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Does sentiment index predict future returns?

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All comments welcome

ABSTRACT

Recent evidence shows that investor sentiment predicts the cross-section of returns and it has larger effects on hard to value and difficult to arbitrage stocks such as high volatility, young, small, unprofitable, and non-dividend paying stocks. Furthermore, it shows that subsequent returns are relatively low (high) for hard to value stocks following high (low) Baker and Wurgler's (BW) sentiment index suggesting that such stocks are relatively overpriced (underpriced) during high (low) sentiment periods. We present new evidence showing that the predictability of subsequent lower (higher) returns of hard to value stocks following high (low) BW sentiment index occur *only* when subsequent investor sentiment decreases (increases). In fact, hard to value stocks earn relatively higher (lower) returns following high (low) sentiment periods when the subsequent sentiment increases (decreases).

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I. Introduction

Investor sentiment has traditionally been ignored in classic finance theory. The cross-section of expected stock returns is usually posited to depend only on the cross-section of systematic risks. However, Baker and Wurgler (2006) present evidence that the cross-section of expected stock returns is conditioned by investor sentiment. They construct a sentiment index as the first principal component of six investor sentiment proxies and find that the firm characteristics that have no unconditional predictive power exhibit sign flipping predictive ability when conditioned on their investor sentiment index e.g. relative higher returns of low volatility firms over high volatility firms following high sentiment periods. In particular, they find that hard to value and difficult to arbitrage stocks such as high volatility, young, small, unprofitable, and non-dividend paying stocks earn relatively lower (higher) returns following high (low) sentiment periods, which suggest that hard to value and difficult to arbitrage stocks are relatively overpriced (underpriced) in high (low) sentiment periods.

Subsequently, Baker and Wurgler (2007) using volatility as a proxy of hard to value stocks show that high volatility stocks are overpriced compared with low volatility stocks when the sentiment changes index is positive (negative).[1] Specifically, they find that one one-standard-deviation increase in the sentiment changes index increases the returns on high volatility deciles but the effect is slightly negative for low volatility deciles. Therefore, they examine the impact of extreme sentiment changes on the returns of volatility portfolios, not simply the positive (negative) sentiment changes. Furthermore, they argue that sentiment changes index is suitable to test for the return comovement patterns associated with the changes in sentiment; whereas the sentiment levels index as in Baker and Wurgler (2006) is suitable to test for return predictability conditioned on lagged sentiment levels.

[1] They define sentiment changes index as the first principal component of changes in six sentiment proxies.

In this paper, we extend Baker and Wurgler (2006) and empirically examine their suggestion that hard to value stocks are overpriced (underpriced) in high (low) sentiment periods by conditioning firm characteristics on the positive (negative) sentiment changes index. Second and most importantly, we test the effect of investor sentiment dynamics on the relation between sentiment and the cross-section of stock returns; sentiment dynamics refer to sentiment continuation or transition. We hypothesize that hard to value stocks would remain overpriced (underpriced) when sentiment continues to increase (decrease) in the subsequent period following high (low) sentiment periods. Furthermore, the mispricing of hard to value stocks relative to easy to value stocks would be corrected when there is a transition in sentiment, i.e., subsequent sentiment decreases (increases) following high (low) sentiment periods. Finally, we test the effect of investor sentiment on risk-adjusted returns by adjusting cross-sectional returns on CAPM and Fama-French factors plus a momentum factor.

We define High (Low) sentiment periods based on positive (negative) sentiment changes index of Baker and Wurgler (2007), negative (positive) change in the Chicago Board Options Exchange (CBOE) Volatility Index (VIX), negative (positive) change in the CBOE put/call ratio, and positive (negative) bull-bear spread based on the survey of American Association of Individual Investors (AAII). Furthermore, we designate sentiment dynamics as H/H (L/L) when both lagged, and subsequent sentiment continues to increase (decrease) and as H/L (L/H) when the lagged sentiment is High (Low) but the subsequent sentiment decreases (increases).

Consistent with our hypothesis, we find that hard to value stocks are overpriced (underpriced) during High (Low) sentiment periods since hard to value stocks earn higher (lower) returns relative to easy to value stocks. For example, we find that high volatility, young, small size, unprofitable, non-dividend paying and lower asset tangibility firms earn higher (lower) returns relative to low volatility, older, big size, profitable, dividend-paying, and high asset tangibility firms during High (Low) sentiment periods. We also find that the *subsequent* returns of hard to value stocks continue to remain high (low) relative to easy to value stocks if the subsequent sentiment

continues to increase (decrease). Furthermore, we find that hard to value stocks earn lower (higher) returns relative to easy to value stocks following High (Low) sentiment periods *only* when the subsequent sentiment decreases (increases). Consequently, we find that the future return predictability of Baker and Wurgler (2006) sentiment levels index is limited to the extreme sentiment levels and only to the periods where the subsequent sentiment decreases (increases). Finally, we find that the systematic risk is at best only a partial explanation of the relationship between the cross-sectional patterns of firm characteristics and investor sentiment.

Our study makes three important contributions to the existing literature on sentiment. Firstly, it shows that the overpricing (underpricing) of hard to value stocks continues if subsequent sentiment continues to increase (decrease). Secondly, it shows that the existing evidence which suggests relatively low (high) subsequent returns of hard to value stocks (e.g. Baker and Wurgler, 2006) following High (Low) sentiment periods is only valid when the subsequent sentiment decreases (increases). Finally, our results suggest that investors should be careful in interpreting the findings of Baker and Wurgler (2006) that hard to value stocks earn low (high) returns following high (low) sentiment periods as an indication of selling (buying) hard to value stocks following high (low) sentiment periods, since it could happen only when the subsequent sentiment decreases (increases).

Section II reviews the literature and develops our hypotheses, while Section III describes the data, in particular our proxies for investor sentiment and hard to value stocks. Section IV provides the empirical results, Section V applies the robustness tests and the last section concludes.

II. Related literature and Hypothesis Development

Recent literature in the field of behavioural finance shows that investor sentiment is negatively related to future or subsequent stock returns. Using three different categories of sentiment for large, medium and small investors, Fisher and Statman (2000) find a negative relationship between future

stock returns and the sentiment of all three groups of investors.[2] Brown and Cliff (2005) argue that excessive optimism drive stock prices above their fundamental levels; therefore, high sentiment periods are followed by low returns, as prices revert to their fundamental values.[3]

In an influential paper, Baker and Wurgler (2006) construct the sentiment levels index by estimating the first principal component of the six investor sentiment proxies and their lags: the close-end fund discount, the number and average first-day returns on IPOs, the equity share in new issues, the dividend premium, and NYSE share turnover. They find that their sentiment index predicts a negative relationship between investor sentiment and future stock return which is more pronounced in stocks that are hard to value and difficult to arbitrage. In general, difficult to arbitrage stocks also tend to be hard to value (Baker and Wurgler, 2006). For example, high volatility, young, small size and less profitable firms are difficult to arbitrage as these stocks are more costly to buy and sell. Baker and Wurgler (2006) empirically test the impact of investor sentiment on future returns by forming decile portfolios based on volatility, firm age, firm size, etc. and further sort them based on lagged sentiment levels index. They consider a month as high (low) sentiment period when sentiment levels index is positive (negative) based on the previous year-end sentiment levels index. They find that hard to value and difficult to arbitrage stocks have lower (higher) future returns following high (low) sentiment periods. For example, the returns of high volatility stocks are lower (higher) compared with low volatility stocks following a high (low) sentiment period. Baker and Wurgler (2006) argue that subsequent lower (higher) returns of hard to value stocks compared with easy to value stocks following high (low) sentiment periods suggest that these stocks are overpriced (underpriced) during the high (low) sentiment periods and the mispricing is corrected in subsequent months.

[2] They use the wall street strategist sentiment, survey of writers of investment news-letters and survey of American Association of Individual Investor to define sentiment of large, medium and small investors, respectively. They find a negative relation between future stock returns and all three groups of investors, but the relationship is statistically significant only for large and small investors.

[3] Several other authors also find a strong link between stock prices and investor sentiment using sunshine and sporting events as proxies of investor sentiment (Hirshleifer and Shumway, 2003, Edmans, Garcia and Norli, 2007).

Subsequently, Baker and Wurgler (2007) construct sentiment changes index by estimating the first principal component of the changes in six proxies, not simply the changes in the sentiment levels index. They argue that it is a better approach to form a sentiment changes index based on the changes in the six proxies instead of just simply taking the changes in the sentiment levels index since sentiment proxies have differential noisiness in going from levels to changes (see for details, Baker and Wurgler, 2007). Furthermore, they argue that sentiment changes index is suitable to test for the return comovement patterns associated with the changes in sentiment; whereas the sentiment levels index is suitable to test for return predictability conditioned on lagged sentiment levels. Using sentiment changes index, they find that there is a positive (negative) relationship between the current returns of high (low) volatility stocks and sentiment changes index. Furthermore, they find that the sentiment levels index is negatively (positively) related to future returns of high (low) volatility stocks. Put in another way; they use sentiment changes index to explain current returns and sentiment levels index to explain future returns.[4] However, they do not explain that why one index is more suitable for return predictability and the other one for return comovement patterns. Furthermore, should we expect higher or lower returns for hard to value stocks when sentiment levels index is positive in the previous month, and sentiment changes index is positive in the subsequent month since sentiment levels index predict lower returns for hard to value stocks following high sentiment period, whereas sentiment changes index predict higher returns for hard to value stocks when sentiment changes index increases during the subsequent month.

Therefore, we test whether the continuity in sentiment changes index results in overpricing or underpricing of hard to value stocks compared with easy to value stocks. Furthermore, we test whether the predictability of sentiment levels index is conditioned to subsequent changes in sentiment. To the extent that hard to value stocks are overpriced (underpriced) during the high (low) sentiment periods, we suggest that hard to value stocks would remain overpriced (underpriced) as

[4] They use monthly data to construct both sentiment levels index and sentiment changes index.

long as the investor sentiment continues to increase (decrease). Therefore, we expect the correction in the mispricing of these securities to occur only when subsequent sentiment decreases (increases) following high (low) sentiment periods.

We investigate two main hypotheses to test the relationship between hard to value stocks and investor sentiment.

Hypotheses 1: Hard to value stocks would be overpriced (underpriced) compared with easy to value stocks during the period when sentiment increases (decreases).

To the extent that sentiment affects hard to value stocks more than easy to value stocks, the returns of hard to value stocks should be higher (lower) during the period when sentiment increases (decreases) compared with easy to value stocks. Baker and Wurgler (2007) find that there is a positive association between the returns of hard to value stocks and changes in sentiment; however, they examine the impact of extreme sentiment changes on the returns of volatility portfolios, not simply the increase (decrease) in sentiment.

Hypotheses 2: Hard to value stocks would remain overpriced (underpriced) if sentiment continues to increase (decrease) in the subsequent period. The mispricing would be corrected if there is a transition in investor sentiment.

To the extent that hard to value stocks are overpriced (underpriced) during the period when sentiment increases (decreases) measured by whether sentiment changes index or sentiment levels index, these stocks will remain overpriced (underpriced) when sentiment continues to increase (decrease) in the subsequent period resulting in higher (lower) returns compared with easy to value stocks. The correction will only take place when there is a transition in investor sentiment. Table 1 summarises the predictions based on hypotheses 1 and 2.

III. Data: Investor Sentiment and Hard to Value Stocks

III.A. Investor Sentiment

In this section, we describe the proxies for investor sentiment since sentiment cannot be directly observed. There are two types of proxies to define sentiment; market-based and survey-based.

Using the *Investors Intelligence* bullish sentiment index as a survey-based measure, Clarke and Statman (1998) find that the Bullish Sentiment Index does not predict S&P 500 future returns.[5] Furthermore, Simon and Wiggins (2001) argue that certain problems might arise with the use of survey-based measures. For example, there is a possibility that survey-based measures might be out of date by the time they get published especially in high volatility periods when sentiment is even more important. Furthermore, they argue that responses are weighted equally in survey-based measures irrespective of the amount of funds managed by the survey participants and survey-based measures do not account for the intensity of bullishness or bearishness. In contrast, market-based sentiment measures are observed in real time, and they indicate both the intensity of sentiment (bullish or bearish) and the market power of market participants (Simon and Wiggins, 2001). We use both survey and market-based measures of investor sentiment in this study to test whether the results are sensitive to the choice between market- or survey-based sentiment measures. We use the Baker and Wurgler sentiment changes index and sentiment levels index, CBOE implied volatility index (VIX), CBOE put-call ratio as the market-based sentiment proxies. We employ the American Association of Individual Investors (AAII) bullish sentiment index as our survey-based measure.

Our first and main measure of investor sentiment is the sentiment changes index of Baker and Wurgler (2007). They construct the sentiment index as the first principal component of changes in six different proxies of investor sentiment, the close-end fund discount, NYSE share turnover, the number and average first-day return on IPOs, the equity share in new issues, and the dividend premium. We define High (Low) sentiment state using positive (negative) sentiment changes index since positive (negative) sentiment changes indicate optimism (pessimism) in the market.

Our second measure of sentiment is Baker and Wurgler's (2006, 2007) sentiment levels index, estimated as the as the first principal component of six different proxies of investor sentiment, the

[5] Investors Intelligence compiles its sentiment index based on the recommendations of independent newsletter editors. The bullish sentiment index is the percentage of bullish newsletter editors divided by the sum of both bullish and bearish newsletter editors.

close-end fund discount, NYSE share turnover, the number and average first-day return on IPOs, the equity share in new issues, and the dividend premium. Similar to sentiment changes index, we use positive (negative) sentiment levels index to define High (Low) sentiment state.

We use VIX as a third measure of sentiment. VIX is a measure of market expectations of near-term volatility (30-day) which is estimated in real time basis from at the money CBOE S&P500 index options.[6] It is referred to as a gauge of investor's fears. A high (low) value of VIX indicates fear (confidence) in the market and a decrease (increase) in contemporaneous market returns. We use a negative (positive) change in VIX to define High (Low) sentiment state.

The fourth sentiment indicator, the put-call ratio is also derived from CBOE S&P500 index options. The put-call ratio is estimated by dividing the total trading volume of puts by the total trading volume of calls. A high put-call ratio indicates a bearish trend as investors buy more puts to hedge their position or to make bearish bets when the sentiment is bearish or negative. Similar to VIX, a negative (positive) change in the put-call ratio defines High (Low) sentiment state. Several studies use VIX and/or put-call ratio as a proxy for investor sentiment (e.g. Whaley, 2000, Smales, 2014, Simon and Wiggins, 2001)

We use the American Association of Individual Investors (AAII) sentiment survey as our final proxy of investor sentiment. The AAII asks the participants to chose whether the market will be bullish, bearish or neutral in the next six months. A higher number of responses with bullish (bearish) views indicate optimism (pessimism) about the stock market. AAII defines the bull-bear spread (BBS) based on the difference in bullish and bearish views. A positive (negative) BBS between bullish and bearish views in a month defines High (Low) sentiment state. Several studies use the BBS as an investor sentiment proxy (e.g. Brown and Cliff, 2004, Fisher and Statman, 2000).

We collect data for the value-weighted market returns from CRSP and Baker and Wurgler sentiment changes (▲STM) index and sentiment levels (STM) index is obtained from the website of

[6] VIX measurement was based on S&P 100 index until 2003.

Professor Jeffrey Wurgler from Stern University New York.[7] We obtain VIX data from DataStream International, the put-call ratio data is collected from the Chicago Board of Options Exchange (CBOE), and BBS data is obtained from the AAII's website. The data period for the CRSP value-weighted market returns, sentiment changes index, sentiment levels index, VIX, put-call ratio and BBS starts from July 1964, August 1965, July 1965, January 1990, September 1995 and July 1987, respectively. All the data for sentiment proxies and CRSP value-weighted market returns end in December 2014.

Table 2 reports the summary statistics and correlation coefficients of CRSP value-weighted market returns and investor sentiment proxies used in this study. Panel A of Table 2 shows a mean (median) CRSP value-weighted market return over the sample period of 0.89% (1.13%), a mean (median) ▲STM index of 0.00 (o.oo), a mean (median) STM index of 0.00 (0.05), a mean (median) average VIX of 19.96 (17.80), a mean (median) put-call ratio of 0.83 (0.84), and a mean (median) BBS of 8.57% (9.43%). There are 606 observations for CRSP value-weighted returns (VWRET), 593 for ▲STM index, 594 for STM index, 300 for VIX, 232 for the put-call ratio (PC), and 330 for BBS.

Panel B of Table 2 reports the correlation among the investor sentiment proxies and contemporaneous VWRET. Consistent with the literature (e.g. Brown and Cliff, 2004, Smales, 2017), we expect a positive correlation between investor sentiment and contemporaneous VWRET. The correlation between VWRET and ▲STM index is 0.19 which shows that ▲STM index is positively associated with VWRET which is consistent with our expectation because positive (negative) ▲STM index indicate optimism (pessimism) in the market. The correlation between VWRET and STM is -0.05 which means that an increase in sentiment results in a decrease in VWRET; however, it is statistically insignificant. The insignificant correlation between VWRET and STM is not surprising since Baker and Wurgler (2007) suggest that STM (sentiment levels) index is suitable for future stock return predictability; whereas ▲STM (sentiment changes) index comoves with market returns. The

[7] The sentiment changes index data is available until December 2010; however using Baker and Wurgler (2007), we extend it until December 2014.

correlation between VWRET and VIX (PC) is -0.26 (-0.25) which shows that an increase in VIX or PC results in a decrease in VWRET. The negative correlation between VWRET and VIX and PC is consistent with our expectation because high values of VIX and PC represent fear in the market. The correlation between VWRET and BBS is 0.19 which is consistent with our expectation because higher (lower) values of BBS indicate optimism (pessimism) in the market. In sum, the correlation between different proxies of investor sentiment, are in accord with our expectations.

III.B. Hard to Value Stocks

In this section, we describe the proxies for hard to value stocks. We define hard to value stocks based on their characteristics of profitability, dividend payment ability, and asset tangibility since these characteristics are often cited in the literature to have a straight-forward relationship with sentiment (e.g. Baker and Wurgler, 2006).[8] We collect firm characteristic data from the merged CRSP-Compustat database from 1964 to 2014.

Table 3 shows summary statistics of firm-level data. Panel A reports monthly return and MOM variables. Following the literature, MOM is estimated at time *t* based on the cumulative return from *t*-12 to *t*-2 months. Following Baker and Wurgler (2006), we use MOM as a control variable only.

Panel B reports volatility, age and market equity (ME) variables. Volatility is the standard deviation of monthly returns over past 12 months ending in June of year *t*. Age is estimated at time *t* based on the number of years since the firm first appears on CRSP. ME is measured from June of year *t*, and is matched to monthly returns from July of year *t* to June of *t*+1. High volatility, Young and small size and firms are defined as hard to value stocks.

[8] Baker and Wurgler (2006) also use firm characteristics indicating growth opportunities as a proxy for hard to value stocks i.e. book-to-market equity, external finance and sales growth. They consider extreme deciles (P1 and P10) of these firm characteristics as hard to value stocks and the middle decile (P5) as easy to value stocks. However, Stambaugh, Yu and Yuan (2012) do not find any significant difference in the return spread of book-to-market results in high and low sentiment periods.

Panels C to E report accounting data that are collected from fiscal year ends in the calendar year *t*-1, and are matched to monthly returns from July of year *t* to June of year *t*+1. Panel C reports the profitability variable, return on equity. Return on equity (E+/BE) is earnings over book equity. Earnings (E) is income before extraordinary item (item 18) plus income statement deferred taxes (item 50) minus preferred dividends (item 9). The book equity (BE) is shareholders equity (item 60) plus balance sheet deferred taxes (item 35). The E+/BE is positive for profitable firms and zero for unprofitable firms. We also use dummy variables for firms with positive earnings (E) that is equal to one, otherwise zero. Less profitable firms are considered as hard to value stocks.

Panel D reports dividend characteristics, Dividend (D) divided by book equity of the firm where D represents dividend per share at the ex-date (item 26) times Compustat shares outstanding (item 25). We also use dummy variables for firms with positive dividends (D) that is equal to one, otherwise zero. Non-dividend paying firms are identified as hard to value stocks.

Panel E reports two variables representing asset tangibility characteristics, property plant and equipment (item 7) over assets (PPE/A), and research and development expense (item 46) over assets (RD/A). Following Baker and Wurgler (2006), we do not use R&D variables before 1972 because of the limited data before 1972. Lower PPE/A and higher RD/A firms are identified as hard to value stocks.

IV. Empirical Results

IV.A. Current investor sentiment and firm characteristics

In this section, we directly test the relationship between current investor sentiment and returns of stocks by firm characteristics. At the beginning of each month *t*, we rank stocks in deciles based on their firm characteristics as described in Section III.B. Following the literature (e.g. Baker and Wurgler, 2006), we use the NYSE cut-off points for deciles. Table 4 provides the average monthly returns of these portfolios in the months where ▲STM index is High (positive) and Low (negative). We also provide the difference in monthly returns between the P1 and P10 deciles (P1-P10), and also the difference between High and Low (H-L) sentiment states for each decile. The

extreme left column provides the average monthly returns of firm characteristics that have values equal or less than zero, and the extreme right column shows the difference between average monthly returns of firm characteristics that have values equal or less than zero and above zero.[9]

The first rows of Table 4 report the sentiment effect on volatility deciles. We find that the highest volatility decile, P10, earns 4.33% (-1.63%) per month and lowest volatility decile (P1) earns 1.47% (0.79%) per month during High (Low) sentiment states. Therefore, the highest volatility decile, P10 earns 2.86% (2.42%) higher (lower) average monthly returns during High (Low) sentiment states than lowest volatility decile portfolio, P1 indicating that hard to value stocks are overpriced (underpriced) during High (Low) sentiment state. We also find that H-L values monotonically increase from P1 to P10, indicating that high volatility firms are more sensitive to sentiment. For example, the difference in monthly returns of portfolio P10 (P1) between High and Low (H-L) sentiment state is 5.96% (0.68%) per month.

The next three rows of Table 4 examine the impact of investor sentiment on firm age deciles. The youngest firms, P1, earn 3.43% (-1.45%) per month and the oldest firms, P10, earn 1.50% (0.42%) per month during High (Low) sentiment states. Therefore, the youngest firm decile, P1 earns 1.93% (1.87%) higher (lower) average monthly returns than the oldest firm decile, P10 indicating that youngest firms are indeed overpriced (underpriced) during High (Low) sentiment states. This is consistent with the Baker and Wurgler (2006) argument that investors are optimistic (pessimistic) during High (Low) sentiment states and prefer young (old) firms when sentiment is positive or High (negative or Low). We also find that lowest firm age deciles are more sensitive to sentiment. For example, H-L values monotonically decrease from P1 to P10, indicating that young firms are more sensitive to sentiment. Therefore, our results based on age characteristics support hypothesis 1 and show that hard to value stocks are overpriced (underpriced) during High (Low) sentiment states compared with easy to value stocks.

[9] The extreme left and right columns are only used for profitability, dividend and asset tangibility characteristics.

The next rows show the sentiment effect in firm size (ME) deciles. In High sentiment state, we find that the smallest size decile, P1 earns 2.30% (0.92%) per month higher (lower) returns than the big size decile, P10. We also find that in general H-L values decrease from P1 to P10 indicating that hard to value stocks are more sensitive to sentiment. Therefore, our results show that smaller size firms are overpriced (underpriced) during High (Low) sentiment states compared with easy to value stocks, consistent with hypothesis 1.

The next rows examine the sentiment effect in stocks sorted on earnings and dividends. We find that the firms with no earnings ($\leqslant$0) earn 1.66% (1.23%) higher (lower) returns than the firms with positive earnings during High (Low) sentiment states. We also find that the non-dividend paying firms earn 1.78% (1.40%) per month higher (lower) returns than firms with positive earnings during High (Low) sentiment states, respectively. These results are also consistent with hypothesis 1 and show that hard to value stocks earn higher (lower) returns during High (Low) sentiment states compared with easy to value stocks.

The last rows in Table 4 examine the sentiment effect in stocks sorted on tangibility characteristics. We use PPE/A and RD/A to define tangibility characteristics and generally find results supporting our hypothesis 1. For example, we find that the lowest PPE/A decile, P1 earns 1.20% (1.64%) per month higher (lower) returns than the highest PPE/A decile, P10 during High (Low) sentiment states. However, the sentiment effect is apparent only in the firms with positive PPE/A, consistent with Baker and Wurgler (2006). We also find that the firms with positive RD/A earns 0.84% (0.46%) per month higher (lower) returns than firms with zero or missing RD/A values during High (Low) sentiment states. However, the sentiment effect is more pronounced when we use PPE/A instead of RD/A to define tangibility characteristics. In fact, Baker and Wurgler (2006) do not find a conditional effect of sentiment on RD/A firms.

We also graphically describe the results of Table 4 in Figure 1 for the reader's convenience. Panels A to G shows that hard to value stocks earn higher (lower) returns than easy to value stocks during High (Low) sentiment states. For example, in Panel A the average monthly returns of high

volatility firms are higher than the low volatility firms in the High sentiment state (black bars), and the average monthly returns of high volatility firms are lower than low volatility firms in the Low sentiment state (grey bar), consistent with hypothesis 1 that high volatility firms are overpriced in the High sentiment state, and vice versa. Similarly, in Panels B to G the average monthly returns of hard to value stocks are increasing in the High sentiment state (black bars), whereas, the average monthly returns of easy to value stocks are decreasing in the Low sentiment state (grey bars) consistent with hypothesis 1 that hard to value stocks are overpriced in the High sentiment state, and vice versa.

In sum, we find that the hard to value stocks (i.e., high volatility, young, small size, unprofitable, non-dividend paying and low tangible asset firms) earn higher (lower) returns than easy to value stocks (i.e., low volatility, old, big size, profitable, dividend-paying and high tangible asset firms) during High (Low) sentiment states which is consistent with our hypothesis 1 that hard to value stocks are overpriced (underpriced) during High (Low) sentiment states compared with easy to value stocks.

IV.B. Lagged and subsequent sentiment chnages and firm characteristics

In this section, we empirically test our second hypothesis that hard to value stocks remain overpriced (underpriced) if sentiment continues to increase (decrease) in the subsequent period and that the mispricing would be corrected *only* if there is a transition in investor sentiment. At the beginning of each month *t,* we classify firms in deciles based on their firm characteristics and into High (Low) sentiment state if the lagged ▲STM index in month *t*-1 is positive (negative). Furthermore, we classify subsequent month *t* as being High (Low) sentiment state if ▲STM index in month *t* is positive (negative). Therefore, H/H (L/L) represents sentiment increase (decrease) in the High (Low) states, while H/L (L/H) captures the transition in sentiment from High to Low (Low to High) states.

Table 5 provides the average monthly returns of firm characteristic deciles for all sentiment states and the difference in monthly returns between P1 and P10 deciles (P1-P10). The extreme left column provides the average monthly returns of firm characteristics that have values equal or less

than zero.[10] The extreme right column shows the difference between average monthly returns of firm characteristics that have values equal or less than zero and above zero.[11]

The first rows of Table 5 examine the cross-sectional effect of volatility conditioned on sentiment dynamics. Results indicate that highest volatility decile (P10) earns 2.92% higher returns than the lowest volatility decile (P1) in H/H state, suggesting that high volatility stocks are overpriced compared with low volatility stocks. However, the overpricing of high volatility stocks is corrected when sentiment transitions to Low (H/L) state, where the P10 earns 1.43% lower returns than P1. Furthermore, high volatility stocks remain underpriced compared with low volatility stocks in L/L state such that P10 earns 3.52% lower returns than P1. The underpricing of high volatility stocks is corrected in L/H state, where P10 earns 2.79% higher returns than P1. These results are also consistent with hypothesis 2 and show that high volatility stocks remain overpriced (underpriced) compared with low volatility stocks when sentiment continues in High (Low) state, and the mispricing is corrected only when sentiment transitions to another state.

The next rows in Table 5 show a clear and strong pattern between sentiment dynamics and stock returns for firms classified by age. For example, we find that the youngest firm decile (P1) earns 2.16% higher returns per month than the oldest firm decile (P10) when sentiment continues in the High state (H/H), indicating that young firms remain overpriced compared with older firms in the H/H state. The overpricing of young firms is corrected when sentiment transitions to the Low state (H/L) where P1 earns 0.91% lower returns than P10. Furthermore, we find that P1 earns 2.85% less than P10 when sentiment continues in the Low state (L/L), indicating that young firms remain underpriced when sentiment continues in Low state. The under-pricing of young firms is corrected when sentiment transitions to the High state (L/H) where P1 earns 1.69% per month higher returns than P10. These results are consistent with hypothesis 2 that hard to value stocks are overpriced

[10] The unprofitable and non-dividend paying firms, and firms with zero R&D expenses and zero PPE/A values.

[11] It is the difference between the profitable and unprofitable firms, dividend and non-dividend paying firms, firms with positive and zero R&D expenses, and the firms with positive and zero power, plant and equipment assets.

(underpriced) compared with easy to value stocks when sentiment continues in the High (Low) state, and the mispricing is corrected *only* when sentiment transitions to another state.

The next rows examine the cross-sectional effect of firm size (ME) conditioned on sentiment dynamics. We find that the lowest size decile (P1) earns 2.95% higher returns than highest size decile (P10) in the H/H state, indicating that small size firms remain overpriced in the H/H state. The overpricing is corrected when the sentiment transitions to the Low (H/L) state, where P1 earns 0.29% per month lower returns than P10.[12] Furthermore, small size stocks remain underpriced in the L/L state such that P1 earns 1.55% lower returns than P10. The underpricing of small size stocks is corrected in the L/H state, where P1 earns 1.64% higher returns than P1. These results also support our hypothesis 2 and show that small size stocks remain overpriced (underpriced) when sentiment continues in High (Low) state, and the mispricing is corrected when sentiment transitions to another state.

In the next rows, we examine the returns of profitability and dividend decile portfolios conditioned on sentiment dynamics. The extreme left column provides the average monthly returns of unprofitable and non-dividend paying firms, and the extreme right column provides the difference in average monthly returns between unprofitable (non-dividend paying) and profitable (dividend paying) firms. We find that the unprofitable (non-dividend paying) firms earn 2.06% (1.98%) per month higher returns than the profitable (dividend paying) firms in the H/H state, indicating that unprofitable and non-dividend paying firms remain overpriced when sentiment continues in the High (H/H) state. The overpricing of unprofitable (non-dividend paying) firms is corrected when sentiment transitions to the Low state such that unprofitable (non-dividend paying) firms earn 0.59% (0.67%) per month lower returns than profitable (dividend paying) firms in the H/L state. Furthermore, we find that the unprofitable (non-dividend paying) firms earn 1.87% (2.15%) per month lower returns than profitable (dividend paying) firms in L/L state, indicating that unprofitable and non-dividend

[12] The difference between average monthly returns of P1 and P10 shows the expected signs, but statistically insignificant in H/L state.

paying firms remain underpriced when sentiment continues in the Low state. The underpricing of unprofitable (non-dividend paying) firms is corrected when sentiment transitions to the High state such that unprofitable (non-dividend paying) firms earn 1.25% (1.59%) per month higher returns than profitable (dividend paying) firms in L/H state. Our results based on profitability and dividend characteristics also support hypothesis 2 and show that hard to value stocks remain overpriced (underpriced) compared with easy to value stocks when sentiment continues in High (Low) state, and the mispricing is only corrected when sentiment transitions to another state.

The next rows consider returns of firm deciles formed on asset tangibility characteristics, PPE/A and RD/A conditioned on sentiment dynamics. The extreme left column provides the average monthly returns of firms with zero PPEA and RD/A values, and the extreme right column provides the difference in average monthly returns between firms with zero PPE/A (RD/A) values and firms with non-zero PPE/A (RD/A) values. We find that firms in the lowest PPE/A decile (P1) earn 1.50% higher average monthly returns than the firms in highest PPE/A decile (P10) in H/H state. The overpricing of firms in the lowest PPE/A decile is corrected when sentiment transitions to the Low state (H/L) such that P1 earns 1.03% lower returns than P10. Furthermore, we find that the firms in lowest PPE/A decile (P1) earn 2.25% lower average monthly returns than the firms in highest PPE/A decile (P10) in L/L state. The underpricing of firms in P1 decile is corrected when sentiment transitions to the High (L/H) state such that P1 earns 0.90% higher returns than P10. This PPE/A pattern, however, exists only in the firms that report positive PPE/A. We find a modest pattern when we use RD/A as a proxy for intangible assets, and it exists only when we compare positive RD/A firms with zero RD/A firms. However, we do not find a significant difference between the returns of firms with positive and zero RD/A values following High (H/H, H/L) sentiment state. Similar to the results in Table 4, our results in Table 5 indicate that the sentiment effect is more pronounced when we use PPE/A instead of RD/A to define tangibility characteristics. On balance, the results based on tangibility characteristics also support hypothesis 2.

We also graphically describe the results of Table 5 in Figure 2 for the reader's convenience.

The black (grey) bars represents H/H (H/L) sentiment states, and red (green) shows L/H (L/L) sentiment states. All panels show that hard to value and difficult to arbitrage firms (high volatility, young, small size, unprofitable, non-dividend paying, and low tangible asset firms) earn higher (lower) returns compared with easy to value and arbitrage firms (old, big size, low volatility, profitable, dividend-paying, and high tangible asset firms) when sentiment continues in the High (Low) state.[13] The overpricing (underpricing) is corrected when sentiment transitions to the Low (High) state where hard to value and difficult to arbitrage firms earn lower (higher) returns than easy to value and arbitrage firms.

In sum, our results show that high volatility, young, small size, unprofitable, non-dividend paying and low tangible asset firms remain overpriced (underpriced) compared with low volatility, older, big size, profitable, dividend-paying and high tangible asset firms when sentiment continues to increase (decrease) i.e., continues in H/H (L/L) state. Subsequently, the overpricing (underpricing) is corrected when sentiment transitions to H/L (L/H) state, i.e., sentiment decreases (increases) following positive (negative) sentiment levels.

IV.C. Lagged sentiment levels and subsequent sentiment changes and firm characteristics

In this section, we empirically test whether the prediction of lower (higher) returns of hard to value stocks following Baker and Wurgler's sentiment levels index is conditioned to the subsequent change in sentiment measured by the sentiment changes index since we find in section IV.B. that hard to value stocks remain overpriced (underpriced) compared with easy to value stocks when sentiment continues to increase (decrease), i.e., continues in H/H (L/L) state. Consequently, the overpricing (underpricing) is corrected when sentiment transitions to H/L (L/H) state, i.e., sentiment decreases (increases) following positive (negative) sentiment levels.

Table 6 reports the results based on lagged sentiment levels index of month *t*-1 and subsequent

[13] We do not find a clear pattern for RD/A firms.

sentiment changes index of month t. Similar to our results in Table 5, we find that hard to value stocks remain overpriced (underpriced) following High (Low) sentiment levels index when the subsequent sentiment changes index is High (Low), i.e., remain overpriced (underpriced) in H/H (L/L) sentiment state. For example, we find that highest volatility decile (P10) earns 1.72% higher returns than the lowest volatility decile (P1) in H/H state, suggesting that high volatility stocks are overpriced compared with low volatility stocks. However, the overpricing of high volatility stocks is corrected when sentiment transitions to Low (H/L) state, where the P10 earns 3.03% lower returns than P1. Furthermore, high volatility stocks remain underpriced compared with low volatility stocks in L/L state such that P10 earns 1.58% lower returns than P1. The underpricing of high volatility stocks is corrected in L/H state, where P10 earns 4.03% higher returns than P1. Similarly, in Panels B to G, we also find that hard to value stocks remain overpriced (underpriced) in H/H (L/L) sentiment state, and the mispricing is corrected only when the subsequent sentiment transitions to H/L (L/H) state. Thes results are also consistent with hypothesis 2 and show that high volatility stocks remain overpriced (underpriced) compared with low volatility stocks when sentiment continues in High (Low) state, and the mispricing is corrected only when sentiment transitions to another state. Most importantly, the results in Table 6 suggest that the sentiment levels index prediction of future returns is conditional to the subsequent change in sentiment measured by the sentiment changes index.

Our results in Table 6 suggest that the sentiment levels index prediction of lower (higher) future returns following positive (negative) sentiment levels index might be limited to the extreme sentiment periods since we find that relatively lower (higher) returns of hard to value stocks compared with easy to value stocks occur only when the subsequent sentiment decreases (increases). Therefore, we formally test this conjecture in Table 7 by dividing sentiment periods into quintiles based on sentiment levels index of the previous month, t-1. We define the lowest sentiment quintile as low and the highest sentiment quintile as high. We also rank stocks in deciles based on the volatility estimated

at the end of month June.[14]

Table 7 reports the average monthly returns of volatility deciles based on lagged sentiment quintiles. We find that the firms in the highest volatility decile (P10) earn 1.67% higher average monthly returns than the firms in lowest volatility decile (P10) in low sentiment quintile. We find similar results for sentiment quintile 2 which is the second lowest sentiment quintile. However, we do not find any significant difference in average monthly returns of high and low volatility deciles in sentiment quintiles 3 and 4 where quintile 3 is the middle sentiment quintile, and 4 is the second highest sentiment quintile. Finally, we find that the highest volatility decile (P10) earn 1.75% lower average monthly returns than the firms in lowest volatility decile (P10) in high sentiment quintile. Therefore, our results for extreme sentiment quintiles appear to be consistent with the conjecture that the relatively lower (higher) future returns of hard to value stocks compared with easy to value stocks following positive (negative) sentiment levels index occur only when the subsequent sentiment decreases (increases).

In untabulated results, we find subsequent sentiment increases for 75 out of 121 months following the lowest sentiment levels (low sentiment quintile). Therefore, we find that the firms in the highest volatility decile (P10) earn 3.68% higher average monthly returns than the firms in lowest volatility decile (P1) in low sentiment quintile when the subsequent sentiment increases. Furthermore, we find that the firms in the highest volatility decile (P10) earn 1.29% lower average monthly returns than the firms in lowest volatility decile (P10) in low sentiment quintile when the subsequent sentiment continues to decrease. Following highest sentiment levels (high sentiment quintile), we find that the subsequent sentiment decreases for 75 out of 120 months. Therefore, we find that the firms in the highest volatility decile (P10) earn 3.91% lower average monthly returns than the firms in lowest volatility decile (P10) in high sentiment quintile when the subsequent sentiment decreases. Furthermore, we find that the firms in the highest volatility decile (P10) earn 1.85% higher average

[14] We find similar results for other proxies of hard to value stocks; therefore, we report results only for volatility portfolios here to save the space.

monthly returns than the firms in lowest volatility decile (P10) in high sentiment quintile when the subsequent sentiment continues to increase.

In sum, the results in Tables 6 and 7 are fully consistent with our hypothesis 2 and show that hard to value stocks remain overpriced (underpriced) compared with easy to value stocks when sentiment continues to increase (decrease), and the overpricing (underpricing) is corrected when there is a transition in sentiment, i.e., subsequent sentiment decreases (increases). Most importantly, our results show that the future returns prediction of sentiment levels index of Baker and Wurgler (2006, 2007) is conditioned to transition in subsequent sentiment.

V. Robustness Tests

V.A. Risk-adjusted returns of firm characteristics and sentiment

The results in the previous section demonstrate that raw returns of hard to value stocks are higher (lower) than easy to value stocks when the sentiment continues to increase (decrease), and the mispricing is corrected only when the sentiment transitions to another state. As a robustness test, in this section, we test whether risk factors can explain the difference in returns between hard to value and easy to value stocks. Several studies (e.g. D'avolio, 2002, Wurgler and Zhuravskaya, 2002, Shleifer and Vishny, 1997, Pontiff, 1996) suggest that hard to value and difficult to arbitrage stocks such as small, unprofitable, non-dividend paying and high volatility firms are riskier; therefore, such stocks require higher returns based on the asset pricing models. However, our results show that such risky stocks sometimes have lower expected returns. For example, we find relatively lower returns for younger, small size, high volatility, unprofitable and non-dividend paying firms when sentiment continues or transitions to Low state, which is inconsistent with a risk-based explanation. Nonetheless, as a robustness test, we provide the risk-adjusted returns of P1-P10 and ≤ 0 - ≥ 0 portfolios. To calculate the risk-adjusted returns, we regress the returns of P1-P10 and ≤ 0 - ≥ 0 portfolios separately on the CAPM (RMRF), and the Fama-French factors (RMRF, SMB, ML) plus a momentum factor (UMD) and a constant to obtain factor loadings (β). RMRF is the excess return

of the market, SMB is the small-minus-big size premium, HML is the high-book-to-market-minus-low-book-to-market premium, and UMD is the high-minus-low momentum premium. We do not include SMB in the regression when we use size as a proxy to define hard to value stocks. The risk-adjusted returns for each month *t* are

$$R_{x_t}^{adj} = R_{x_t} - \sum_i \beta_{xt} f_{it} \quad (1)$$

where R_{x_t} is the raw returns of P10-P1 or ≤0 - ≥0 portfolio for each month *t*, f_{it} is the realization factor *i* in month *t*, and β_{xt} is the estimated factor loading of the time-series of the raw returns of P10-P1 or ≤0 - ≥0 portfolio on the appropriate risk factors and a constant.

Table 8 reports the risk-adjusted returns of P1-P10 and ≤0 - ≥0 portfolios based on firm characteristics and High and Low sentiment states. Similar to Table 4, we use sentiment changes index to define High and Low sentiment states. Similar to our findings in section IV.A, we find that the hard to value stocks earn higher (lower) returns than easy to value stocks even after adjustment for risk factors. For example, we find that high volatility firms earn 1.63% (2.09%) higher (lower) returns compared with low volatility firms after adjusting for the CAPM factor. The high volatility firms earn 0.51% (0.64%) higher (lower) returns compared with low volatility firms after adjusting for Fama-French three factors plus a momentum factor. We find similar trends for the other firm characteristics. Furthermore, most of our results remain statistically significant even after adjusting for the risk factors.

Table 9 shows the risk-adjusted returns of P1-P10 and ≤0 - ≥0 portfolios based on firm characteristics and sentiment dynamics. Similar to Table 5, we use sentiment changes index to define H/H, H/L, L/H and L/L sentiment states. Similar to our results in IV.B, we find that hard to value stocks remain overpriced (underpriced) compared with easy to value stocks when the sentiment continues in High (Low) state. The overpricing (underpricing) is corrected when the sentiment transitions to another state. Furthermore, we find that bulk of our results are statistically significant and show the right signs even after adjusting for the risk factors.

In sum, our risk-adjusted returns in Tables 8 and 9 are generally consistent with our hypothesis 1 and 2, respectively. Therefore, these results suggest that risk factors at best can only partially explain the cross-sectional patterns based on firm's characteristics and that sentiment has a significant role in explaining the cross-section of stock returns.

V.B. Alternative sentiment proxies

So far, our results are based on Baker and Wurgler's sentiment changes index and sentiment levels index. In this section, we apply other proxies of investor sentiment to show that our results remain robust whether we use Baker and Wurgler sentiment index or other proxies of investor sentiment. We chose VIX, put-call ratio and bull-bear spread which are described in Section III.A. These proxies are not included in the construction of Baker and Wurgler sentiment index; therefore, these proxies can confirm whether different proxies of investor sentiment provide same results or not.

Table 10 reports the average monthly returns of volatility decile portfolios in the months where sentiment is High (Low). We define High (Low) sentiment based on ▲VIX, the put-call ratio (PC) and bull-bear spread (BBS). [15] For ▲VIX and ▲PC, a negative (positive) change defines High (Low) sentiment state. For BBS a positive (negative) change defines High (Low) sentiment state. Using ▲VIX as a proxy of investor sentiment, we find that high volatility decile, P10 earns 3.05% (3.01%) higher (lower) returns than low volatility decile, P1 during High (Low) sentiment state. We find similar results when we use ▲PC and BBS as proxies of investor sentiment.

Table 11 reports the average monthly returns of volatility decile portfolios in H/H, H/L, L/L and L/H sentiment states. Similar to the results in section IV.B and IV.C, H/H (L/L) represents sentiment continuation in High (Low) states, while H/L (L/H) captures the transition in sentiment from High to Low (Low to High) states. Using ▲VIX as a proxy of investor sentiment, we find that

[15] We find similar results for other proxies of hard to value stocks; therefore, we report results only for volatility portfolios here to save the space.

high volatility decile, P10 earns 5.59% (3.67%) higher (lower) returns than low volatility decile, P1 when the sentiment continues in H/H (L/L) state. Furthermore, we find that high volatility decile, P10 earns 2.67% (0.90%) lower (higher) returns than low volatility decile, P1 in H/L (L/H) sentiment state.[16] We find similar results when we use ▲PC and BBS as proxies of investor sentiment.

In sum, our results in Tables 10 and 11 also show that hard to value firms are overpriced (underpriced) compared with easy to value firms when sentiment increases/continues to increase (decreases/continues to decrease) i.e., sentiment in High (Low) state or continues in H/H (L/L) state. Consequently, the overpricing (underpricing) is corrected when sentiment transitions to H/L (L/H) state. Therefore, our results are consistent with our main findings in section IV and provide further support for hypothesis 1 and 2.

VI. Conclusion

Baker and Wurgler (2006) present evidence that the cross-section of expected stock returns is conditioned by investor sentiment. In particular, they find that hard to value and difficult to arbitrage stocks earn relatively lower (higher) returns following high (low) sentiment periods, suggesting that hard to value and difficult to arbitrage stocks are relatively overpriced (underpriced) in high (low) sentiment periods.

We extend Baker and Wurgler (2006) by conditioning the cross-section of expected stock returns on investor sentiment dynamics. First, we show that hard to value and difficult to arbitrage stocks are indeed overpriced (underpriced) in high (low) sentiment periods. More importantly, we show that hard to value and difficult to arbitrage stocks continue to remain overpriced (underpriced) if investor sentiment continues to increase (decrease) and hence would exhibit a return pattern inconsistent with that proposed by Baker and Wurgler (2006) that hard to value stocks earn lower

[16] The results in Table 11 shows right signs for all sentiment states, but results are not statistically significant for L/H state using VIX, and H/H and L/L using BBS as proxies if investor sentiment.

(higher) returns following High (Low) sentiment state. We show that hard to value and difficult to arbitrage stocks would only earn lower (higher) returns following high (low) Baker and Wurgler's sentiment levels index as posited by Baker and Wurgler (2006) *only* when the subsequent decreases (increases). Therefore, the future returns predictability of Baker and Wurgler's sentiment levels index is conditioned on the subsequent sentiment. Finally, our results are robust to the alternative proxies of investor sentiment.

Our study predicts a significant cross-sectional pattern in stocks returns conditioned on sentiment dynamics and suggest that systematic risk is not the complete but might be a partial explanation. Therefore, we suggest future work could develop asset pricing models that consider not only risk factors but also sentiment dynamics.

Our results also suggest a possibility of constructing zero-cost trading strategies, but only if we can predict sentiment in the subsequent periods. For example, on possible trading strategy is to buy (sell) hard (easy) to value stocks following High sentiment state if we expect subsequent sentiment would continue to increase. However, we suggest that investors need to be careful in interpreting the earlier work on sentiment that suggests lower (higher) returns of hard to value stocks following high (low) sentiment periods as an indication to sell (buy) hard to value stocks following high (low) sentiment periods since it could end up into losses if the subsequent sentiment increases (decreases). Therefore, our results suggest future research could explore the better ways to predict investor sentiment in the subsequent periods.

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Table 1: Predictions of returns of hard to value firms under different sentiment states. This table summarises the hypothesis presented in section II. Panel A hypothesises the impact of current sentiment on the cross-sectional returns of firm characteristics. Panel B hypothesises the impact of both lagged and current sentiment on the cross-sectional returns of firm characteristics. We define the current sentiment based on Baker and Wurgler (2007) sentiment changes index, changes in VIX (▲VIX), changes in P/C ratio (▲P/C), and bull-bear spread (BBS) in month *t*. We define lagged sentiment based on sentiment changes index in month *t*-1, ▲VIX in month *t*-1, ▲P/C ratio in month *t*-1, and BBS in month *t*-1. High (Low) sentiment states are based on sentiment increases (decreases) in month *t*. H/H (L/L) sentiment states are identified when subsequent sentiment continues to increase (decrease) following High (Low) sentiment state. H/L (L/H) states are identified when subsequent sentiment decreases (increases) following High (Low) sentiment state.

Panel A: Current Sentiment Changes and Returns on Hard-Minus-Easy to Value Stocks (HME)		
Sentiment	High	Low
HME Premium	Positive	Negative

Panel B: Lagged and Current Sentiment changes and Returns on Hard-Minus-Easy to Value Stocks (HME)				
Sentiment	H/H	H/L	L/H	L/L
HME Premium	Positive	Negative	Positive	Negative

Table 2: Summary Statistics and Correlation Matrix of Investor Sentiment Proxies, 1964 to 2014. This table reports summary statistics and correlation coefficients of CRSP value-weighted market returns and investor sentiment proxies.VW Ret is the CRSP Value-weighted monthly returns in percentage; ▲STM is the Baker and Wurgler sentiment changes index. STM is the Baker and Wurgler sentiment levels index. VIX is the CBOE implied volatility index, and the Put-Call ratio is the put to call ratio of CBOE options. BBS is the average monthly bull-bear spread (%). The term a (b) indicates a significant correlation coefficient at 99% (95%) confidence level.

Panel A: Summary Statistics

Variable	N	Mean	Std Dev	10%	25%	Median	75%	90%	Minimum	Maximum
VWRET (%)	606	0.89	4.32	-4.44	-1.56	1.13	3.74	5.87	-21.58	16.81
▲STM	593	0.00	1.00	-1.19	-0.53	0.00	0.55	1.10	-3.53	4.37
STM	594	0.00	1.00	-1.48	-0.55	0.05	0.53	1.01	-2.33	3.08
VIX	300	19.96	7.74	12.35	14.20	17.80	23.67	28.97	10.82	62.64
Put-Call	232	0.83	0.16	0.62	0.72	0.84	0.92	1.02	0.44	1.21
BBS (%)	330	8.57	15.27	-10.60	-1.81	9.43	18.75	28.90	-41.00	50.47

Panel B: Pearson Correlation Coefficients

	VWRET	▲STM	STM	VIX	Put-Call	BBS
VWRET	1					
▲STM	0.19[a]	1				
STM	-0.05	-0.14[a]	1			
VIX	-0.26[a]	-0.08	-0.16[a]	1		
Put-Call	-0.25[a]	-0.12	-0.29[a]	0.03	1	
BBS	0.19[a]	0.06	0.16[a]	-0.30[a]	-0.59[a]	1

Table 3: Summary Statistics, 1964 to 2014. Panel A reports Monthly Returns and Momentum Returns. Momentum Returns (MOM) is the cumulative return for eleven months between *t*-12 to *t*-2. Panel B reports Volatility, Age and Size variables. Volatility is the annual standard deviation of monthly returns from CRSP for the 12-month period ending in the June prior to *t*. Age is the number of years between the firm's first appearance on CRSP and month *t*. Market equity (ME) is price times shares outstanding from CRSP in June prior to *t*. Panel C reports Profitability variables. The Earnings to Book Equity (E+/BEt-1) is defined for firms with positive earnings. Earnings (E+) is defined as income before extraordinary item (item 18) plus income statement deferred taxes (item 50) minus preferred dividends (item (19). Book equity (BE) is defined as shareholders' equity (Item 60) plus balance sheet deferred taxes (Item 35). We also report an indicator variable (E>0) equal to one for firms with positive earnings. Panel D reports dividend variables. Dividends to equity (D) are dividends per share at the ex-date (Item 26) times shares outstanding (Item 25) divided by Book Equity. We also report an indicator variable (D>0) equal to one for firms with positive dividends. Panel E shows tangibility variables. Plant, property, and equipment (Item 7) and research and development (Item 46) are scaled by assets (item 6). We record research and development (RD) from 1972 when it is widely available. We set RD to zero if there is a missing value. In Panels C through E, accounting data from the fiscal year ending in *t*-1 are matched to monthly returns from July of year *t* through June of year *t*+1. All variables are Winsorized at 99.5 and 0.5 percent.

	N	Mean	Std Dev	10th Pctl	25th Pctl	Median	75th Pctl	90th Pctl	Minimum	Maximum
Panel A: Monthly Returns and Momentum Returns										
Ret (%)	2103452	1.37	17.26	-14.47	-6.29	0.00	7.28	16.98	-98.13	2400.00
MOM_{t-1} (%)	2103452	14.73	51.00	-41.25	-11.72	12.71	37.92	70.17	-265.93	475.46
Panel B: Age, Market Equity, and Volatility										
$Volatility_{t-1}$ (%)	2103452	13.46	8.98	5.39	7.61	11.22	16.57	23.75	1.36	101.25
Firm Age_t (Years)	2103452	15.63	14.41	3.17	5.58	10.83	20.33	35.83	1.00	89.00
ME_{t-1} ($M)	2103452	1425.28	6867.57	8.28	25.37	105.60	530.05	2180.18	0.38	169059.45
Panel C: Profitability										
$E+/BE_{t-1}$ (%)	2103452	10.26	10.51	0.00	0.42	9.27	14.95	21.33	0.00	130.37
$E>0_{t-1}$	2103452	0.76	0.43	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Panel D: Dividend Policy										
D/BE_{t-1} (%)	2105729	2.18	4.09	0.00	0.00	0.00	3.57	6.05	0.00	123.52
$D>0_{t-1}$	2105729	0.47	0.50	0.00	0.00	0.00	1.00	1.00	0.00	1.00
Panel E: Tangibility										
PPE/Assets (%)	1965482	53.97	38.69	9.90	23.79	46.28	78.00	108.66	0.00	299.72
RD/Assets (%)	1829616	4.08	10.15	0.00	0.00	0.00	3.52	12.10	0.00	188.30

Table 4: Monthly Returns by Sentiment Changes (▲STM) Index and Firm Characteristics, 1964 to 2014. In each month *t*, we form decile portfolios according to the NYSE breakpoints of volatility, firm age, equity (ME), earnings to book ratio for profitable firms (E+/BE), dividend-book ratio for dividend payers (D/BE), fixed assets (PPE/A) and research and development (RD/A). We also calculate portfolio returns of unprofitable firms, non-dividend paying firms, zero PP&E firms, and firms with zero R&D expenses. We report average portfolio returns in High and Low sentiment states. We define High (Low) sentiment states where the ▲STM in month *t* is positive (negative). We also report the difference in portfolio returns between High and Low sentiment states (H-L). We report average monthly returns in percentage and *t*-statistics in parenthesis.

	CRSP	N	≤0	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P1-P10	≤0 - ≥0
Sigma	**High**	299		1.47	1.83	2.06	2.26	2.54	2.68	2.98	3.33	3.68	4.33	-2.86	
				(8.41)	(8.93)	(8.81)	(9.20)	(9.47)	(9.32)	(9.48)	(9.69)	(9.49)	(8.84)	(-7.08)	
	Low	294		0.79	0.57	0.29	0.20	0.07	-0.11	-0.38	-0.67	-0.88	-1.63	2.42	
				(4.14)	(2.47)	(1.13)	(0.69)	(0.25)	(-0.35)	(-1.13)	(-1.87)	(-2.23)	(-3.51)	(6.84)	
	H-L			0.68	1.25	1.77	2.07	2.47	2.79	3.36	3.99	4.56	5.96	-5.28	
				(2.64)	(4.05)	(5.10)	(5.52)	(6.2)	(6.56)	(7.30)	(8.07)	(8.24)	(8.83)	(-9.82)	
Age	**High**	299		3.43	3.58	3.36	3.14	3.04	2.55	2.16	2.20	2.13	1.50	1.93	
				(9.25)	(9.58)	(9.51)	(9.08)	(9.23)	(8.78)	(8.15)	(7.99)	(7.84)	(5.77)	(6.77)	
	Low	294		-1.45	-0.74	-0.68	-0.40	-0.29	-0.12	0.13	0.17	0.20	0.42	-1.87	
				(-3.78)	(-1.96)	(-1.88)	(-1.14)	(-0.84)	(-0.40)	(0.42)	(0.55)	(0.68)	(1.52)	(-7.36)	
	H-L			4.88	4.32	4.03	3.54	3.33	2.68	2.03	2.03	1.93	1.08	3.80	
				(9.15)	(8.13)	(8.01)	(7.18)	(7.02)	(6.26)	(5.10)	(5.01)	(4.85)	(2.85)	(9.94)	
ME	**High**	299		3.77	3.10	2.98	2.87	2.74	2.52	2.45	2.15	1.92	1.48	2.30	
				(9.79)	(8.56)	(8.72)	(8.83)	(8.78)	(8.46)	(8.57)	(7.87)	(7.23)	(6.05)	(7.16)	
	Low	294		-0.71	-0.93	-0.81	-0.71	-0.51	-0.39	-0.26	-0.06	0.01	0.21	-0.92	
				(-1.94)	(-2.49)	(-2.19)	(-2.00)	(-1.47)	(-1.14)	(-0.79)	(-0.18)	(0.03)	(0.73)	(-3.59)	
	H-L			2.74	2.66	2.41	2.13	1.88	1.39	1.53	1.32	1.23	0.79	1.95	
				(2.90)	(2.52)	(2.32)	(2.19)	(1.95)	(1.51)	(1.71)	(1.52)	(1.52)	(1.09)	(3.53)	
E/BE	**High**	299	4.35	3.26	2.79	2.63	2.51	2.35	2.41	2.52	2.59	2.79	3.04	0.22	1.66
			(8.95)	(9.49)	(9.67)	(9.50)	(9.27)	(8.75)	(8.74)	(8.89)	(8.62)	(8.93)	(9.28)	(1.57)	(5.77)
	Low	294	-1.43	-0.52	-0.18	-0.06	-0.04	0.00	-0.09	-0.09	-0.14	-0.37	-0.54	0.02	-1.23
			(-3.24)	(-1.53)	(-0.60)	(-0.19)	(-0.13)	(-0.01)	(-0.30)	(-0.31)	(-0.45)	(-1.12)	(-1.50)	(0.13)	(-5.63)
	H-L		5.78	3.78	2.98	2.69	2.55	2.35	2.50	2.61	2.73	3.16	3.58	0.21	2.88
			(8.79)	(7.83)	(7.11)	(6.71)	(6.34)	(5.88)	(6.20)	(6.26)	(6.23)	(6.93)	(7.40)	(1.10)	(7.98)

Table 4: Continued

	CRSP	N	≤0	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P1-P10	≤0 - ≥0
D/BE	**High**	299	4.00	2.90	2.72	2.55	2.50	2.24	2.09	1.94	1.73	1.58	1.86	1.04	1.78
			(9.61)	(8.95)	(9.03)	(8.85)	(9.17)	(8.26)	(8.22)	(7.97)	(7.46)	(6.99)	(7.90)	(6.95)	(7.24)
	Low	294	-1.18	-0.20	-0.20	0.06	0.07	0.16	0.25	0.46	0.52	0.60	0.47	-0.67	-1.40
			(-2.92)	(-0.57)	(-0.60)	(0.19)	(0.25)	(0.55)	(0.90)	(1.75)	(2.04)	(2.50)	(1.81)	(-4.66)	(-6.87)
	H-L		5.18	3.10	2.92	2.50	2.43	2.08	1.84	1.48	1.22	0.98	1.39	1.71	0.69
			(8.91)	(6.50)	(6.58)	(5.92)	(5.98)	(5.25)	(4.89)	(4.16)	(3.53)	(2.97)	(3.98)	(8.24)	(4.79)
PPE/A	**High**	299	2.29	3.56	3.76	3.52	3.43	3.29	3.14	2.92	2.72	2.25	2.36	1.20	-0.79
			(6.15)	(8.97)	(9.50)	(9.48)	(9.57)	(9.70)	(9.77)	(9.14)	(9.12)	(8.65)	(9.10)	(4.83)	(-2.77)
	Low	294	0.16	-1.28	-1.25	-0.99	-0.72	-0.53	-0.35	-0.35	-0.14	0.22	0.36	-1.64	0.61
			(0.44)	(-3.17)	(-3.22)	(-2.65)	(-1.99)	(-1.51)	(-1.01)	(-1.05)	(-0.41)	(0.75)	(1.16)	(-7.27)	(2.45)
	H-L		2.14	4.84	5.02	4.51	4.15	3.83	3.50	3.27	2.86	2.03	1.99	2.84	-1.40
			(4.12)	(8.55)	(9.03)	(8.56)	(8.15)	(7.81)	(7.37)	(7.05)	(6.40)	(5.26)	(4.92)	(8.45)	(-3.70)
RD/A	**High**	253	2.61	3.81	3.96	4.07	3.98	3.66	3.64	3.39	3.07	2.86	2.12	1.69	-0.84
			(8.14)	(8.53)	(8.53)	(8.57)	(8.47)	(7.85)	(8.15)	(8.00)	(7.75)	(7.92)	(6.80)	(4.92)	(-4.18)
	Low	245	-0.07	-0.78	-0.94	-1.02	-0.90	-0.70	-0.60	-0.34	-0.18	-0.04	0.27	-1.05	0.46
			(-0.19)	(-1.79)	(-2.02)	(-2.15)	(-1.84)	(-1.46)	(-1.26)	(-0.75)	(-0.42)	(-0.08)	(0.77)	(-3.67)	(2.61)
	H-L		2.68	4.59	4.90	5.09	4.88	4.36	4.24	3.73	3.25	2.89	1.85	2.74	-1.30
			(5.68)	(7.34)	(7.45)	(7.58)	(7.19)	(6.53)	(6.49)	(6.04)	(5.55)	(5.27)	(3.98)	(6.11)	(-4.86)

Table 5: Sentiment Dynamics based on Sentiment Changes Index and Monthly Returns based on Firm Characteristics, 1964 to 2014. In each month *t*, we form decile portfolios according to the NYSE breakpoints of volatility, firm age, equity (ME), earnings to book ratio for profitable firms (E+/BE), dividend-book ratio for dividend payers (D/BE), fixed assets (PPE/A) and research and development (RD/A). We also calculate portfolio returns of unprofitable firms, non-dividend paying firms, zero PP&E firms, and firms with zero R&D expenses. We report average portfolio returns based on sentiment dynamics. We define H/H (L/L) sentiment state if ▲STM in month *t-1* and *t* are positive (negative). Furthermore, we classify H/L (L/H) sentiment state if ▲STM in month *t*-1 is positive (negative) and ▲STM in month *t* is negative (positive). We report average monthly returns in percentage and *t*-statistics in parenthesis.

	Sentiment	N	≤0	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P1-P10	≤0 - ≥0
Sigma	**H/H**	150		1.49	1.72	2.00	2.19	2.43	2.65	2.87	3.25	3.59	4.41	-2.92	
				(6.27)	(6.27)	(6.44)	(6.61)	(6.78)	(7.17)	(7.13)	(7.28)	(7.22)	(7.05)	(-5.65)	
	H/L	148		0.87	0.75	0.54	0.50	0.37	0.32	0.08	-0.15	-0.19	-0.56	1.43	
				(3.34)	(2.38)	(1.60)	(1.31)	(0.93)	(0.75)	(0.17)	(-0.30)	(-0.36)	(-0.88)	(3.01)	
	L/L	146		0.70	0.39	0.02	-0.14	-0.26	-0.59	-0.88	-1.25	-1.63	-2.81	3.52	
				(2.49)	(1.13)	(0.04)	(-0.35)	(-0.59)	(-1.29)	(-1.76)	(-2.40)	(-2.83)	(-4.21)	(6.90)	
	L/H	149		1.46	1.94	2.11	2.33	2.66	2.70	3.08	3.41	3.77	4.25	-2.79	
				(5.64)	(6.35)	(6.04)	(6.40)	(6.62)	(6.12)	(6.38)	(6.50)	(6.31)	(5.61)	(-4.49)	
Age	**H/H**	150		3.44	3.63	3.33	3.17	2.91	2.36	1.94	2.02	1.87	1.28	2.16	
				(7.30)	(7.52)	(7.08)	(7.24)	(6.71)	(6.15)	(5.73)	(5.92)	(5.35)	(3.80)	(6.59)	
	H/L	148		-0.55	-0.07	-0.06	0.16	0.21	0.07	0.24	0.45	0.41	0.36	-0.91	
				(-1.09)	(-0.14)	(-0.13)	(0.32)	(0.44)	(0.16)	(0.60)	(1.10)	(1.03)	(0.90)	(-2.67)	
	L/L	146		-2.36	-1.44	-1.29	-0.96	-0.79	-0.32	0.01	-0.12	-0.02	0.48	-2.85	
				(-4.17)	(-2.56)	(-2.41)	(-1.9)	(-1.61)	(-0.74)	(0.01)	(-0.28)	(-0.05)	(1.25)	(-7.87)	
	L/H	149		3.42	3.54	3.39	3.12	3.17	2.74	2.38	2.38	2.39	1.73	1.69	
				(5.95)	(6.16)	(6.40)	(5.78)	(6.38)	(6.28)	(5.83)	(5.49)	(5.75)	(4.34)	(3.62)	
ME	**H/H**	150		4.18	3.00	2.79	2.55	2.36	2.13	2.09	1.82	1.55	1.23	2.95	
				(8.22)	(6.35)	(6.32)	(6.11)	(6.00)	(5.65)	(5.8)	(5.26)	(4.67)	(3.89)	(6.98)	
	H/L	148		0.21	-0.38	-0.33	-0.30	-0.17	0.00	0.15	0.31	0.34	0.50	-0.29	
				(0.41)	(-0.75)	(-0.67)	(-0.63)	(-0.37)	(0.00)	(0.33)	(0.71)	(0.83)	(1.23)	(-0.73)	
	L/L	146		-1.64	-1.48	-1.29	-1.12	-0.86	-0.78	-0.68	-0.44	-0.33	-0.08	-1.55	
				(-3.14)	(-2.73)	(-2.36)	(-2.16)	(-1.64)	(-1.54)	(-1.37)	(-0.91)	(-0.75)	(-0.21)	(-5.05)	
	L/H	149		3.36	3.21	3.18	3.19	3.13	2.90	2.80	2.47	2.29	1.73	1.64	
				(5.81)	(5.82)	(6.06)	(6.40)	(6.45)	(6.31)	(6.33)	(5.86)	(5.54)	(4.63)	(3.42)	

Table 5: Continued

	Sentiment	N	≤0	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P1-P10	≤0 - ≥0
E/BE	**H/H**	150	4.69	3.38	2.73	2.53	2.39	2.27	2.29	2.42	2.58	2.64	3.07	0.31	2.06
			(7.47)	(7.43)	(7.21)	(7.10)	(6.67)	(6.40)	(6.34)	(6.56)	(6.59)	(6.57)	(7.28)	(1.51)	(5.54)
	H/L	148	-0.35	0.18	0.29	0.24	0.34	0.43	0.22	0.34	0.24	0.13	0.01	0.17	-0.59
			(-0.58)	(0.39)	(0.71)	(0.62)	(0.84)	(1.06)	(0.55)	(0.82)	(0.55)	(0.30)	(0.02)	(0.97)	(-1.95)
	L/L	146	-2.53	-1.23	-0.67	-0.36	-0.43	-0.44	-0.41	-0.54	-0.53	-0.88	-1.09	-0.14	-1.87
			(-3.97)	(-2.53)	(-1.51)	(-0.85)	(-0.99)	(-1.03)	(-0.94)	(-1.19)	(-1.13)	(-1.80)	(-2.08)	(-0.85)	(-6.14)
	L/H	149	4.00	3.15	2.86	2.73	2.64	2.43	2.53	2.62	2.60	2.93	3.01	0.13	1.25
			(5.39)	(6.08)	(6.52)	(6.42)	(6.46)	(6.00)	(6.06)	(6.07)	(5.68)	(6.12)	(5.98)	(0.68)	(2.87)
D/BE	**H/H**	150	4.14	2.90	2.72	2.51	2.54	2.23	2.06	1.82	1.60	1.39	1.78	1.13	1.98
			(7.65)	(6.84)	(6.87)	(6.62)	(7.13)	(6.27)	(6.17)	(5.68)	(5.37)	(4.84)	(5.97)	(5.37)	(6.5)
	H/L	148	-0.24	0.17	0.13	0.40	0.38	0.30	0.38	0.57	0.62	0.75	0.63	-0.46	-0.67
			(-0.43)	(0.35)	(0.30)	(0.94)	(0.93)	(0.77)	(1.00)	(1.53)	(1.76)	(2.31)	(1.78)	(-2.21)	(-2.44)
	L/L	146	-2.15	-0.57	-0.53	-0.29	-0.23	0.02	0.12	0.34	0.41	0.44	0.31	-0.88	-2.15
			(-3.66)	(-1.12)	(-1.11)	(-0.65)	(-0.52)	(0.04)	(0.29)	(0.93)	(1.13)	(1.26)	(0.80)	(-4.47)	(-7.35)
	L/H	149	3.86	2.90	2.72	2.60	2.47	2.25	2.11	2.06	1.86	1.77	1.94	0.95	1.59
			(6.08)	(5.90)	(5.97)	(5.95)	(5.94)	(5.47)	(5.51)	(5.60)	(5.22)	(5.06)	(5.31)	(4.46)	(4.09)
PPE/A	**H/H**	150	2.41	3.56	3.66	3.40	3.45	3.22	3.07	2.87	2.69	2.07	2.06	1.50	-0.50
			(4.36)	(7.03)	(7.31)	(7.28)	(7.45)	(7.50)	(7.51)	(6.93)	(7.08)	(6.36)	(6.08)	(4.8)	(-1.21)
	H/L	148	0.05	-0.28	-0.45	-0.17	-0.07	0.02	0.35	0.27	0.40	0.49	0.75	-1.03	-0.02
			(0.10)	(-0.53)	(-0.88)	(-0.34)	(-0.15)	(0.05)	(0.71)	(0.57)	(0.88)	(1.27)	(1.72)	(-3.63)	(-0.07)
	L/L	146	0.27	-2.29	-2.07	-1.82	-1.38	-1.10	-1.07	-0.98	-0.68	-0.07	-0.03	-2.25	1.26
			(0.57)	(-3.82)	(-3.55)	(-3.30)	(-2.58)	(-2.12)	(-2.15)	(-2.02)	(-1.40)	(-0.15)	(-0.07)	(-6.54)	(3.48)
	L/H	149	2.18	3.56	3.87	3.64	3.41	3.36	3.21	2.97	2.76	2.43	2.66	0.90	-1.08
			(4.32)	(5.80)	(6.28)	(6.28)	(6.21)	(6.37)	(6.44)	(6.09)	(5.95)	(5.98)	(6.79)	(2.33)	(-2.74)
RD/A	**H/H**	125	2.55	3.81	3.61	3.52	3.34	2.89	2.81	2.67	2.39	2.18	1.69	2.12	-0.34
			(6.02)	(6.62)	(6.25)	(5.81)	(5.52)	(4.84)	(4.82)	(4.83)	(4.51)	(4.47)	(3.81)	(4.76)	(-1.37)
	H/L	127	0.22	0.02	-0.31	-0.44	-0.33	-0.33	-0.31	-0.18	0.01	0.29	0.45	-0.42	0.33
			(0.46)	(0.04)	(-0.50)	(-0.69)	(-0.51)	(-0.51)	(-0.46)	(-0.30)	(0.01)	(0.5)	(0.93)	(-1.03)	(1.32)
	L/L	118	-0.38	-1.65	-1.63	-1.64	-1.51	-1.10	-0.92	-0.50	-0.38	-0.38	0.07	-1.72	0.59
			(-0.75)	(-2.53)	(-2.35)	(-2.34)	(-2.07)	(-1.55)	(-1.33)	(-0.74)	(-0.60)	(-0.64)	(0.15)	(-4.43)	(2.45)
	L/H	128	2.67	3.81	4.30	4.61	4.61	4.41	4.45	4.10	3.73	3.51	2.54	1.27	-1.34
			(5.53)	(5.58)	(5.94)	(6.33)	(6.45)	(6.22)	(6.64)	(6.43)	(6.40)	(6.69)	(5.80)	(2.44)	(-4.28)

Table 6: Lagged Sentiment Levels Index and Subsequent Sentiment Changes Index and Monthly Returns based on Firm Characteristics, 1964 to 2014. In each month *t*, we form decile portfolios according to the NYSE breakpoints of volatility, firm age, equity (ME), earnings to book ratio for profitable firms (E+/BE), dividend-book ratio for dividend payers (D/BE), fixed assets (PPE/A) and research and development (RD/A). We also calculate portfolio returns of unprofitable firms, non-dividend paying firms, zero PP&E firms, and firms with zero R&D expenses. We report average portfolio returns based on sentiment dynamics. We define H/H (L/L) sentiment state if STM in month *t-1* and ▲STM in month *t* are positive (negative). Furthermore, we classify H/L (L/H) sentiment state if STM in month *t*-1 is positive (negative) and ▲STM in month *t* is negative (positive). We report average monthly returns in percentage and *t*-statistics in parenthesis.

	Sentiment	N	≤0	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P1-P10	≤0 - ≥0
Sigma	**H/H**	152		1.62	1.94	2.06	2.18	2.47	2.46	2.68	2.86	3.03	3.34	-1.72	
				(8.01)	(8.06)	(7.81)	(7.69)	(8.04)	(7.43)	(7.27)	(7.03)	(6.32)	(5.19)	(-3.04)	
	H/L	170		0.95	0.68	0.41	0.30	0.14	-0.15	-0.43	-0.87	-1.10	-2.08	3.03	
				(3.94)	(2.35)	(1.32)	(0.87)	(0.38)	(-0.40)	(-1.06)	(-2.04)	(-2.30)	(-3.56)	(6.55)	
	L/L	124		0.57	0.43	0.12	0.05	-0.02	-0.06	-0.30	-0.39	-0.58	-1.02	1.58	
				(1.84)	(1.12)	(0.28)	(0.11)	(-0.04)	(-0.11)	(-0.53)	(-0.64)	(-0.86)	(-1.35)	(2.92)	
	L/H	147		1.32	1.71	2.05	2.35	2.62	2.90	3.28	3.81	4.35	5.35	-4.03	
				(4.57)	(5.12)	(5.27)	(5.78)	(5.88)	(6.11)	(6.41)	(6.85)	(7.13)	(7.29)	(-7.20)	
Age	**H/H**	152		2.84	3.07	3.04	2.88	2.75	2.33	2.10	2.00	1.95	1.67	1.17	
				(5.74)	(6.57)	(6.69)	(6.78)	(6.81)	(6.68)	(6.57)	(6.36)	(6.40)	(5.86)	(2.86)	
	H/L	170		-2.01	-0.87	-0.84	-0.39	-0.36	-0.17	0.18	0.31	0.24	0.50	-2.52	
				(-4.04)	(-1.88)	(-1.85)	(-0.89)	(-0.87)	(-0.45)	(0.45)	(0.89)	(0.65)	(1.39)	(-7.47)	
	L/L	124		-0.68	-0.56	-0.45	-0.43	-0.19	-0.06	0.06	-0.03	0.14	0.31	-0.99	
				(-1.14)	(-0.88)	(-0.78)	(-0.72)	(-0.33)	(-0.11)	(0.13)	(-0.06)	(0.30)	(0.71)	(-2.64)	
	L/H	147		4.03	4.11	3.68	3.42	3.33	2.78	2.22	2.40	2.32	1.33	2.71	
				(7.33)	(7.02)	(6.79)	(6.20)	(6.40)	(5.95)	(5.23)	(5.27)	(5.06)	(3.02)	(7.03)	
ME	**H/H**	152		2.95	2.65	2.71	2.71	2.67	2.50	2.32	2.11	2.02	1.64	1.30	
				(6.15)	(5.84)	(6.44)	(6.60)	(6.65)	(6.53)	(6.27)	(6.00)	(5.78)	(4.89)	(2.88)	
	H/L	170		-0.91	-1.14	-0.98	-0.93	-0.75	-0.54	-0.34	-0.12	-0.08	0.10	-1.01	
				(-2.02)	(-2.47)	(-2.12)	(-2.07)	(-1.66)	(-1.21)	(-0.80)	(-0.28)	(-0.20)	(0.26)	(-3.09)	
	L/L	124		-0.42	-0.64	-0.57	-0.41	-0.19	-0.19	-0.15	0.02	0.13	0.37	-0.79	
				(-0.7)	(-1.03)	(-0.94)	(-0.72)	(-0.35)	(-0.35)	(-0.29)	(0.04)	(0.28)	(0.82)	(-1.92)	
	L/H	147		4.63	3.57	3.27	3.03	2.82	2.53	2.58	2.19	1.81	1.30	3.32	
				(7.70)	(6.30)	(6.01)	(5.98)	(5.85)	(5.52)	(5.88)	(5.20)	(4.51)	(3.67)	(7.55)	

Table 6: Continued

	Sentiment	N	≤0	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P1-P10	≤0 - ≥0
E/BE	**H/H**	152	3.34	2.74	2.60	2.43	2.44	2.36	2.31	2.47	2.44	2.60	2.75	0.00	0.83
			(5.48)	(7.03)	(7.64)	(7.52)	(7.65)	(7.42)	(7.06)	(7.29)	(6.81)	(6.87)	(6.68)	(-0.01)	(2.14)
	H/L	170	-1.83	-0.69	-0.22	-0.07	-0.06	-0.05	-0.08	-0.17	-0.18	-0.40	-0.63	-0.05	-1.58
			(-3.30)	(-1.63)	(-0.58)	(-0.20)	(-0.17)	(-0.15)	(-0.22)	(-0.46)	(-0.46)	(-0.94)	(-1.44)	(-0.36)	(-5.29)
	L/L	124	-0.88	-0.29	-0.13	-0.03	-0.01	0.07	-0.10	0.02	-0.09	-0.34	-0.40	0.11	-0.75
			(-1.22)	(-0.52)	(-0.27)	(-0.07)	(-0.02)	(0.14)	(-0.21)	(0.03)	(-0.16)	(-0.63)	(-0.68)	(0.56)	(-2.39)
	L/H	147	5.38	3.80	3.00	2.83	2.59	2.35	2.52	2.57	2.75	2.98	3.35	0.45	2.51
			(7.15)	(6.68)	(6.35)	(6.25)	(5.84)	(5.35)	(5.61)	(5.60)	(5.64)	(5.95)	(6.51)	(2.03)	(6.05)
D/BE	**H/H**	152	3.17	2.45	2.38	2.34	2.31	2.12	2.14	1.96	1.72	1.65	1.90	0.55	1.08
			(6.13)	(6.74)	(6.96)	(7.39)	(7.36)	(6.86)	(7.39)	(7.14)	(6.54)	(6.29)	(6.94)	(3.13)	(3.04)
	H/L	170	-1.51	-0.16	-0.12	0.17	0.17	0.34	0.32	0.62	0.68	0.72	0.56	-0.72	-1.84
			(-2.99)	(-0.37)	(-0.31)	(0.44)	(0.48)	(0.96)	(0.96)	(1.92)	(2.23)	(2.61)	(1.84)	(-3.79)	(-6.42)
	L/L	124	-0.74	-0.26	-0.30	-0.09	-0.06	-0.09	0.15	0.23	0.29	0.44	0.35	-0.61	-0.81
			(-1.10)	(-0.44)	(-0.54)	(-0.18)	(-0.12)	(-0.20)	(0.32)	(0.53)	(0.68)	(1.03)	(0.77)	(-2.73)	(-2.91)
	L/H	147	4.85	3.36	3.07	2.77	2.71	2.37	2.03	1.92	1.75	1.51	1.81	1.55	2.52
			(7.46)	(6.23)	(6.14)	(5.69)	(6.00)	(5.25)	(4.82)	(4.72)	(4.52)	(4.06)	(4.69)	(6.51)	(7.58)
PPE/A	**H/H**	152	1.86	3.05	3.23	3.01	3.00	2.88	2.79	2.58	2.28	2.14	2.12	0.93	-0.76
			(4.92)	(5.87)	(6.19)	(6.19)	(6.78)	(6.82)	(7.03)	(6.56)	(6.50)	(6.76)	(6.31)	(2.64)	(-2.03)
	H/L	170	0.17	-1.61	-1.52	-1.30	-0.94	-0.71	-0.57	-0.49	-0.35	0.08	0.21	-1.82	0.73
			(0.40)	(-3.10)	(-3.03)	(-2.75)	(-2.07)	(-1.61)	(-1.36)	(-1.18)	(-0.88)	(0.23)	(0.52)	(-5.65)	(2.31)
	L/L	124	0.14	-0.82	-0.89	-0.56	-0.42	-0.30	-0.06	-0.17	0.15	0.40	0.57	-1.39	0.45
			(0.23)	(-1.28)	(-1.44)	(-0.93)	(-0.71)	(-0.51)	(-0.09)	(-0.30)	(0.26)	(0.84)	(1.16)	(-4.62)	(1.13)
	L/H	147	2.79	4.09	4.32	4.04	3.87	3.71	3.50	3.27	3.18	2.36	2.60	1.49	-0.84
			(4.15)	(6.79)	(7.22)	(7.20)	(6.84)	(6.96)	(6.89)	(6.46)	(6.55)	(5.67)	(6.57)	(4.21)	(-1.89)
RD/A	**H/H**	140	2.23	3.12	3.37	3.46	3.46	3.10	3.53	2.98	2.85	2.65	2.13	0.98	-0.84
			(6.41)	(5.39)	(5.62)	(5.78)	(5.81)	(5.33)	(6.01)	(5.85)	(5.76)	(6.05)	(5.56)	(1.97)	(-3.00)
	H/L	148	-0.20	-1.12	-1.34	-1.48	-1.43	-1.14	-1.09	-0.71	-0.57	-0.20	0.21	-1.32	0.68
			(-0.52)	(-2.03)	(-2.29)	(-2.48)	(-2.29)	(-1.92)	(-1.85)	(-1.30)	(-1.06)	(-0.38)	(0.51)	(-3.47)	(2.75)
	L/L	97	0.14	-0.27	-0.34	-0.32	-0.10	-0.03	0.14	0.23	0.41	0.22	0.36	-0.63	0.11
			(0.22)	(-0.38)	(-0.44)	(-0.41)	(-0.13)	(-0.03)	(0.17)	(0.30)	(0.57)	(0.32)	(0.58)	(-1.47)	(0.50)
	L/H	113	3.09	4.66	4.68	4.83	4.62	4.35	3.78	3.90	3.33	3.11	2.10	2.56	-0.85
			(5.38)	(6.74)	(6.48)	(6.37)	(6.18)	(5.78)	(5.48)	(5.50)	(5.20)	(5.20)	(4.09)	(5.75)	(-2.92)

Table 7: Future Returns by Lagged Sentiment Levels Index and Volatility, 1964 to 2014. In each month *t*, we form decile portfolios according to the NYSE breakpoints of volatility. Furthermore, we divide our sample into quintiles based on sentiment levels index of the previous month, *t-1*. The lowest sentiment quintile is defined as "Low" and highest sentiment quintile as "High". We report average portfolio returns of volatility deciles and the difference in extreme deciles (P1-P10) in percentage and *t*-statistics in parenthesis.

Lagged STM Level	N	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P1-P10
Low	121	1.03	1.29	1.28	1.46	1.62	1.73	1.80	2.15	2.28	2.69	1.67
		(3.03)	(3.28)	(2.83)	(3.04)	(3.11)	(3.11)	(3.04)	(3.28)	(3.16)	(3.20)	(2.74)
2	117	1.10	1.27	1.36	1.52	1.58	1.75	1.90	2.10	2.45	2.79	1.69
		(3.96)	(3.56)	(3.23)	(3.30)	(3.16)	(3.26)	(3.19)	(3.30)	(3.45)	(3.20)	(2.42)
3	114	1.08	1.09	1.06	1.07	1.17	1.21	1.19	1.26	1.28	1.42	0.34
		(3.84)	(3.21)	(2.83)	(2.64)	(2.80)	(2.63)	(2.44)	(2.40)	(2.26)	(2.06)	(0.61)
4	121	0.95	0.97	0.85	0.91	0.99	0.76	0.84	0.58	0.55	0.24	-0.71
		(3.33)	(2.79)	(2.30)	(2.24)	(2.24)	(1.68)	(1.67)	(1.08)	(0.91)	(0.33)	(-1.18)
High	120	1.51	1.41	1.35	1.22	1.23	1.04	0.85	0.65	0.55	-0.24	-1.75
		(5.73)	(4.50)	(3.84)	(3.19)	(3.03)	(2.32)	(1.74)	(1.22)	(0.88)	(-0.29)	(-2.50)

Table 8: Risk-Adjusted Returns by Sentiment Changes (▲STM) Index and Firm Characteristics, 1964 to 2014. This Table provides the risk-adjusted returns of P1-P10 and ≤0 - ≥0 portfolios based on firm characteristics and High and Low sentiment states. We regress the returns of P1-P10 and ≤0 - ≥0 portfolios separately on the CAPM (RMRF), and the Fama-French factors (RMRF, SMB, ML) plus a momentum factor (UMD) and a constant to obtain factor loadings (β). RMRF is the excess return of the market, SMB is the small-minus-big size premium, HML is the high-book-to-market-minus-low-book-to-market premium, and UMD is the high-minus-low momentum premium. We do not include SMB in the regression when we use size as a proxy to define hardtop value stocks. The risk adjusted returns for each month *t* are $R_{x_t}^{adj} = R_{x_t} - \sum_i \beta_{xt} f_{it}$ where R_{x_t} is the raw returns from P10-P1 or ≤0 - ≥0 portfolio for each month *t*, f_{it} is the realization factor *i* in month *t*, and β_{xt} is the estimated factor loading of the time-series of the raw returns of P10-P1 or ≤0 - ≥0 portfolio on the appropriate risk factors and a constant. We define High (Low) sentiment states where the ▲STM in month *t* is positive (negative). We also report the difference in portfolio returns between High and Low sentiment states (H-L). We report average monthly returns in percentage and *t*-statistics in parenthesis.

		CAPM Adjusted Returns		FF plus UMD Factors Adjusted Returns	
	Sentiment	**P1-P10**	**≤0 - ≥0**	**P1-P10**	**≤0 - ≥0**
SIGMA	**High**	**-1.63**		**-0.51**	
		(-4.61)		**(-2.14)**	
	Low	**2.09**		**0.64**	
		(7.83)		**(2.85)**	
AGE	**High**	**1.40**		**0.56**	
		(5.07)		**(2.94)**	
	Low	**-1.73**		**-0.40**	
		(-7.31)		**(-2.22)**	
MV	**High**	**2.16**		**2.21**	
		(6.72)		**(6.95)**	
	Low	**-0.88**		**-0.88**	
		(-3.43)		**(-3.41)**	
E/BE	**High**	**0.38**	**1.26**	0.15	**0.52**
		(2.71)	**(4.46)**	(1.27)	**(2.37)**
	Low	-0.03	**-1.12**	-0.07	**-0.32**
		(-0.23)	**(-5.43)**	(-0.64)	**(-1.66)**
D/BE	**High**	**0.64**	**1.26**	0.10	**0.49**
		(4.67)	**(5.4)**	(0.95)	**(3.17)**
	Low	**-0.56**	**-1.26**	-0.27	**-0.25**
		(-4.64)	**(-6.92)**	(-2.64)	**(-1.69)**
PPE/A	**High**	**0.65**	-0.41	0.29	-0.35
		(2.89)	(-1.48)	(1.58)	(-1.33)
	Low	**-1.49**	**0.52**	**-0.48**	-0.01
		(-7.22)	**(2.22)**	**(-2.89)**	(-0.05)
RD/A	**High**	**1.60**	**-0.38**	**0.41**	**-0.42**
		(4.66)	**(-2.04)**	**(1.80)**	**(-2.89)**
	Low	**-1.03**	**0.38**	-0.22	**-0.27**
		(-3.63)	**(2.51)**	(-1.01)	**(-2.09)**

Table 9: Risk-Adjusted Returns by the Sentiment Dynamics based on Sentiment Changes Index and Firm Characteristics, 1964 to 2014. This Table provides the risk-adjusted returns of P1-P10 and ≤0 - ≥0 portfolios based on firm characteristics and High and Low sentiment states. We regress the returns of P1-P10 and ≤0 - ≥0 portfolios separately on the CAPM (RMRF), and the Fama-French factors (RMRF, SMB, ML) plus a momentum factor (UMD) and a constant to obtain factor loadings (β). RMRF is the excess return of the market, SMB is the small-minus-big size premium, HML is the high-book-to-market-minus-low-book-to-market premium, and UMD is the high-minus-low momentum premium. We do not include SMB in the regression when we use size as a proxy to define hardtop value stocks. The risk adjusted returns for each month *t* are $R_{x_t}^{adj} = R_{x_t} - \sum_i \beta_{xt} f_{it}$ where R_{x_t} is the raw returns from P10-P1 or ≤0 - ≥0 portfolio for each month *t*, f_{it} is the realization factor *i* in month *t*, and β_{xt} is the estimated factor loading of the time-series of the raw returns of P10-P1 or ≤0 - ≥0 portfolio on the appropriate risk factors and a constant. We define H/H (L/L) sentiment state if ▲STM in month *t-1* and *t* are positive (negative). Furthermore, we classify H/L (L/H) sentiment state if ▲STM in month *t*-1 is positive (negative) and ▲STM in month *t* is negative (positive). We report average monthly returns in percentage and *t*-statistics in parenthesis.

		CAPM Adjusted Returns		FF plus UMD Factors Adjusted Returns	
	Sentiment	**P1-P10**	**≤0 - ≥0**	**P1-P10**	**≤0 - ≥0**
SIGMA	**H/H**	**-1.84**		**-0.96**	
		(-4.07)		**(-2.92)**	
	H/L	**1.33**		0.21	
		(3.47)		(0.63)	
	L/L	**-1.41**		-0.05	
		(-2.59)		(-0.14)	
	L/H	**2.92**		**1.08**	
		(8.18)		**(3.57)**	
AGE	**H/H**	**1.07**		**1.07**	
		(4.41)		**(4.41)**	
	H/L	**0.15**		0.15	
		(0.56)		(0.56)	
	L/L	**0.04**		0.04	
		(0.15)		(0.15)	
	L/H	**-0.95**		**-0.95**	
		(-3.94)		**(-3.94)**	
MV	**H/H**	**2.83**		**2.93**	
		(6.69)		**(7.03)**	
	H/L	**-0.28**		**-0.27**	
		(-0.69)		**(-0.67)**	
	L/L	**1.48**		**1.48**	
		(3.09)		**(3.12)**	
	L/H	**-1.49**		**-1.49**	
		(-4.91)		**(-4.88)**	

Table 9: Continued

		CAPM Adjusted Returns		FF plus UMD Factors Adjusted Returns	
	Sentiment	**P1-P10**	**≤0 - ≥0**	**P1-P10**	**≤0 - ≥0**
E/BE	**H/H**	**0.45**	**1.71**	0.18	**1.08**
		(2.21)	**(4.68)**	(1.06)	**(3.6)**
	H/L	0.16	**-0.56**	0.15	0.07
		(0.94)	**(-1.88)**	(0.99)	(0.25)
	L/L	0.31	**0.81**	0.12	-0.03
		(1.61)	**(1.88)**	(0.72)	(-0.1)
	L/H	-0.19	**-1.73**	**-0.26**	**-0.74**
		(-1.22)	**(-6.32)**	**(-1.73)**	**(-2.69)**
D/BE	**H/H**	**0.78**	**1.53**	0.22	**0.89**
		(4.05)	**(5.36)**	(1.49)	**(4.2)**
	H/L	**-0.43**	**-0.63**	-0.20	0.15
		(-2.33)	**(-2.42)**	(-1.32)	(0.70)
	L/L	**0.50**	**1.00**	-0.02	0.09
		(2.56)	**(2.69)**	(-0.10)	(0.40)
	L/H	**-0.69**	**-1.90**	**-0.34**	**-0.65**
		(-4.45)	**(-7.74)**	**(-2.48)**	**(-3.19)**
PPE/A	**H/H**	**1.02**	-0.19	**0.92**	-0.32
		(3.67)	(-0.45)	**(3.76)**	(-0.80)
	H/L	**-0.99**	-0.06	-0.21	-0.48
		(-3.58)	(-0.17)	(-0.95)	(-1.49)
	L/L	0.28	-0.63	-0.34	-0.39
		(0.79)	(-1.68)	(-1.28)	(-1.10)
	L/H	**-2.00**	1.11	**-0.75**	0.47
		(-6.61)	(3.47)	**(-3.07)**	(1.50)
RD/A	**H/H**	**2.05**	0.03	**0.98**	-0.23
		(4.59)	(0.14)	**(3.26)**	(-1.24)
	H/L	-0.42	0.31	0.34	-0.22
		(-1.01)	(1.34)	(1.12)	(-1.11)
	L/L	**1.17**	**-0.78**	-0.15	**-0.61**
		(2.24)	**(-2.62)**	(-0.45)	**(-2.71)**
	L/H	**-1.70**	**0.46**	**-0.82**	**-0.32**
		(-4.43)	**(2.32)**	**(-2.65)**	**(-1.98)**

Table 10: Monthly Returns by Current Sentiment and Firm Characteristics, 1964 to 2014. In each month *t*, we form decile portfolios according to the NYSE breakpoints of firm age, equity (ME), volatility, earnings to book ratio for profitable firms (E+/BE), dividend-book ratio for dividend payers (D/BE), fixed assets (PPE/A) and research and development (RD/A). We also calculate portfolio returns of unprofitable firms, non-dividend paying firms, zero PP&E firms, and firms with zero R&D expenses. We report average portfolio returns in High and Low sentiment states. We define High (Low) sentiment states using ▲VIX, ▲PC, and BBS. For ▲VIX and ▲PC, a negative (positive) change defines High (Low) sentiment state. For BBS, a positive (negative) change defines High (Low) sentiment state. We also report the difference in portfolio returns between High and Low sentiment states (H-L). We report average monthly returns in percentage and *t*-statistics in parenthesis.

Sentiment Proxy		N	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P1-P10
VIX	High	122	1.67	2.02	2.13	2.48	2.74	2.81	3.16	3.40	4.00	4.72	-3.05
			(6.57)	(6.57)	(6.05)	(6.31)	(6.63)	(6.41)	(6.29)	(6.29)	(6.39)	(5.66)	(-4.17)
	Low	108	0.44	0.12	-0.06	-0.32	-0.34	-0.53	-0.61	-0.99	-1.36	-2.57	3.01
			(1.56)	(0.35)	(-0.16)	(-0.8)	(-0.79)	(-1.19)	(-1.19)	(-1.79)	(-2.19)	(-3.17)	(4.22)
	H-L		1.23	1.91	2.19	2.80	3.08	3.34	3.77	4.39	5.35	7.29	-6.06
			(3.25)	(4.20)	(4.26)	(4.97)	(5.14)	(5.32)	(5.23)	(5.66)	(6.06)	(6.23)	(-5.9)
PC	High	159	1.90	2.32	2.48	2.76	3.00	3.05	3.32	3.48	3.87	4.45	-2.55
			(11.02)	(11.28)	(10.2)	(9.93)	(10.18)	(9.50)	(9.17)	(8.51)	(8.18)	(6.66)	(-4.24)
	Low	140	0.11	-0.20	-0.42	-0.54	-0.62	-0.77	-0.82	-1.10	-1.20	-1.95	2.06
			(0.44)	(-0.66)	(-1.26)	(-1.46)	(-1.6)	(-1.89)	(-1.74)	(-2.24)	(-2.12)	(-2.73)	(3.29)
	H-L		1.79	2.52	2.90	3.29	3.62	3.82	4.14	4.59	5.07	6.40	-4.62
			(5.93)	(6.92)	(7.10)	(7.26)	(7.53)	(7.44)	(7.08)	(7.21)	(6.91)	(6.55)	(-5.30)
BBS	High	233	1.43	1.57	1.63	1.79	1.93	1.94	2.06	2.10	2.33	2.57	-1.14
			(8.45)	(7.66)	(7.48)	(7.41)	(7.31)	(6.96)	(6.50)	(6.00)	(5.66)	(4.46)	(-2.18)
	Low	96	0.02	-0.13	-0.29	-0.42	-0.55	-0.72	-0.69	-0.96	-1.06	-1.95	1.97
			(0.06)	(-0.29)	(-0.57)	(-0.75)	(-0.95)	(-1.16)	(-1.02)	(-1.36)	(-1.38)	(-2.28)	(3.16)
	H-L		1.41	1.70	1.92	2.21	2.48	2.66	2.75	3.07	3.39	4.52	-3.11
			(4.15)	(4.01)	(4.08)	(4.24)	(4.48)	(4.53)	(4.17)	(4.31)	(4.19)	(4.30)	(-3.43)

Table 11: Sentiment Dynamics (Sentiment Changes Index)) and Monthly Returns based on Firm Characteristics, 1964 to 2014. In each month *t*, we form decile portfolios according to the NYSE breakpoints of firm age, equity (ME), volatility, earnings to book ratio for profitable firms (E+/BE), dividend-book ratio for dividend payers (D/BE), fixed assets (PPE/A) and research and development (RD/A). We also calculate portfolio returns of unprofitable firms, non-dividend paying firms, zero PP&E firms, and firms with zero R&D expenses. We report average portfolio returns based on sentiment dynamics. We define H/H, H/L, L/L and L/H sentiment state using ▲VIX, ▲PC, and BBS. H/H (L/L) represents sentiment continuation in High (Low) states, while H/L (L/H) captures the transition in sentiment from High to Low (Low to High) states. For ▲VIX and ▲PC, a negative (positive) change defines High (Low) sentiment state. For BBS, a positive (negative) change defines High (Low) sentiment state. We report average monthly returns in percentage and *t*-statistics in parenthesis.

Sentiment Proxy		N	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P1-P10
VIX	H/H	56	2.08	2.73	3.03	3.72	4.04	4.26	4.93	5.34	6.16	7.66	-5.59
			(5.89)	(6.39)	(6.01)	(7.07)	(7.44)	(7.44)	(7.45)	(7.88)	(8.05)	(7.62)	(-5.93)
	H/L	67	0.61	0.12	0.00	-0.22	-0.25	-0.49	-0.46	-0.75	-1.01	-2.06	2.67
			(1.63)	(0.29)	(0.00)	(-0.43)	(-0.44)	(-0.84)	(-0.67)	(-1.03)	(-1.23)	(-1.83)	(2.65)
	L/L	66	0.12	0.06	-0.23	-0.54	-0.56	-0.65	-0.92	-1.46	-2.02	-3.55	3.67
			(0.28)	(0.1)	(-0.37)	(-0.82)	(-0.80)	(-0.89)	(-1.15)	(-1.69)	(-2.14)	(-3.18)	(3.94)
	L/H	40	1.33	1.42	1.36	1.44	1.64	1.57	1.66	1.75	2.17	2.23	-0.90
			(3.69)	(3.32)	(2.88)	(2.63)	(2.82)	(2.57)	(2.40)	(2.29)	(2.40)	(1.84)	(-0.87)
PC	H/H	85	2.01	2.42	2.64	2.98	3.28	3.26	3.77	4.04	4.49	5.40	-3.39
			(9.19)	(8.72)	(7.54)	(7.84)	(8.18)	(7.65)	(7.61)	(7.41)	(7.44)	(6.40)	(-4.42)
	H/L	75	0.10	-0.28	-0.42	-0.48	-0.54	-0.66	-0.82	-1.04	-1.06	-2.04	2.14
			(0.28)	(-0.71)	(-1.01)	(-1.06)	(-1.09)	(-1.27)	(-1.39)	(-1.62)	(-1.45)	(-2.17)	(2.60)
	L/L	65	0.13	-0.12	-0.43	-0.60	-0.72	-0.91	-0.81	-1.18	-1.37	-1.84	1.98
			(0.34)	(-0.24)	(-0.78)	(-1.01)	(-1.16)	(-1.39)	(-1.09)	(-1.54)	(-1.53)	(-1.68)	(2.05)
	L/H	74	1.77	2.19	2.29	2.50	2.67	2.80	2.81	2.85	3.15	3.36	-1.59
			(6.50)	(7.17)	(6.85)	(6.14)	(6.17)	(5.76)	(5.31)	(4.64)	(4.27)	(3.19)	(-1.69)
BBS	H/H	192	1.40	1.44	1.42	1.55	1.67	1.64	1.68	1.68	1.88	1.93	-0.53
			(7.43)	(6.49)	(6.12)	(6.12)	(5.97)	(5.63)	(5.02)	(4.59)	(4.30)	(3.15)	(-0.95)
	H/L	41	0.00	-0.36	-0.41	-0.72	-0.82	-1.03	-1.10	-1.59	-1.75	-3.20	3.20
			(-0.01)	(-0.6)	(-0.63)	(-0.99)	(-1.15)	(-1.28)	(-1.37)	(-1.79)	(-1.82)	(-2.89)	(3.93)
	L/L	55	0.03	0.05	-0.20	-0.20	-0.35	-0.48	-0.38	-0.50	-0.55	-1.02	1.05
			(0.08)	(0.08)	(-0.27)	(-0.25)	(-0.40)	(-0.54)	(-0.37)	(-0.47)	(-0.48)	(-0.82)	(1.18)
	L/H	41	1.57	2.21	2.59	2.92	3.17	3.35	3.83	4.07	4.43	5.55	-3.98
			(4.06)	(4.16)	(4.52)	(4.33)	(4.42)	(4.32)	(4.54)	(4.23)	(4.10)	(3.73)	(-3.06)

Figure 1: Monthly Returns Sorted on Sentiment States (BW Index) and Firm Characteristics, 1964 to 2014. In each month *t*, we form decile portfolios according to the NYSE breakpoints of volatility, age, market equity (ME), earnings to book ratio for profitable firms (E+/BE), dividend-book ratio for dividend payers (D/BE), fixed assets (PPE/A), and research and development (RD/A) expenses. We also calculate portfolio returns of unprofitable firms, non-dividend paying firms, zero PP&E firms, and firms with zero R&D expenses. The black (grey) bars are returns during High (Low) sentiment states. We define High (Low) sentiment states based on the months where the Baker and Wurgler sentiment changes index is positive (negative).

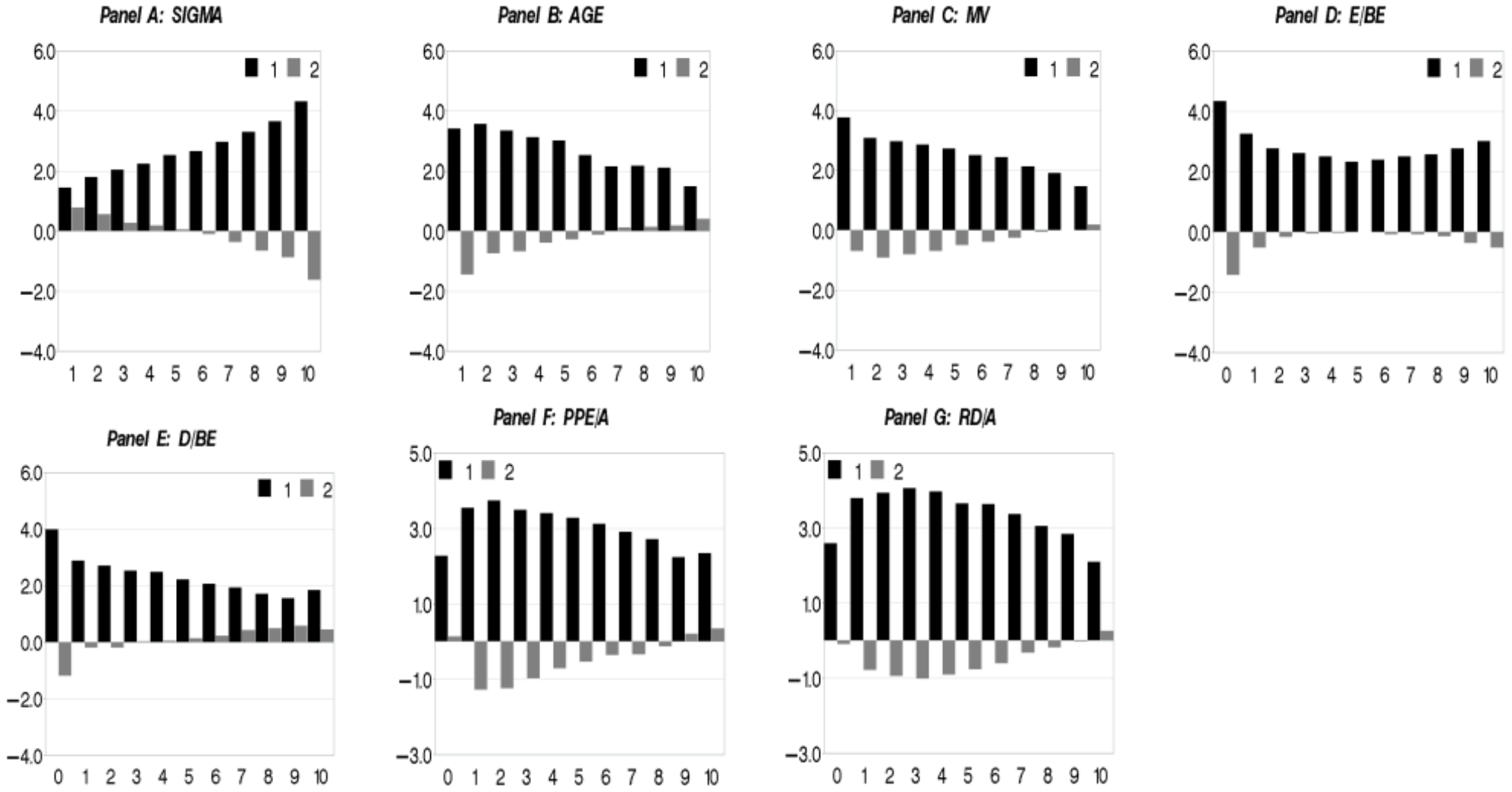

Figure 6: Monthly Returns Sorted on Sentiment Dynamics and Firm Characteristics, 1964 to 2014. In each month *t*, we form decile portfolios according to the NYSE breakpoints of volatility, age, market equity (ME), earnings to book ratio for profitable firms (E+/BE), dividend-book ratio for dividend payers (D/BE), fixed assets (PPE/A), and research and development (RD/A) expenses. We also calculate portfolio returns of unprofitable firms, non-dividend paying firms, zero PP&E firms, and firms with zero R&D expenses. The black (grey) bars are returns in H/H (H/L) sentiment states. The red (green) bars are returns in L/H (L/L) sentiment states. We define H/H (L/L) sentiment state if ▲STM in month t-1 and t are positive (negative). Furthermore, we classify H/L (L/H) sentiment state if ▲STM in month t-1 is positive (negative) and ▲STM in month t is negative (positive).