.

When we look at the longer three and six-month periods, however, the picture noticeably changes.[5] In Table 4 we show the results of regression Equations 1, 2, and 3 focusing on the relationship between individual investor sentiment and the three-month performance of our broadest indexes: *Market, Value*, and *Growth*. Bullish sentiment as measured by *Bull_3mo* is a significant and negative explanatory variable of the overall market. *Bull_3mo* is significant when it is the only explanatory variable and in the full model, but not in the model that includes just the three Fama-French factors as additional explanatory variables. *Bull_3mo* does not have any explanatory power with *Value* stocks, but it is significant at the 0.05-level across all three

TABLE 5
Bullish Sentiment versus Subsequent Three-Month Market Performance of Large-Capitalization Indexes

Dependent Variable	Constant	Bull_3mo	Rm_Rf	SMB	HML	Yld_Spread	Inflation
Large Cap	0.100	−0.193					
	0.002	***0.014***					
	0.095	−0.181	0.216	−0.358	−0.054		
	0.059	*0.121*	*0.237*	*0.082*	*0.663*		
	0.243	−0.244	−0.020	−0.233	−0.038	−4.897	−2.973
	0.000	***0.013***	*0.881*	*0.162*	*0.736*	*0.047*	*0.004*
Large Value	0.029	−0.013					
	0.351	*0.862*					
	0.028	−0.014	0.199	−0.169	0.024		
	0.533	*0.893*	*0.262*	*0.395*	*0.852*		
	0.158	−0.076	0.000	−0.049	0.044	−4.739	−2.323
	0.003	*0.356*	*0.999*	*0.774*	*0.723*	*0.092*	*0.024*
Large Growth	0.167	−0.359					
	0.000	***0.000***					
	0.157	−0.333	0.234	−0.540	−0.152		
	0.011	***0.025***	*0.241*	*0.024*	*0.360*		
	0.321	−0.397	−0.037	−0.410	−0.140	−5.001	−3.578
	0.000	***0.002***	*0.807*	*0.037*	*0.365*	*0.028*	*0.001*

Note. The dependent variable is the subsequent three-month total returns of the stated market indexes. *Bull_3mo* is the average bullish sentiment of individual investors over the prior three months. Observations are based on a total of 221 three-month periods using OLS regression and adjusted per Newey and West [1987]. Regression coefficients are noted with related *p-values in italics*. Sentiment p-values of 0.10 or lower are additionally noted in bold print.

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TABLE 6
Bullish Sentiment versus Subsequent Three-Month Market Performance of Mid-Capitalization Indexes

Dependent Variable	Constant	Bull_3mo	Rm_Rf	SMB	HML	Yld_Spread	Inflation
Mid Cap	0.096	−0.162					
	0.013	***0.084***					
	0.091	−0.150	0.225	−0.332	−0.088		
	0.102	*0.236*	*0.254*	*0.181*	*0.575*		
	0.215	−0.189	0.012	−0.247	−0.085	−3.208	−3.037
	0.001	***0.062***	*0.941*	*0.225*	*0.565*	*0.258*	*0.026*
Mid Value	0.005	0.066					
	0.875	*0.432*					
	0.006	0.063	0.142	−0.113	0.077		
	0.902	*0.592*	*0.441*	*0.638*	*0.595*		
	0.103	0.032	−0.024	−0.047	0.079	−2.484	−2.367
	0.094	*0.735*	*0.879*	*0.817*	*0.556*	*0.413*	*0.066*
Mid Growth	0.186	−0.387					
	0.000	***0.001***					
	0.175	−0.358	0.303	−0.534	−0.265		
	0.011	*0.029*	*0.183*	*0.075*	*0.332*		
	0.325	−0.406	0.045	−0.430	−0.262	−3.918	−3.676
	0.000	***0.004***	*0.807*	*0.098*	*0.328*	*0.165*	*0.016*

Note. The dependent variable is the subsequent three-month total returns of the stated market indexes. *Bull_3mo* is the average bullish sentiment of individual investors over the prior three months. Observations are based on a total of 221 three-month periods using OLS regression and adjusted per Newey and West [1987]. Regression coefficients are noted with related *p-values in italics*. Sentiment p-values of 0.10 or lower are additionally noted in bold print.

models for *Growth* stocks. The *Value* stocks are in some way already distressed (high book-to-market ratios) and investor enthusiasm about them is muted, thus it appears that increased bullish sentiment readings relate to *Growth* stocks first and foremost. The significantly negative coefficients on *Bull_3mo* are consistent with the notion of individual investor bullishness being a precursor of market declines, and vice versa. Bullishness may lead to an overvaluation of current asset prices which results in lower subsequent returns.

Tables 5, 6, and 7 present the results of Equations 1, 2, and 3 with the dependent variable as the subsequent three-month returns of *Large Cap, Mid Cap*, and *Small Cap* stocks, respectively. *Value* and *Growth* stocks for each category are also examined. The results are consistent with what we observe in Table 4. There is some support that

TABLE 7
Bullish Sentiment versus Subsequent Three-Month Market Performance of Small-Capitalization Indexes

Dependent Variable	Constant	Bull_3mo	Rm_Rf	SMB	HML	Yld_Spread	Inflation
Small Cap	0.097	−0.161					
	0.017	*0.101*					
	0.093	−0.153	0.239	−0.329	−0.029		
	0.117	*0.260*	*0.253*	*0.201*	*0.862*		
	0.195	−0.183	0.062	−0.262	−0.028	−2.514	−2.562
	0.009	***0.099***	*0.712*	*0.227*	*0.858*	*0.463*	*0.077*
Small Value	0.030	0.005					
	0.415	*0.953*					
	0.032	−0.001	0.178	−0.117	0.111		
	0.580	*0.991*	*0.372*	*0.615*	*0.427*		
	0.118	−0.029	0.030	−0.058	0.112	−2.209	−2.109
	0.106	*0.793*	*0.848*	*0.774*	*0.397*	*0.536*	*0.125*
Small Growth	0.168	−0.338					
	0.000	***0.005***					
	0.159	−0.314	0.296	−0.536	−0.172		
	0.020	***0.051***	*0.205*	*0.082*	*0.499*		
	0.277	−0.348	0.090	−0.459	−0.172	−2.838	−3.025
	0.001	***0.011***	*0.650*	*0.082*	*0.481*	*0.401*	*0.054*

Note. The dependent variable is the subsequent three-month total returns of the stated market indexes. *Bull_3mo* is the average bullish sentiment of individual investors over the prior three months. Observations are based on a total of 221 three-month periods using OLS regression and adjusted per Newey and West [1987]. Regression coefficients are noted with related *p-values in italics*. Sentiment p-values of 0.10 or lower are additionally noted in bold print.

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TABLE 8
Bullish Sentiment versus Subsequent Six-Month Market Performance of Overall Market Indexes

Dependent Variable	Constant	Bull_3mo	Rm_Rf	SMB	HML	Yld_Spread	Inflation
Market	0.139	−0.247					
	0.005	***0.038***					
	0.133	−0.231	0.266	−0.466	−0.096		
	0.116	*0.234*	*0.254*	*0.144*	*0.627*		
	0.317	−0.295	−0.039	−0.351	−0.098	−4.583	−4.479
	0.000	***0.056***	*0.846*	*0.145*	*0.592*	*0.291*	*0.011*
Value	0.049	0.006					
	0.302	*0.958*					
	0.049	0.005	0.295	−0.268	0.037		
	0.541	*0.979*	*0.194*	*0.360*	*0.842*		
	0.184	−0.044	0.072	−0.181	0.037	−3.474	−3.223
	0.019	*0.748*	*0.707*	*0.429*	*0.836*	*0.457*	*0.081*
Growth	0.254	−0.513					
	0.000	***0.000***					
	0.242	−0.478	0.241	−0.663	−0.248		
	0.017	***0.049***	*0.350*	*0.080*	*0.320*		
	0.471	−0.555	−0.141	−0.524	−0.253	−5.530	−5.667
	6.390	***0.007***	*0.556*	*0.075*	*0.267*	*0.211*	*0.002*

Note. The dependent variable is the subsequent six-month total returns of the stated market indexes. *Bull_3mo* is the average bullish sentiment of individual investors over the prior three months. Observations are based on a total of 219 six-month periods using OLS regression and adjusted per Newey and West [1987]. Regression coefficients are noted with related *p-values in italics*. Sentiment p-values of 0.10 or lower are additionally noted in bold print.

Bull_3mo is significant for the broader market measures, but it is clear that these results are being driven by *Growth* stocks. *Bull_3mo* is significant at the 0.05-level for all of the regression equations on *Growth*, except for one where the significance level is 0.051. The sign on all of these results is consistently negative, as well. This is indicative of investor bullishness reflected in higher asset prices at time t, and a subsequent decline in those valuations over the next three months. In that sense, *Bull_3mo* is a contrarian indicator for *Growth* stocks, across all three size classes.

The sentiment of individual investors also has a significant level of explanatory power when examining the subsequent six-month return period. In Table 8, we show the results of Equations 1, 2, and 3 relative to subsequent six-month performance of the overall *Market, Growth*, and *Value* stocks. As is the case with three-month returns, the

TABLE 9
Bullish Sentiment versus Subsequent Six-Month Market Performance of Large-Capitalization Indexes

Dependent Variable	Constant	Bull_3mo	Rm_Rf	SMB	HML	Yld_Spread	Inflation
Large Cap	0.158	−0.278					
	0.001	***0.020***					
	0.151	−0.262	0.284	−0.483	−0.104		
	0.075	*0.185*	*0.221*	*0.140*	*0.602*		
	0.354	−0.339	−0.045	−0.343	−0.099	−5.589	−4.607
	0.000	***0.035***	*0.823*	*0.164*	*0.600*	*0.197*	*0.007*
Large Value	0.054	−0.017					
	0.242	*0.879*					
	0.054	−0.017	0.324	−0.301	0.010		
	0.489	*0.922*	*0.151*	*0.300*	*0.954*		
	0.210	−0.082	0.075	−0.184	0.019	−4.691	−3.334
	0.007	*0.546*	*0.689*	*0.412*	*0.916*	*0.305*	*0.061*
Large Growth	0.252	−0.515					
	0.000	***0.000***					
	0.240	−0.480	0.252	−0.665	−0.246		
	0.018	***0.050***	*0.317*	*0.087*	*0.317*		
	0.485	−0.569	−0.151	−0.504	−0.245	−6.397	−5.786
	5.130	***0.007***	*0.520*	*0.093*	*0.280*	*0.147*	*0.001*

Note. The dependent variable is the subsequent six-month total returns of the stated market indexes. *Bull_3mo* is the average bullish sentiment of individual investors over the prior three months. Observations are based on a total of 219 six-month periods using OLS regression and adjusted per Newey and West [1987]. Regression coefficients are noted with related *p-values in italics*. Sentiment p-values of 0.10 or lower are additionally noted in bold print.

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TABLE 10
Bullish Sentiment versus Subsequent Six-Month Market Performance of Mid-Capitalization Indexes

Dependent Variable	Constant	Bull_3mo	Rm_Rf	SMB	HML	Yld_Spread	Inflation
Mid Cap	0.154	−0.228					
	0.006	0.092					
	0.148	−0.213	0.227	−0.429	−0.067		
	0.108	*0.301*	*0.365*	*0.202*	*0.768*		
	0.301	−0.246	−0.046	−0.368	−0.087	−2.331	−4.589
	0.002	*0.120*	*0.845*	*0.164*	*0.677*	*0.622*	*0.025*
Mid Value	0.016						
	0.766						
	0.018	0.117	0.197	−0.157	0.132		
	0.841	*0.557*	*0.415*	*0.631*	*0.566*		
	0.096	0.117	0.043	−0.154	0.107	0.024	−3.042
	0.289	*0.446*	*0.847*	*0.568*	*0.616*	*0.996*	*0.144*
Mid Growth	0.285	−0.562					
	0.000	***0.001***					
	0.272	−0.526	0.241	−0.696	−0.239		
	0.015	***0.044***	*0.412*	*0.079*	*0.407*		
	0.499	−0.591	−0.147	−0.576	−0.253	−4.681	−6.073
	0.000	***0.009***	*0.612*	*0.078*	*0.349*	*0.340*	*0.008*

Note. The dependent variable is the subsequent six-month total returns of the stated market indexes. *Bull_3mo* is the average bullish sentiment of individual investors over the prior three months. Observations are based on a total of 219 six-month periods using OLS regression and adjusted per Newey and West [1987]. Regression coefficients are noted with related *p-values in italics*. Sentiment p-values of 0.10 or lower are additionally noted in bold print.

investor sentiment linkage is with *Growth*, rather than *Value* stocks, and the signs of the coefficients on *Bull_3mo* are all negative. Tables 9, 10, and 11 present the results for the cases with *Large Cap, Mid Cap*, and *Small Cap* stocks, respectively. In all but one of the cases, *Bull_3mo* is significant at the 0.05-level when used to explain the subsequent six-month performance of *Growth* stocks. In the one remaining case, the significance level is 0.085.

The significance of the *Bull_3mo* sentiment indicator remains despite the introduction of five widely used control variables, indicating that the use of the sentiment measure improves subsequent period return estimation. Our findings

TABLE 11
Bullish Sentiment versus Subsequent Six-Month Market Performance of Small-Capitalization Indexes

Dependent Variable	Constant	Bull_3mo	Rm_Rf	SMB	HML	Yld_Spread	Inflation
Small Cap	0.146	−0.207					
	0.011	*0.136*					
	0.140	−0.190	0.193	−0.418	−0.087		
	0.133	*0.364*	*0.478*	*0.243*	*0.717*		
	0.244	−0.197	−0.005	−0.402	−0.113	−0.511	−3.724
	0.013	*0.219*	*0.984*	*0.151*	*0.606*	*0.919*	*0.085*
Small Value	0.045	0.047					
	0.402	*0.722*					
	0.046	0.043	0.185	−0.172	0.090		
	0.616	*0.835*	*0.478*	*0.616*	*0.672*		
	0.109	0.050	0.055	−0.182	0.064	0.535	−2.751
	0.277	*0.757*	*0.807*	*0.515*	*0.752*	*0.918*	*0.212*
Small Growth	0.249	−0.465					
	0.000	***0.006***					
	0.236	−0.428	0.193	−0.663	−0.247		
	0.028	***0.085***	*0.526*	*0.107*	*0.419*		
	0.382	−0.450	−0.074	−0.620	−0.274	−1.594	−4.729
	0.002	***0.029***	*0.795*	*0.060*	*0.332*	*0.754*	*0.036*

Note. The dependent variable is the subsequent six-month total returns of the stated market indexes. *Bull_3mo* is the average bullish sentiment of individual investors over the prior three months. Observations are based on a total of 219 six-month periods using OLS regression and adjusted per Newey and West [1987]. Regression coefficients are noted with related *p-values in italics*. Sentiment p-values of 0.10 or lower are noted in bold print. In this case we find significance of the Bull_3mo indicator only for the Small Growth regressions.

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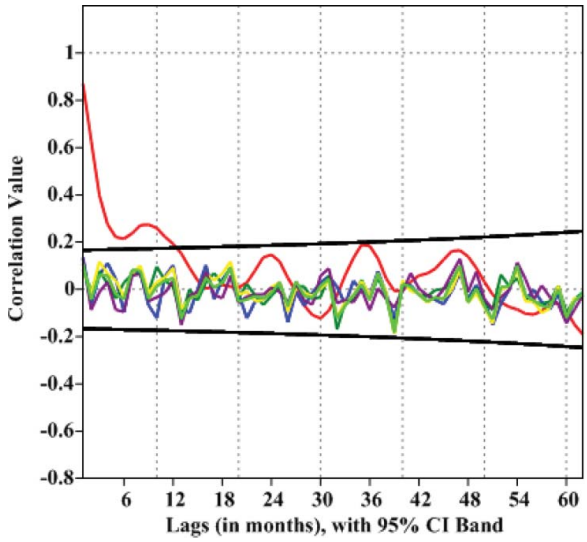

FIGURE 4 Lagged Autocorrelation of Sentiment and Other Style/size and Market Return Variables (1992–2010). *Note*. This exhibit shows lagged autocorrelations for a total of 60 lagged periods on 223 monthly observations of sentiment (Bull_3mo), Value, Growth, Large Cap, Small Cap, and the (Rm-Rf) return series. As expected, there is virtually no directional correlation for the market return variables at lags of 1 or more—all of them are well within the 95% CI band. However there is some strength in the lagged autocorrelation for the sentiment variable that lasts for 3 to 9 months. Over short time periods there appears to be some momentum in sentiment readings, ranging from 0.87 to 0.27 for lags of 1 month to 9 months, respectively. The implication of this is shown in Tables 4 through 11. As the lags increase the correlations become similar to those of market return variables, which is indicative of minimal factor predictability for longer lags.

relative to the explanatory power of sentiment on three and six-month returns differ from those of Solt and Statman [1988] and Clarke and Statman (1998), but these authors focused on the subsequent performance of just the DJIA. As we show, it is the performance of growth stocks that are primarily related to changes in individual investor sentiment. Brown and Cliff [2005] did look at size and book-to-market portfolios, which would capture size, value and growth categories, but they did not find significant explanatory power for sentiment and subsequent six-month returns. They did, however, find that sentiment was significantly negatively related to subsequent 12-month and 24-month returns, predominantly for large growth stocks. Our results found a significant negative relationship between subsequent short-term returns and growth stocks regardless of size. Brown and Cliff [2005] used the Investors Intelligence survey results, which they considered to be the opinions of professionals, rather than the AAII survey, which is predominantly the opinion of individual investors.

CONCLUSIONS

Our study period was 1992–2010. We find support that individual investor sentiment has value as a contrarian indicator of future short-term (three to six month) market performance. The level of bullishness of investors, as surveyed by the AAII, is a significant explanatory variable for the subsequent three-month and six-month market returns, but not for one-month returns. In other words, higher levels of bullish sentiment are followed by lower market returns. Baker and Wurgler [2007] suggest that investor sentiment would be more likely to affect small-capitalization stocks, but we found the relationship was significant for mid- and large-cap stocks, as well.

The negative correlation between investor sentiment levels and subsequent market returns was present for overall broad market indexes, but our findings indicate that the effect is primarily driven by growth stocks. When value and growth indexes are examined, sentiment is a significant explanatory variable for growth stocks, but not for value. Growth stocks are presumably more sensitive to changes in investor sentiment, while value stocks are, by definition, already distressed and possibly under-valued. Our findings are consistent with the notion that bullish sentiment by investors drives the prices of growth stocks up, and these higher valuations are followed by lower returns. The significance of investor sentiment in explaining subsequent returns holds up even when five other commonly employed control variables (Fama-French [1993] factors, yield spreads and inflation) are added to the equation. Finally, we find some strength in the lagged autocorrelation structure for the sentiment variable that lasts for about three to nine months, but tapers off after that.

Prior studies by Clarke and Statman [1988, 1998] and Brown and Cliff [2004] did not find sentiment to be a useful predictor of subsequent short-term market returns. On the other hand, Fisher and Statman [2000] found that sentiment was negatively related to the subsequent performance of large-cap stocks, but not small-cap stocks. Fisher and Statman [2003] later found that sentiment was negatively correlated with the subsequent returns of both large and small-cap stocks. Our observation was that individual investor sentiment was negatively correlated with the subsequent performance of small-, mid-, and large-cap stocks, but that the effect was driven by growth stocks in each area.

So why did a relationship between sentiment and subsequent short-term market returns show up in some studies and not in others? The studies used different methodologies, different sentiment measures, different market measures, and covered different time periods, but there may be another factor at work. One of our anonymous reviewers suggested that an explanation for the different findings might be that the negative correlation between market returns and sentiment might be more prevalent when growth stocks dominate the market capitalization of the indexes examined. This would mean that during periods when growth stocks dominated indexes, their strong relationship with investor sentiment would be sufficient to cause the sentiment-return relationship of the broad market

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to also be significant. While limitations in our dataset prevent us from fully testing this, we do believe that this may be the case.

We compared the average annual price-to-earnings (PE) ratios of the market over the different study periods and noted that periods where no relationship was found between sentiment and subsequent market returns were all periods where the PE ratio of the market was below its long-term average of about 16.[6] The Solt and Statman [1988, 1998] and Brown and Cliff [2004] papers covered the periods 1963–1985, 1964–1995, and 1965–1998 and had average annual PE ratios of about 13.5, 14.6, and 15.0, respectively. Fisher and Statman's [2000] study period of 1985–1998 had a somewhat above average PE ratio of 17.7, but they found a sentiment-return relationship only with large-cap stocks. Fisher and Statman [2003] found a significant relationship with sentiment and both large- and small-cap returns. The average annual PE ratio of the market over the authors' 1989–2002 study period was a clearly above-average 23.3. Likewise, the average market PE ratio over our 1992–2010 study period was the highest of all at 24.8. None of the studies other than ours examined value and growth stocks, so we cannot say for sure that growth is the driver of the other works with significant results, but the PE ratios suggest that it is likely. We also cannot say for sure that the sentiment-growth-stock-return relationship would hold up during periods of lower PE ratios. More study is needed in this area.

While we have documented a strong relationship between individual investor sentiment levels and the subsequent short-term returns of the market, particularly in the area of growth stocks, we have not tested a trading strategy based on this relationship. This is, however, a potential investment strategy that could allow for easy participation by individual investors. It would be easy for an investor to purchase exchange-traded funds (ETFs) aligned with our study data. Vanguard, for example, offers small-, mid-, and large-cap ETFs that track either value or growth categories so these portfolios are a simple purchase for most investors. Additional work remains to show whether or not this information could be economically profitable to investors. Among other investment strategy decisions, we have not identified optimal sentiment levels at which to swap into or out of growth stocks. We have also not looked at the longer term trends of the market in response to market sentiment. Additional work is needed to identify how long the predictive ability of investor sentiment provides information and whether sentiment is driven by exogenous factors such as macro news events or endogenous company-specific events.[7] The latter may be longer lasting.

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NOTES

1. See, for example, Eggins and Hill [2010]. Also, Lawrence, McCabe, and Prakash [2007] show that investor sentiment can explain pricing bubbles when added to the existing asset pricing models.
2. Survey results are available at www.aaii.com/sentimentsurvey.
3. MSCI index data are available from www.mscibarra.com/products/indices/domestic_equity_indices/us/performance.html.
4. The Fama-French factors are available from Kenneth French's website at mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.
5. In Figure 4 we notice that sentiment momentum drops rapidly after about six months, indicated by lagged auto-correlations becoming similar to those of various size/style return variables. However, we find some strength in the lagged autocorrelation structure for the sentiment variable that lasts for about three to nine months.
6. Historical PE ratios were obtained from Robert Schiller's website http://www.econ.yale.edu/~shiller/data.htm.
7. We thank another reviewer for highlighting this and for suggesting looking into longer period auto-correlations for the sentiment factor (Figure 4).

REFERENCES

Baker, Malcolm and Jeffrey Wurgler. "Investor Sentiment and the Cross-Section of Stock Returns." *Journal of Finance*, 61, (2006), pp. 1645–1680.

Baker, Malcolm and Jeffrey Wurgler. "Investor Sentiment in the Stock Market." *Journal of Economic Perspectives*, 21, (2007), pp. 129–151.

Bollen, Johan, Huina Mao, and Xiao-Jun Zeng. "Twitter Mood Predicts the Stock Market." *Journal of Computational Science*, 2, (2011), pp. 1–8.

Brown, Gregory W. and Michael T. Cliff. "Investor Sentiment and the Near-Term Stock Market." *Journal of Empirical Finance*, 11, (2004), pp. 1–27.

Brown, Gregory W. and Michael T. Cliff. "Investor Sentiment and Asset Valuation." *Journal of Business*, 78, (2005), pp. 405–440.

Clarke, Roger G. and Meir Statman. "Bullish or Bearish?" *Financial Analysts Journal*, 54, (1998), pp. 63–72.

Eggins, Jon E. and Robert J. Hill. "Momentum and Contrarian Stock-Market Indices." *Journal of Applied Finance*, 20, (2010), pp. 78–94.

Fama, Eugene F. and Kenneth R. French. "Common Risk Factors in the Returns on Stocks and Bonds." *Journal of Financial Economics*, 33, (1993), pp. 3–56.

Feldman, Todd. "A More Predictive Index of Market Sentiment." *Journal of Behavioral Finance*, 11, (2010), pp. 211–223.

Fisher, Kenneth L. and Meir Statman. "Investor Sentiment and Stock Returns." *Financial Analysts Journal*, 56, (2000), pp. 16–23.

Fisher, Kenneth L. and Meir Statman. "Consumer Confidence and Stock Returns." *Journal of Portfolio Management*, 30, (2003), pp. 115–127.

Harri, Ardian and B. Wade Brorsen. "The Overlapping Data Problem." *Quantitative and Qualitative Analysis in Social Sciences*, 3, (2009), pp. 78–115.

Lawrence, Edward R., George McCabe, and Arun J. Prakash. "Answering Financial Anomalies: Sentiment-Based Stock Pricing." *The Journal of Behavioral Finance*, 8, (2007), pp. 161–171.

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Lemmon, Michael and Evgenia Portniaguina. "Consumer Confidence and Asset Prices: Some Empirical Evidence." *Review of Financial Studies*, 19, (2006), pp. 1499–1529.

Neal, Robert and Simon M. Wheatley. "Do Measures of Investor Sentiment Predict Returns?" *Journal of Financial and Quantitative Analysis*, 33(4) (1998), pp. 523–547.

Newey, Whitney K. and Kenneth D. West. "A Simple, Positive Semi-Definite, Heteroskedacticity and Autocorrelation Consistent Covariance Matrix." *Econometrica*, 55, (1987), pp. 703–708.

Peltomaki, Jarkko. "Investor Sentiment and Time-Varying Market Risk in Market-Neutral Hedge Funds." *The Journal of Behavioral Finance*, 10, (2009), pp. 226–233.

Ray, Russ. "Prediction Markets and the Financial 'Wisdom of Crowds.'" *The Journal of Behavioral Finance*, 7, (2006), pp. 2–4.

Schmeling, Maik. "Investor Sentiment and Stock Returns: Some International Evidence." *Journal of Empirical Finance*, 16, (2009), pp. 394–408.

Shefrin, Hersh M. and Statman, Meir. *Behavioral Portfolio Theory*. (1999). Retrieved from http://ssrn.com/abstract=5947.

Solt, Michael E. and Meir Statman. "How Useful is the Sentiment Index?" *Financial Analysts Journal*, 44, (1988), pp. 45–55.

Verma, Rahul and Gokce Soydemir. "The Impact of U.S. Individual and Institutional Investor Sentiment on Foreign Stock Markets." *The Journal of Behavioral Finance*, 7, (2006), pp. 128–144.

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