ERASMUS UNIVERSITY ROTTERDAM
ERASMUS SCHOOL OF ECONOMICS

INVESTOR SENTIMENT AND EXPECTED RETURNS: EXPLAINING THE VALUE PREMIUM

Roger van den Oord
Student number: 386902
Supervisor: Dr. M. Montone
MSc Economics & Business
Specialisation Financial Economics

Abstract

In this paper I study the effect of investor sentiment on the value premium. Instead of using realized returns, my main analysis concerns expected returns. My main prediction is that investor sentiment affects the expectations investors have about their investments and that higher investor sentiment leads to higher expectations of the risky value stocks and lower expectations of the growth stocks. The expected value premium is found to be an annualized 3.4%. Second, investor sentiment has a positive relationship with the value premium. Third, the sentiment has a strong negative effect on the short leg and a less strong positive effect on the long leg of the value strategy.

Contents

1 Introduction

Stock market sentiment goes back a long way, Keynes (1936) argued in his General Theory that the stock market investors could be driven by so-called 'animal spirits', which can cause stock market prices to depart from fundamentals. This behavioural view on the stock market has often been criticized by the classical argument that rational traders, arbitrageurs, could exploit the mispricing and bring the prices back to fundamental value. There are however documented obstacles that may limit the effectiveness of these arbitrageurs and allow the (sentiment-driven) mispricing to persist, examples of those obstacles are the limits-to-arbitrage. These would lead to investor sentiment having significant effect on returns in the cross-section and along that line, also on the existence of stock market anomalies.

The value premium is an example of a stock market enigma that has often been classified as the result of persisting mispricing. 'Value' stocks, stocks which have a high book value compared to market value, consistently yield higher returns than growth stocks, stocks that have a low book value compared to their market value. The return difference between these two groups of stocks is called the value premium and its existence has been ever-puzzling academics.

The explanations for the value premium can be split up in two main categories. The first category is the rational expectations approach, which argues that the value premium represents the difference in risk between distressed firms (value) and well-performing firms (growth). The other category is of a behavioral nature, stating that the value premium does not represent risk. They argue that the value premium arises due to mispricing caused by relative over- and undervaluation, which is then not arbitraged away. Aside from these two categories there exists another strand of literature that even states that the value premium is merely a statistical phenomenon. Recent research however, has found that the value premium is still very much alive, having an annualized premium of 6.1% (Chen et al., 2008).

With a few exceptions, no work has been done in the intersection of the value premium and investor sentiment. In this paper I aim to change this lack of research and provide insights in the source of the (expected) value premium by examining the relational effect of investor sentiment. This research therefore contributes to both the value premium and investor sentiment strands of contemporary literature and tries to connect both concepts, which I could not find in preceding literature.

Chen et al. (2008) provide evidence that the expected value premium is alive and significant, I use their methodology to calculate expected returns to investigate the presence of the value premium, both expected and realized in the US stock market for the period 1965-2015. Then using the investor sentiment index created by Baker and Wurgler (2006) I investigate the differences in value premium returns following high or low sentiment months. Finally I also split up the value premium in the short and long leg and use predictive regressions of investor sentiment to shed a light on the source of the relationship between investor sentiment and the value premium.

I formulate three hypotheses. The first hypothesis is that, in line with earlier literature, there is a positive expected value premium in the US stock market in the period 1965-2015. I find that there is an average annualized expected value premium of 3.4% and that the expected value premium is positive for almost the whole period. The expected value premium exists for both a single sort on Book-to-Market (B/M) and the double sort on B/M and size.

The second hypothesis is that there is a positive relationship between investor sentiment and the expected value premium. This is based on the notion first described in (Baker and Wurgler, 2006) that investor sentiment has effects on stocks which are hard to value and the notion in (Stambaugh et al., 2012) that investor sentiment can lead to over- and undervaluation. This would

manifest itself in the expected value premium through deviating expectations regarding value and growth stocks during times of high and low sentiment. My main prediction is that in times of high sentiment, value stocks become subject to higher expectations regarding returns at the expense of the expectations regarding growth stocks. The expected value premium should therefore be stronger following high sentiment months than following low sentiment months. My findings confirm this relationship, the expected returns, both raw and benchmark-adjusted, for the value strategy are higher following high sentiment months. This is then again confirmed by a predictive regression of lagged sentiment on value returns. Investor sentiment shows to have a reverse, less strong, effect on the realized value premium, which is in line with earlier research.

My last hypothesis is that the difference in value premium should be related to both the long and the short leg of the value strategy. This is contrary to Stambaugh, Yu and Yuan (2012) who argue that the sentiment-driven overvaluation leads to higher negative returns in short legs of anomalies because of limits-to-arbitrage. This does not hold for expected returns because expectations should not be strongly effected by limits-to-arbitrage. I find limited evidence for this hypothesis, as it holds only for the double-sorted value strategy. In the single sort the sentiment effect seems to be driven by the short leg only. This indicates that expected returns for the growth stocks are especially low during times of higher sentiment.

The paper the closest to mine is (Stambaugh et al., 2012) that researches the effect of investor sentiment on 11 well-documented market anomalies. They find a positive relationship between these anomalies and investor sentiment, stemming from the short leg due to limits-to-arbitrage. They also look at the value premium but find an insignificant reverse effect of investor sentiment. They conclude that the insignificant effect can either be caused by the extreme risk profiles in the extremes of the B/M portfolios or that the stocks in both extremes are affected by sentiment in the same manner. The key difference between my research and theirs is that my main research topic is the value premium whereas they only quickly touch this subject. Furthermore, I make use of expected returns and compare these to the realized returns to investigate the source of the value premium.

The rest of this paper is structured as follows: Section 2 reviews relevant literature regarding the value premium and investor sentiment. Section 3 describes the methodology used to obtain expected returns, the portfolio formation and how the effect of investor sentiment will be tested. Section 4 describes my databases and data transformations. In Section 5 my results will be shown, they are provided in the same order as the hypotheses. Section 6 concludes and provides limitations and suggestions for further research.

2 Literature Review

2.1 Value premium

Often documented and disputed, the value premium is still a hot topic for research. Investing in relatively undervalued stocks has been around for a long time with Graham and Dodd (1934) opting for value investing in their world famous Security Analysis. Basu (1977) made one of the first documentations of the value premium and found that low Price-to-Earnings (P/E) stocks outperform high P/E stocks and concluded that this phenomenon represents a violation of the efficient market hypothesis. Rosenberg, Reid and Lanstein (1985) were the first to document the value premium by (B/M) as a proxy for value.

A lot of literature since then documented the existence of this value premium, one of the most recent analyses has been done in (Chen et al., 2008). Using expected returns instead of realized returns by applying the (Fama and French, 2002) method to estimate equity premium, they find that value stocks still earn significant premium over growth stocks in both a single sort on B/M or a double sort on B/M and size. Their premium is 6,1% per annum over the period 1945-2005. The existence of this premium is therefore undisputed, however its true origin is still shrouded in mystery. The explanations can be classified as either belonging to the risk-based explanation or the mispricing-based explanation.

2.1.1 Risk

Perhaps the oldest approach to explaining the value premium is the risk-based explanation. This approach starts out with the classical rational expectations and efficient markets arguments. The main notion is that value premium arises because of a kind of risk that is not captured through market risk which investors process in their expectations. This risk can be modeled through the creation of a factor-mimicking portfolio (Fama and French, 1992). This portfolio, called High-Minus-Low (HML) can be added to the standard CAPM market excess return together with the small firm factor (SMB) in order to explain stock returns. The resulting three factor model does a decent job at explaining the cross-section of stock returns and the value premium is subsumed in the factor-mimicking portfolio. Explanatory power of the model has also been documented for markets outside the US (Fama and French, 1998). This explanation was disputed by literature which stated that the value premium is merely a statistical bias or the explanation that the value premium is caused by firm characteristics rather than risk (Davis et al., 2000).

Consistent with the risk-based framework is the thought that the value premium is caused by riskiness of value stocks in bad periods. This effect comes from the unproductive capital that value firms have which cannot be used during bad periods. Furthermore it is less costly to expand than to cut (Zhang, 2005). Other preceding literature states that value firms have more unproductive capital which makes them riskier in times of low sentiment. This is also consistent with other literature findings that sentiment influences investment and that investment during periods of market downturns predicts profitability (McLean and Zhao, 2014).

2.1.2 Mispricing

Another strand of literature does not regard the value premium as a risk phenomenon but rather has a behavioural explanation. That is, the value premium is a form of mispricing caused by irrationality in the market and is not arbitraged away due to limits-to-arbitrage. The effects of limits-to-arbitrage and deviating expectations were first argued by Miller (1977). Noise trader risk is one of these limits-to-arbitrage, established by Delong et al (1990).

One of the first inquiries into this matter was done by DeBondt and Thaler (1985). They lend views from Basu (1977) who proposes the idea that low P/E firms are underpriced because investor react overly pessimistic to bad news regarding these firms. They do not aim to find the main cause for mispricing, but rather investigate whether the market overreacts to good and bad news, which leads to over- and underpricing. They look at the CAR's for 36 months for stocks that were past winners or past losers and find that the past losers outperform the market by 19.6% whereas winner portfolios lose 5.0% compared to the market. They find that the effect is the strongest in January, however the effect is distant from the January effect and increases when the formation period is increased. Furthermore the loser portfolios are shown to have lower beta so they have less CAPM risk.

Lakonishok, Shleifer and Vishny (1994) applied a behavioural approach to the value strategy, which they call the contrarian strategy. Testing for 5 year holding period returns, they find that value strategies always outperform the market and are not riskier. They find strong presence of B/M effect with value stocks outperforming glamour stocks by 10.5% each year on average. They test different value measures and find that cashflow measures value effect more accurately because it is a better proxy for future earnings, that the P/E effect is smaller and that Growth of Sales could be another proxy for value and growth.

They argue that base rate fallacy and inability to account for mean reversion leads to profitability in the value strategy. They then test the effect of using double classification (so combining E/P with GS for instance) and find that the more precise classification allows the value effect to increase. Value strategies based on both future expectations and past earnings provide stronger value effect, but also the effect of B/M is subsumed by E/P, C/P and GS. Their results apply to the largest stocks as well.

Furthermore they find that the value effect is distinct from momentum since it shows that people overestimate past growth rates of glamour stocks, which only hold for a few more years and then drop. Lastly they find evidence that value strategies are also not riskier since they perform even better in bad states of the market and are shown to have higher up market potential and less down market potential. As a reason for the value premium they propose that individual investors look too much at recent historical data or get pushed by brokers. Institutional investors on the other side invest in prudent strategies which often lead to the exclusion of financially distressed firms in their investments. Institutional investors also could have short horizons which make investing in value strategies that take 4-5 years to pay off (large tracking error) seem unattractive.

Another support for this theorem is provided by Ali, Hwang and Trombley (2003) who find that the Book-to-Market effect is stronger for firms with higher arbitrage risk, measured through stock market historical volatility residuals, which is consistent with the mispricing story.

2.2 Investor sentiment and returns

As stated above, the investor sentiment literature focuses on irrationality in the market which can lead to mispricing. Baker, Stein and Wurgler (2003) for instance find that sentiment matters for when investment decisions are made, especially for equity dependent firms. McLean and Zhao (2014) find this same effect of investor sentiment, they also control for the business cycle. They also find that investment during times of low sentiment is a strong predictor for future profitability.

Baker and Wurgler (2006) investigate the cross-sectional effect of investor sentiment and stock returns and argue that investor sentiment causes mispricing through 2 channels. These are limits to arbitrage and an uninformed demand shock. In the case of an uninformed demand shock, the propensity to speculate varies. In times of a bubble (sentiment is high), stocks that are very hard

to value (young, risky, unprofitable, extreme growth) may be subject to very optimistic projections and therefore be selected more easily. They then take the stand that stocks are selected according to certain characteristics that matches investors' sentiment.

With regard to limits-to-arbitrage they state that the same hard to value, risky stocks are likely to have weaker arbitrage because their high idiosyncratic risk makes arbitrage very risky. Also the stocks can be costly to trade and short-selling might even be impossible. Their theory implies that in practice, the same stocks that are subject to effects of uninformed demand stocks are the same stocks with strong limits to arbitrage. This makes this particular set of stocks vulnerable to investor sentiment.

To study the effects of investor sentiment they create a composite investment sentiment index which lines up with historical episodes of high and low activity in financial markets. This index is formed using Closed-End Fund Discount, NYSE share turnover, Number of IPO's, average first-day IPO return, share of equity issues in total debt and equity issues and dividend premium.

Their general finding is that average returns seem to be higher following times of low sentiment. They also find that investors demand younger (more speculative) stocks when sentiment is high and older stocks when sentiment is low. When sentiment is high, riskier stocks earn lower returns and when sentiment is low, these stocks have weaker performance. This is according to them related to hard-to-value and speculative stocks being prone to fluctuations in sentiment.

They also find significant effects of investor sentiment on both the size and value factors as well as that when sentiment is high, subsequent returns are low on stocks judged harder for investors to price: small-cap stocks as well as stocks at both extremes of the value-growth spectrum. Many researchers argue, however, that the size and value factors are not solely the result of mispricing but instead reflect priced systematic risks not captured by the CAPM. In that case, small-cap stocks and value stocks can be relatively overpriced following high sentiment while still delivering higher expected returns than other stocks due to their greater exposure to systematic risks.

Stambaugh, Yu and Yuan (2012) research the effect of investor sentiment on a set of 11 different anomalies. Their rationale is that impediments to short-selling prevent prices from being corrected and this leads to mispricing in the form of overpricing. Periods of high investor sentiment then naturally should be accompanied by higher overpricing. Therefore they predict that high investor sentiment should lead to stronger presence of well-documented anomalies. Their second prediction is that due to the overpricing the effect of investor sentiment is concentrated in the short leg of corresponding anomaly. The short leg of each anomaly should be more overpriced in times of high sentiment and thus should the profits of the anomaly stem from the short leg, which effect is greater in times of high sentiment.

Their third prediction is that the long leg of the anomaly should not have different returns following high or low sentiment periods. The stocks in those legs are unlikely to be underpriced and could be overpriced following the high sentiment period, however this should be small compared to the short leg of the anomaly.

They find that high year-end sentiment has a positive effect on the anomalies. They find significant results in line with all three of their predictions, using both excess returns and benchmark-adjusted returns, providing strong evidence for their mispricing story. They also control for asymmetry in sentiment compared to asymmetry in pricing by taking the University of Michigan's Consumer Sentiment Index as another proxy for investor sentiment, however the results do not change.

They furthermore investigate the effect of investor sentiment on the (Fama and French, 1993) factors: Rm, SMB and HML, to examine the relation between systemic risk and investor sentiment. They find reverse effects for market beta and investor sentiment, which they conclude is in line

with the story that investors tend to be most optimistic about improvement of the economy when investment is high which translates to high beta stocks. As for the size effect they find the same results as Baker and Wurgler (2006) namely that investor sentiment has a strong effect on small stocks.

With regard to the value premium, they find that investor sentiment has no significant effect on the returns of this anomaly. Curiously, they do not find any evidence for the existence of the value premium at all, as in neither the period following low sentiment or high sentiment is there a value premium present. They attribute their findings to two possible explanations. That either the value premium is a proxy for systemic risk and that the results are an indicator of the confounding effects of risk and mispricing. Or that the stocks in the extremes of the value premium legs are more likely to be mispriced, which explains the absence of the return pattern. The conundrum in their findings is that they do find effects for financially distressed anomalies but not for the value effect, although a lot of literature links these two concepts.

3 Methodology

3.1 Expected returns

In this paper I look at the value premium ex-ante. That is, if there exists an expected value premium. I calculate the expected value premium using expected returns just like Chen, Petkova and Zhang (2008). The expected returns they, and I, use are not based on actual average stock returns but rather on expected dividend and capital growth. Fama and French (2002) have pioneered with this method in order to calculate the expected equity premium.

The basis of this model is the following formula which is in turn based on the Gordon Growth Model. The expected stock returns is the expected dividend-price ratio plus the expected rate of capital gain:

$$\mathrm{E}[R_t + 1] = \mathrm{E}\left[\frac{D_{t+1}}{P_t}\right] + \mathrm{E}\left[\frac{P_{t+1}}{P_t}\right]$$

The main assumption supporting the use of this technique is that the dividend-price ratio is stationary and therefore mean-reverting. If this is the case, the dividend growth compound rate approaches the capital gain compound rate. Their resulting formula, which I use for my expected returns, is based on the more complex model used by Blanchard (1993) with the main difference being that they, and I, do not use conditional values.

The authors give several reasons for using this method to calculate expected returns instead of average returns. First of all, they argue that average returns are noisy and do not converge to expected returns in the long run. Furthermore, this method utilizes economic fundamentals, which should provide more accurate estimates, whereas average returns are not based on economic fundamentals.

Taking the above into account, the formula to calculate expected returns becomes the following:

$$\mathrm{E}[R_t + 1] = \mathrm{E}\left[\frac{D_{t+1}}{P_t}\right] + \mathrm{E}[Ag_{t+1}]$$

Where Ag_{t+1} is the long-run dividend growth rate:

$$\mathrm{E}[Ag_{t+1}] = \left[\frac{\overline{r} - \overline{g}}{1 + \overline{r}}\right] \sum_{i=0}^{\infty} \left[\frac{1 + \overline{g}}{1 + \overline{r}}\right]^i g_{t+i+1}$$

Were $\overline{r}$ and $\overline{g}$ are the sample average real stock return and sample average real growth rate of dividends respectively. g_{t+i+1} is the dividend growth rate from period t + i to t + i +1. Just like in (Chen et al., 2008) in practice a finite sum of 100 periods is used to account for the unlimited annuity. Dividend growth rates after 2010 equal the average 1962-2010 dividend growth rate. Dividend growth g is calculated using the following formula:

$$g_{t+1} = \left(\frac{\frac{D_{t,t+1}}{P_t}}{\frac{D_{t-1,t}}{P_{t-1}}}\right) - 1$$

Chen et al (2008) and Fama and French (2002) make use of real values because, they argue, the goal of investment is consumption. However Fama and French (2002) repeat their analysis with

nominal values, which yields the same outcomes. For the sake of simplicity I utilize nominal values in my estimation.

3.2 Value premium and returns

A lot of literature has been written about the value premium in the US stock market. The most prevalent measure for the value premium is the Book-to-Market ratio (B/M). B/M will also be my main measure for the value premium in this research. However to get a broader view on the effect of investor sentiment, another value premium measure is added. This is P/E, which has also been often documented in the literature as a value measure.

The classic (Fama and French, 1993) high-minus-low (HML) value portfolio is used to generate the value premium returns. Portfolio creation is done in line with their methods using a 2x3 double sort on size, which is the median sample size and book-to-market which is done by creating three groups, the bottom 30% (low), the middle 40% (medium) and the op 30% (high) of the Book-to-Market ranking. This way I obtain six portfolios (S/L, S/M, S/H, B/L, B/M and B/H), where the B/H portfolio for instance contains the large stocks that also have a high book-to-market ratio. The value strategy, HML, then becomes (S/H + B/H)/2 - (S/L + B/L)/2. Returns from the expected value premium are either equally weighted or value weighted in order to control for size affecting the expected returns.

I differ from Fama and French (1993) and follow Chen et al (2008) in the timing of the portfolio construction. The latter use the end of December rather than the end of June for each year t to form portfolios, which I do as well. Next to that, book equity is taken from the year ending t-1, which I then divide by the market equity at the end of December year t. The portfolios is held for one year before being rebalanced again at the ending of the year.

In addition to this portfolio I follow Chen et al (2008) and create a single sort on book-to-market consisting of quintiles. The value strategy then becomes Quintile 5 – Quintile 1 and shall be named P5-1.

The P/E value proxy portfolios are calculated in a slightly different way. For each observation, both price and earnings-per-share (EPS) are taken from December in the year t-1. This timing is applied because investors usually do not have the most recent EPS information available at the time when they make their investment decisions.

Portfolio creation resorts to a single sort into quintiles based on P/E. Low P/E stocks should be analogous to high B/M stocks, as also found in (Fama and French, 1995), that is subtracting portfolio 5 (the one with the highest P/E) from portfolio 1 (the portfolio with the lowest P/E) in order to obtain the strategy I shall call P1-5.

Raw returns from the value strategies will be compared following high and low sentiment. Benchmark-adjusted returns will also be compared. The CAPM of Sharpe (1964) and Lintner (1965) will be used. The CAPM alphas will be compared which are estimated using the following traditional formula:

$$R_{i,t} = a_{i,t} + \beta_{i,t}\text{MKT} + \epsilon_{i,t}$$

Where MKT is the excess market return factor as obtained from Kenneth French's website. The value of alpha from the high minus the low portfolios from both the single and double sort strategies will be of interest in this study.

To improve the rigour of the asset pricing tests, the (Fama and French, 1992) small-minus-big (SMB) and high-minus-low (HML) factors are added. Regressing the raw returns on the market excess return and these two additional factors allows me the calculate the three factor alpha:

$$R_{i,t} = a_{i,t} + \beta_1 \text{MKT} + \beta_2 \text{SMB} + \beta_3 \text{HML} + \epsilon_{i,t}$$

The returns from the strategies are regressed on the market return to obtain CAPM and three-factor betas and alphas.

3.3 Investor sentiment and interaction

Investor sentiment is measured through the SENTIMENT⊥ index constructed in (Baker and Wurgler, 2006). Their index, as described in the literature section, is a composite index consisting of six elements and the index lines up with almost all historical accounts of high investor sentiment. As of the latest update, the index only consists of five elements, as NYSE share turnover was dropped. This indicator, they state, no longer lines up with the other indicators in measuring investor sentiment. Since different indicators may have different timing relationships to investor sentiment, the index is formed on either current or lagged values from each indicator, which ever one has the highest correlation with the first-stage index. In the end, SENTIMENT is defined as the first principal component in the correlation matrix of all the indicators where each indicator has been standardized, this means that the SENTIMENT index is standardized as well.

The resulting index has a lot of appealing attributes, however there was one source of major concern. The index could not make a distinction between investor sentiment effects and common business cycle effects. To overcome this issue, SENTIMENT is regressed on various macroeconomic variables and as a result the sentiment index is orthogonalized, which results in the SENTIMENT⊥ index. When using both indices in their tests, the results however did not differ depending on which of the two sentiment indices was used. The plot of SENTIMENT⊥ can be found in figure 1.

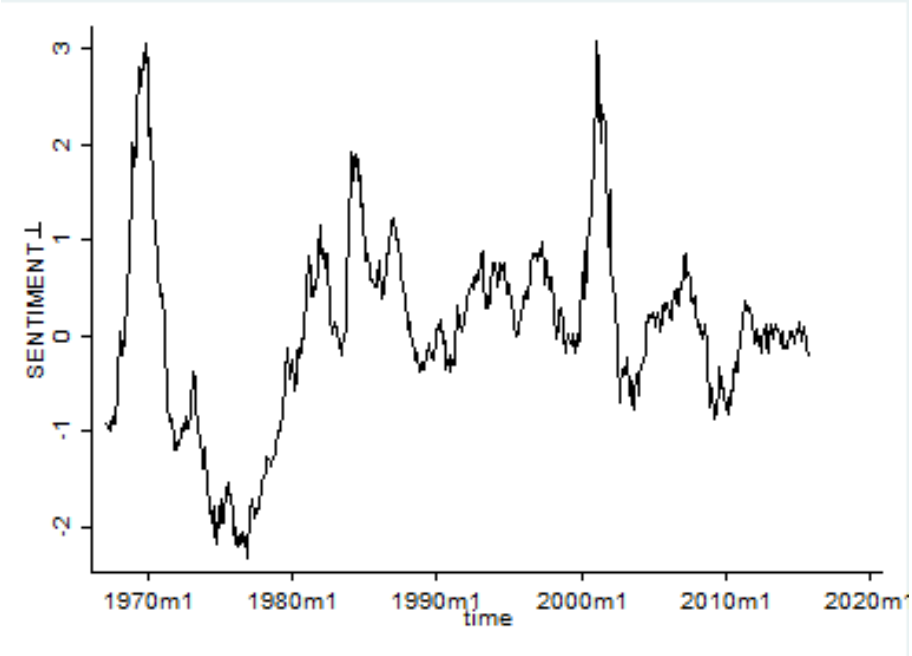

Figure 1: The SENTIMENT⊥ index in the period 1965-2015. The SENTIMENT⊥ index is the first principal component of six measures: the closed-end fund discount, NYSE share turnover, the number of and the average of first-day returns on initial public offerings, the equity share in new issues, and the dividend premium.

Finally to test for the effect of investor sentiment on the expected value premium, I follow Stambaugh, Yu and Yuan (2012) who classify returns as following either a high sentiment month

or a low sentiment month. A high sentiment month is a month where the SENTIMENT$\perp$ index of previous month was above the sample median and a low sentiment month is a month with below-median values. The expected returns, both raw and benchmark-adjusted, are then computed separately for both low sentiment months and high sentiment months. Stambaugh, Yu and Yuan (2012) find that their anomalies are stronger following high sentiment months. In line with their findings I also predict a positive relation between expected returns and investor sentiment, as in times of high sentiment the riskier high B/M stocks are more prone to speculation and investors expect higher returns because they are in a period of high sentiment.

To check the results obtained by comparing the differences from low and high sentiment months a predictive regression is run. One-month lagged SENTIMENT$\perp$ is regressed on the monthly returns from the HML strategy as well as the P5-1 strategy:

$$R_{i,t} = a_{i,t} + \beta_{i,t} S_{t-1} + \epsilon_{i,t}$$

Where R is the raw EW/VW monthly return from either the HML or the P5-1 strategy and $S_(t-1)$ is the one month lagged sentiment index. In line with my hypotheses, the beta coefficient should be positive, indicating that high lagged sentiment leads to higher returns for the value strategy.

To extend my analysis and in order to investigate the source of the value premium during high and low sentiment periods, I follow Stambaugh, Yu and Yuan (2012) by splitting op the value returns in both the returns from the long leg and the short leg. Lagged sentiment is then regressed on the long leg and short leg returns separately. Stambaugh, Yu and Yuan (2012) find that the coefficient from sentiment only has a significant effect on the short leg of different strategies. Therefore they conclude that the excess returns from these strategies stem from limits to arbitrage on the short leg, which disables investors to short the stocks that become overvalued during periods of high sentiment. Since the expected premium is arguably not caused by limits to arbitrage but rather by deviating expectations about the future, I would not expect the expected value premium to only stem from the short leg but rather from both short and long legs.

This leads to the following hypotheses:

- H1: There is a significant expected value premium for the period 1965-2015. This means both HML and p5-1 yield significant expected returns and CAPM alphas.
- H2: There is a positive relationship between investor sentiment and the expected value premium.
- H3: The relationship between investor sentiment and the expected value premium is independent of limits-to-arbitrage on stocks because of deviating expectations during periods of high and low sentiment. Therefore the relation between investor sentiment and expected value premium does not stem from the short leg the value strategy only.

4 Data

4.1 Databases

I use the CRSP database for data on monthly stock prices, shares outstanding, dividend and returns for NYSE, Amex and NASDAQ stocks over the period 1965-2015. The COMPUSTAT IQ North America database is used for accounting data on US firms. The starting year is 1965 because COMPUSTAT data is not available before 1962.

I drop individual observations without an observation for price as well as observations with a negative price, I drop all firms with negative book equity and to prevent the survivorship bias, I require each firm to appear at least two years in COMPUSTAT before using the data. To prevent outliers from influencing the results, all accounting variables are winsorized at 2.5%. For earlier observations a lot of dividend data is missing, this leads to drastically high or low dividend growth rates in the earlier period. To overcome this issue, just as in (Chen et al., 2008), dividend growth that is higher or lower than 50% or -50% is replaced by 50% and -50% respectively.

Another issue concerns the use of P/E, since CRSP does not contain EPS data before 1986. Therefore the analyses using P/E as a proxy for B/M are performed in the period 1986-2015 which results in a reduction of observations when compared to the B/M tests.

Excess US stock market returns and Fama & French factor returns are obtained from Kenneth French' website. My definition of book equity is as follows:

book equity (BE) is shareholders equity (Item 59) plus balance sheet deferred taxes (Item 35)

The investor sentiment index is collected from the site of Jeffrey Wurgler, which is the SENTIMENT$^{\perp}$ index as described above.

5 Results

5.1 Expected value premium

Before I investigate the effect of investor sentiment on the value premium, I first test for the presence of the (expected) value premium in my dataset. As stated in the methodology, this is done along two axes: a single sort on B/M quintiles and a double sort a la (Fama & French, 1992) to create the HML portfolio.

Table 1 shows the monthly mean and standard deviations for realized return, dividend growth, long-term dividend growth, dividend-price ratio and expected return for each of the six double sort (HML) portfolios. When looking at realized return, one immediately sees that there is a value premium. Both S/L and B/L, so the low B/M portfolios, have a mean monthly return of around 75 basis points. The S/H and B/H portfolios have way larger realized return means with 2.0% and 1.1% for the portfolios respectively. The size of the value premium also seems to be strengthened by the presence of small firms as can be seen from the difference between the S/H and B/H portfolios as the return of the small firm portfolios is nearly the double of the large one. The difference in this order of size can only be found in the high B/M portfolios.

The same return pattern can be found in Table 2 for the single sort. Average return increases monotonically from the lowest B/M portfolio to the highest. Average return more than doubles when moving from the lowest B/M portfolio to the highest portfolio.

Contrary to Chen et al (2008) I find the average dividend growth rates to be higher for growth stocks compared to the value stocks for both the double and single sort portfolios. This seems in line with the conventional thought that growth stocks have more growth options.

The dividend price ratios however are larger for the value stocks when compared to the growth stocks, this can be found for both the single and double sort portfolios. Since expected return is a combination of the dividend-price ratio and the long-term dividend growth rate, the large difference in dividend-price ratios translates into higher expected returns for value stocks when compared to growth stocks, consistent with the existence of an expected value premium like Chen et al (2008). This can be seen for both sorts. Expected returns for the lowest two B/M portfolios in the double sort are 1.9% and 1.6% for S/L and B/L respectively. For S/H and B/H they are 4.1% and 2.1% respectively. Again, a large difference between the small firms and big firms can be observed.

	R_t	g_{t+1}	E$[Ag_{t+1}]$	E$[D_{t+1}/P_t]$	E$[R_t]$
S/L					
mean	0.0078221	0.0021699	0.0009386	0.0246455	0.0264036
Sd	0.1562412	0.1198267	0.0056139	0.1378171	0.1377945
B/L					
mean	0.0077267	0.0043525	0.0014208	0.0189456	0.0211017
Sd	0.1280261	0.1260971	0.0047782	0.1267659	0.12654
S/M					
mean	0.0125218	0.0008119	0.0002905	0.0505039	0.0512733
Sd	0.1871572	0.0831313	0.0055836	0.3840037	0.3838711
B/M					
mean	0.0109366	0.0037192	0.0011697	0.02214	0.0237267
Sd	0.1135525	0.1142326	0.0056071	0.1262233	0.1260818
S/H					
mean	0.019657	0.0004534	0.0004439	0.0516197	0.0525378
Sd	0.2148103	0.0788115	0.0056044	0.2647563	0.26463
B/H					
mean	0.0113318	0.0016922	0.0010973	0.0237037	0.0249774
sd	0.1173337	0.1145325	0.0055855	0.1439054	0.1438157

Table 1: Descriptive statistics for HML value strategy, the mean and standard deviation. R_t is the realized monthly return for each HML portfolio. g_{t+1} is the average monthly dividend growth rate which is calculated using $g_{t+1} = \left(\frac{\frac{D_{t,t+1}}{P_t}}{\frac{D_{t-1,t}}{P_{t-1}}} \right) - 1$. E$[Ag_{t+1}]$ is the average long-term expected dividend growth calculated using E$[Ag_{t+1}] = \left[\frac{\overline{r}-\overline{g}}{1+\overline{r}} \right] \sum_{i=0}^{\infty} \left[\frac{1+\overline{g}}{1+\overline{r}} \right]^i g_{t+i+1}$. E$[D_{t+1}/P_t]$ is the expected dividend-price ratio and E$[R_t]$ are the expected returns, which are calculated using E$[R_t + 1] =$ E$\left[\frac{D_{t+1}}{P_t} \right]$ + E$[Ag_{t+1}]$.The six portfolios are obtained through a double sort on size and B/M and are shown on the left (S/L, S/M, S/H, B/L, B/M and B/H). The B/H portfolio for instance contains the large stocks that also have a high book-to-market ratio.

	R_t	g_{t+1}	E$[Ag_{t+1}]$	E$[D_{t+1}/P_t]$	E$[R_t]$
1					
mean	0.0073977	0.0033306	0.0014208	0.0149682	0.0171538
sd	0.1325393	0.1517598	0.0069267	0.1020487	0.1020142
2					
mean	0.0092804	0.0038705	0.0010168	0.0189685	0.0210883
sd	0.1573152	0.1250034	0.0043406	0.1497832	0.149587
3					
mean	0.0112319	0.0029863	0.0008088	0.0195838	0.0210691
sd	0.1431521	0.1259734	0.0052787	0.1247789	0.1246058
4					
mean	0.0138036	0.0016855	0.0006658	0.0220592	0.0231604
sd	0.1483493	0.119166	0.0053195	0.1335257	0.1333417
5					
mean	0.0181379	0.0003444	0.0005328	0.0325215	0.0336059
sd	0.2037423	0.1040988	0.0064015	0.2217833	0.2216083
N	2349818				

Table 2: Descriptive statistics for P5-1 value strategy, the mean and standard deviation. R_t is the realized monthly return for each P5-1 portfolio. g_{t+1} is the average monthly dividend growth rate which is calculated using $g_{t+1} = \left(\frac{\frac{D_{t,t+1}}{P_t}}{\frac{D_{t-1,t}}{P_{t-1}}} \right) - 1$. E$[Ag_{t+1}]$ is the average long-term expected dividend growth calculated using E$[Ag_{t+1}] = \left[\frac{\overline{r}-\overline{g}}{1+\overline{r}} \right] \sum_{i=0}^{\infty} \left[\frac{1+\overline{g}}{1+\overline{r}} \right]^i g_{t+i+1}$. E$[D_{t+1}/P_t]$ is the expected dividend-price ratio and E$[R_t]$ are the expected returns, which are calculated using E$[R_t + 1] =$ E$\left[\frac{D_{t+1}}{P_t} \right]$ + E$[Ag_{t+1}]$.The five portfolios are obtained through a single sort on B/M into quintiles and they are shown on the left (1,2,3,4 and 5).Portfolio 1 for instance contains the stocks with the lowest B/M ratio and portfolio 5 contains the stocks with the highest B/M portfolio.

Figures 1-4 below show the plots of the yearly average expected value premia, HML and p5-1, both equally-weighted and value-weighted. The plots show a positive expected value premium throughout, with the period 1965-mid 1970s as the exception, showing a negative value premium for all plots. Only the value-weighted value premium shows a small negative sign around the late 2000s. The period 1975-2000 has the highest value premium, only the equally-weighed returns seem to display a small positive trend in value premium over the whole period. The difference in magnitude between equally-weighted returns and value-weighted returns is remarkable and seems to confirm that the expected value premium is driven by the presence of small firms, although the premium does not disappear when taking value-weighted returns.

To directly compare my findings, like in (Chen et al., 2008) in figure 6, I plot the annualized return from the value-weighted HML strategy and find that the average annualized expected value premium is 3.4% per annum in the period 1965-2015 (not reported). The annualized expected value premium has, like the average yearly expected value premium, been mostly positive and relatively large. Only exception is the period 1970-1975 and around 2010.

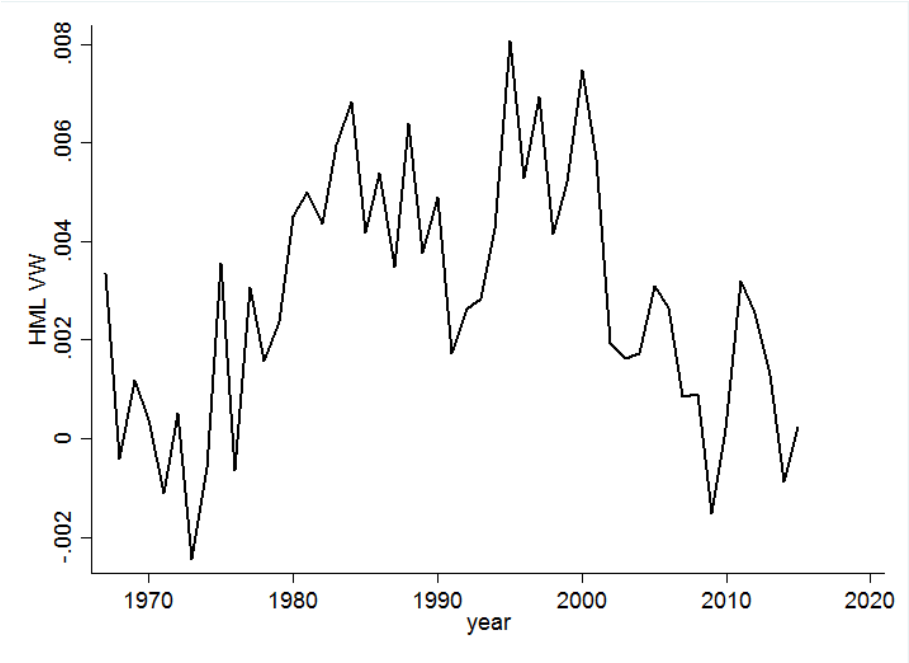

Figure 2: This figure plots the yearly average value-weighted expected returns on the HML strategy over the period 1965-2015. The portfolios are obtained through a double sort on size and B/M which results in six portfolios:S/L, S/M, S/H, B/L, B/M and B/H. The HML strategy is (S/H + B/H)/2 - (S/L + B/L)/2.

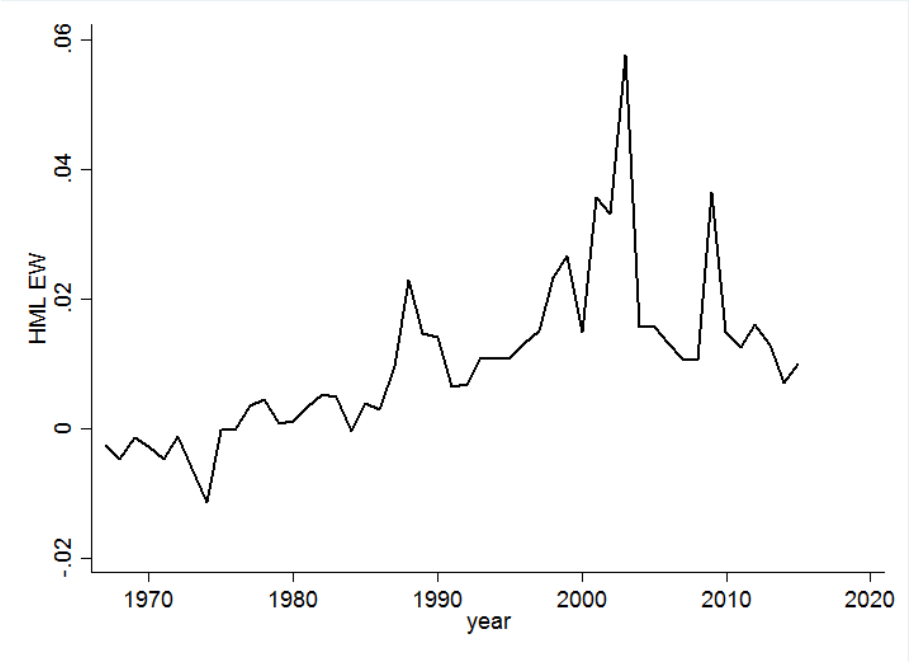

Figure 3: This figure plots the yearly average equally-weighted expected returns on the HML strategy over the period 1965-2015. The portfolios are obtained through a double sort on size and B/M which results in six portfolios:S/L, S/M, S/H, B/L, B/M and B/H. The HML strategy is (S/H + B/H)/2 - (S/L + B/L)/2.

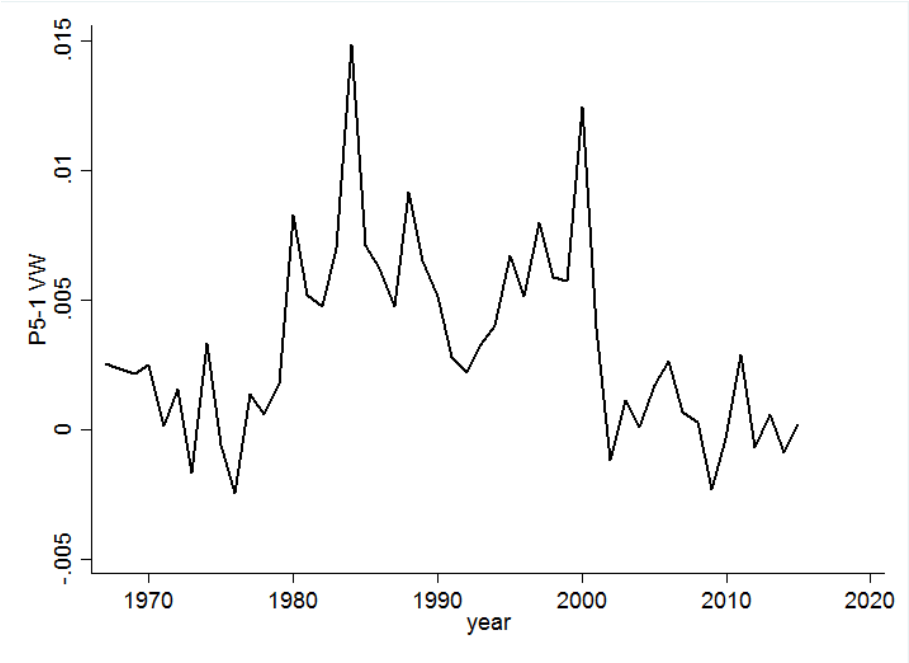

Figure 4: This figure plots the yearly average value-weighted expected returns on the P5-1 strategy over the period 1965-2015. The portfolios are obtained through a single sort on B/M which results in five quintile portfolios:1, 2, 3, 4 and 5. The P5-1 strategy is Portfolio 5 - Portfolio 1.

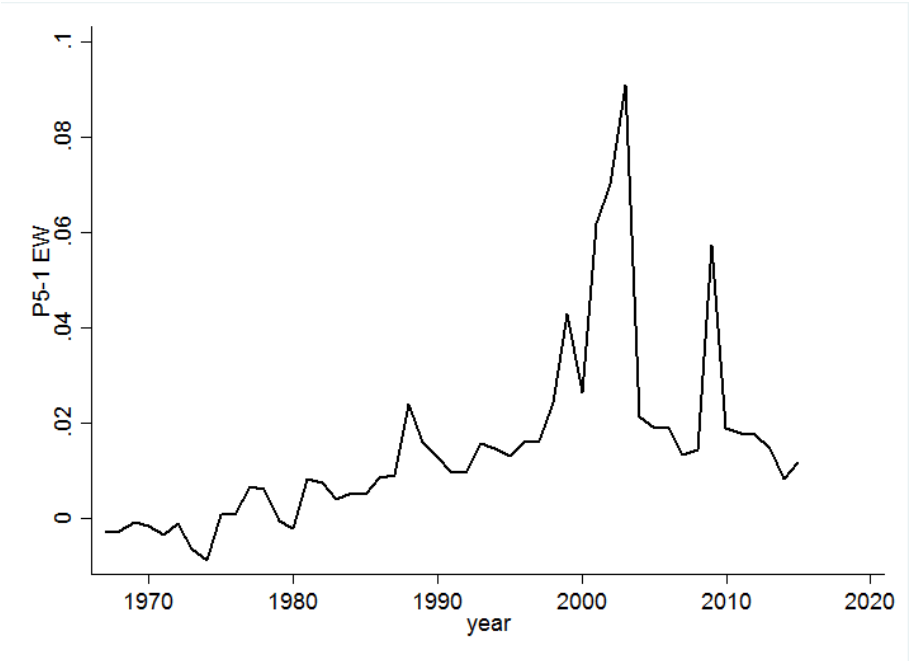

Figure 5: This figure plots the yearly average equally-weighted expected returns on the P5-1 strategy over the period 1965-2015. The portfolios are obtained through a single sort on B/M which results in five quintile portfolios:1, 2, 3, 4 and 5. The P5-1 strategy is Portfolio 5 - Portfolio 1.

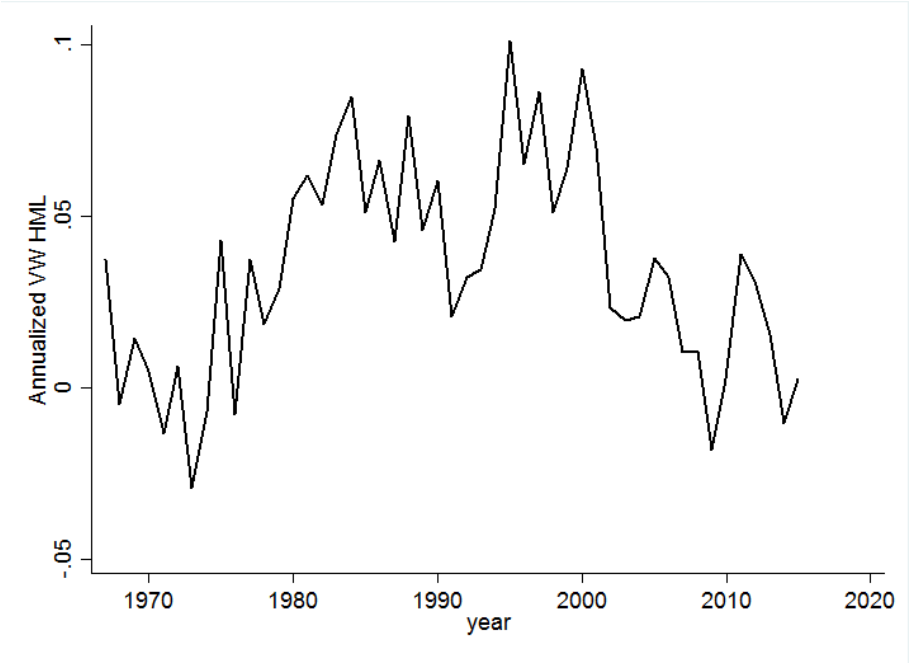

Figure 6: This figure plots the annualized value-weighted expected returns of the HML strategy over the period 1965-2015. The portfolios are obtained through a double sort on size and B/M which results in six portfolios:S/L, S/M, S/H, B/L, B/M and B/H. The HML strategy is (S/H + B/H)/2 - (S/L + B/L)/2.

5.2 Differences in mean return following high or low sentiment

Now I have confirmed the presence of both the realized and expected value premium, I want to turn to the relationship between investor sentiment and the value premium. This is done, as stated in the methodology, by comparing raw and benchmark-adjusted returns following either a high sentiment month or a low sentiment month. Investor sentiment is measured with the (Baker and Wurgler, 2006) SENTIMENT⊥ index.

High sentiment					
	count	Mean return	sd	min	max
Expected					
Vw-HML	295	.0037756	.0045988	-.0069721	.0231596
Vw-P5-1	295	.0043877	.0082442	-.0100953	.0738671
Realized					
Vw-HML	295	.0064185	.0260411	-.1800538	.1226527
Vw-p5-1	295	-.0021455	.0158301	-.0583882	.0561785

Low sentiment					
	count	Mean return	sd	min	max
Expected					
Vw-HML	292	.0018316	.0048749	-.018373	.0216735
Vw-P5-1	292	.0020311	.0054643	-.019961	.0352683
Realized					
Vw-HML	292	.0082035	.0337496	-.0903322	.2575665
Vw-p5-1	292	.0109975	.0421402	-.0907562	.3361145

Table 3: This table shows the count, mean monthly return, standard deviation, minimum and maximum following either a low sentiment month or a high sentiment month. The values are shown for the expected and realized value-weighted HML ((S/H + B/H)/2 - (S/L + B/L)/2) and expected and realized value-weighted P5-1(Portfolio 5 - Portfolio 1). The returns are classified as following a high sentiment month if the SENTIMENT⊥ index in the previous month was above the sample median and classified as following a low sentiment month if the SENTIMENT⊥ index was below the sample median in the preceding month.

In table 3 the mean value-weighted realized, expected and unexpected returns are listed for both the HML and P5-1 strategy following a high sentiment month. In the lower part of the table, one can see the same values following a low sentiment month.

The difference between high and low sentiment returns is immediately visible for the expected returns. Mean monthly expected returns following a high sentiment month are 0.38% and 0.44% for the HML and P5-1 strategy respectively. Whereas following a low sentiment month these expected returns drop to 0.18% and 0.20% respectively. This means expected returns following a high sentiment month are more than the double of those following a low sentiment month. This means that there is a significant effect of investor sentiment on investors' expectations regarding value and growth stocks. These deviations seem to diverge more strongly during times of high sentiment, consistent with (Baker and Wurgler, 2006). During times of high sentiment investors expect to earn either higher returns on the riskier value stocks or they expect lower returns on the growth stocks, which results in the expected value premium.

The realized returns then show the reverse pattern following high and low sentiment. There are lower, even negative for P5-1, value returns following a high sentiment month and higher returns following low sentiment months. This seems to be completely in line with the findings of Stambaugh, Yu and Yuan (2012) who also observe a reverse effect of investor sentiment on the value premium.

5.3 Benchmark-adjusted returns

5.3.1 CAPM

Table 4 shows the results of the univariate regression of value-weighted and equally-weighted returns on the market excess return (CAPM) for respectively the realized, expected and unexpected value premium. Each table shows the constant (alpha) and the coefficient of the market excess return (beta) for the HML and P5-1 strategies following either high or low sentiment months.

The results for the VW realized benchmark-adjusted returns show the same pattern as the raw returns, there are significant alphas and they are larger following low sentiment months than following high sentiment months. The difference is larger for the HML strategy than for the P-1 strategy, indicating there are more differences between the more extreme, unbalanced quintiles. Equally-weighted returns however, show a reverse pattern and are higher following high sentiment months than following low sentiment months. The market coefficient is significantly negative during high sentiment and significantly positive for low sentiment months. This means the value strategies move contrary to the market during high sentiment periods and follow the market during low sentiment periods. Since realized returns are higher following low sentiment months than following high sentiment months, this means the market excess return is higher during times of high sentiment than during times of low sentiment.

VW				
	HML high sentiment	HML low sentiment	P5-1 high sentiment	P5-1 low sentiment
β	-0.1143***	0.1587***	-0.1493***	0.2212***
	(-3.45)	(3.76)	(-3.64)	(4.22)
α	0.0068***	0.0071***	0.0074***	0.0095***
	(4.55)	(3.66)	(4.01)	(3.93)
Observations	295	292	295	292
R^2	0.04	0.05	0.04	0.06

EW				
	HML high sentiment	HML low sentiment	P5-1 high sentiment	P5-1 low sentiment
β	-0.1501***	0.1180***	-0.0870**	0.2312***
	(-4.87)	(3.17)	(-2.06)	(4.72)
α	0.0071***	0.0052***	0.0084***	0.0080***
	(5.13)	(3.02)	(4.42)	(3.53)
Observations	295	292	295	292
R^2	0.07	0.03	0.01	0.07

Table 4: This table reports the values of the CAPM regression $R_{i,t} = a_{i,t} + \beta_{i,t}\text{MKT} + \epsilon_{i,t}$. Where $R_{i,t}$ are monthly realized returns. α is the constant in the regression and β is the coefficient of the value returns on the market excess return. The tables show the returns from the HML and P5-1 strategies following either a month where the preceding month SENTIMENT$\perp$ index was below the sample median (following low sentiment) or where the preceding month SENTIMENT$\perp$ was above the sample median (following high sentiment).The first table shows the results for value-weighted returns, the bottom table shows equally-weighted returns. T-values are in parentheses and *,** and *** show significance at the 10%, 5% and 1% level respectively.

Table 5 shows the same table but now for the expected value premium. When looking at the alphas, they exhibit the same pattern which is in line with my predictions: the alphas for the value strategy are higher (more than double) following high sentiment than following low sentiment, both for equally-weighted returns and value-weighted returns, although the difference is smaller for the equally weighted returns. In this case the market excess return has no significant effect on the expected value strategy returns, with the HML strategy during low sentiment as only exception.

VW				
	HML high sentiment	HML low sentiment	P5-1 high sentiment	P5-1 low sentiment
β	-0.0009	0.0186***	0.0032	-0.0002
	(-0.14)	(3.03)	(0.30)	(-0.02)
α	0.0038***	0.0017***	0.0044***	0.0020***
	(14.05)	(6.00)	(9.08)	(6.28)
Observations	295	292	295	292
R^2	0.00	0.03	0.00	0.00
EW				
	HML high sentiment	HML low sentiment	P5-1 high sentiment	P5-1 low sentiment
β	-0.0096	0.0569**	-0.0463	0.0510
	(-0.52)	(2.14)	(-1.55)	(1.25)
α	0.0104***	0.0096***	0.0156***	0.0139***
	(12.62)	(7.82)	(11.61)	(7.36)
Observations	295	292	295	292
R^2	0.00	0.02	0.01	0.01

Table 5: This table reports the values of the CAPM regression $R_{i,t} = a_{i,t} + \beta_{i,t}\text{MKT} + \epsilon_{i,t}$. Where $R_{i,t}$ are monthly expected returns. α is the constant in the regression and β is the coefficient of the value returns on the market excess return. The tables show the returns from the HML and P5-1 strategies following either a month where the preceding month SENTIMENT$\perp$ index was below the sample median (following low sentiment) or where the preceding month SENTIMENT$\perp$ was above the sample median (following high sentiment).The first table shows the results for value-weighted returns, the bottom table shows equally-weighted returns. T-values are in parentheses and *,** and *** show significance at the 10%, 5% and 1% level respectively.

5.3.2 Three factor

Table 6 shows the realized three-factor adjusted returns. In general, the previous findings remain unchanged. The three factor model has, as one would expect, significant explanatory power over the realized value strategies. Nearly all beta coefficients are large and significant, especially the usual suspect HML has a near unity relationship with the realized value premium and this relationship seems stronger following a low sentiment month. The R-squared statistic is also very high for all regressions.

VW				
	High sentiment HML	Low Sentiment HML	High sentiment P5-1	Low Sentiment P5-1
β_1	0.0664**	0.1536***	0.0497	0.1412***
	(2.30)	(4.46)	(1.41)	(3.64)
β_2	0.0971**	0.1828***	0.3088***	0.5422***
	(2.52)	(3.41)	(6.55)	(9.00)
β_3	0.6428***	0.7594***	0.8143***	0.9137***
	(13.91)	(14.06)	(14.38)	(15.03)
α	0.0022*	0.0060***	0.0018	0.0074***
	(1.88)	(4.03)	(1.20)	(4.40)
Observations	295	292	295	292
R^2	0.43	0.46	0.44	0.56

EW				
	High sentiment HML	Low Sentiment HML	High sentiment P5-1	Low Sentiment P5-1
β_1	0.0174	0.1361***	0.0279	0.1988***
	(0.63)	(4.27)	(0.63)	(4.49)
β_2	0.0188	0.0567	0.1969***	0.2871***
	(0.51)	(1.15)	(3.34)	(4.17)
β_3	0.5584***	0.6440***	0.4798***	0.6907***
	(12.70)	(12.89)	(6.77)	(9.94)
α	0.0031***	0.0045***	0.0051***	0.0066***
	(2.75)	(3.24)	(2.76)	(3.48)
Observations	295	292	295	292
R^2	0.43	0.39	0.15	0.35

Table 6: This table reports the values of the three factor regression $R_{i,t} = a_{i,t} + \beta_1 \text{MKT} + \beta_2 \text{SMB} + \beta_3 \text{HML} + \epsilon_{i,t}$. Where $R_{i,t}$ are monthly realized returns. α is the constant in the regression and β_1 is the coefficient of the value returns on the market excess return. β_2 is the coefficient from the returns on the (Fama and French, 1993) SMB (Small-Minus-Big) factor and β_3 the coefficient on their HML (High-Minus-Low) factor. The tables show the returns from the HML and P5-1 strategies following either a month where the preceding month SENTIMENT$\perp$ index was below the sample median (following low sentiment) or where the preceding month SENTIMENT$\perp$ was above the sample median (following high sentiment).The first table shows the results for value-weighted returns, the bottom table shows equally-weighted returns. T-values are in parentheses and *,** and *** show significance at the 10%, 5% and 1% level respectively.

In the same way, looking at expected returns, table 7 shows no surprises. Unlike as with realized returns, the three factor model does not do a good job explaining the expected returns. Only the SMB and HML coefficients are sometimes significant, but the expected alpha remains unexplained and large. The pattern again is the same following high and low sentiment, confirming once again the positive relationship between investor sentiment and the value premium. The difference is larger for value-weighted returns than for equally-weighted returns, which means that smaller value firms are subject to relatively less speculation during high sentiment.

VW				
	High sentiment HML	Low Sentiment HML	High sentiment P5-1	Low Sentiment P5-1
β_1	0.0040	0.0162**	0.0096	-0.0000
	(0.61)	(2.44)	(0.80)	(-0.00)
β_2	0.0191**	0.0093	0.0156	-0.0052
	(2.15)	(0.91)	(0.97)	(-0.44)
β_3	0.0261**	-0.0059	0.0290	-0.0210*
	(2.45)	(-0.57)	(1.50)	(-1.78)
α	0.0036***	0.0017***	0.0042***	0.0021***
	(13.03)	(5.91)	(8.35)	(6.37)
Observations	295	292	295	292
R^2	0.03	0.03	0.01	0.01
EW				
	High sentiment HML	Low Sentiment HML	High sentiment P5-1	Low Sentiment P5-1
β_1	-0.0063	0.0529*	-0.0279	0.0384
	(-0.31)	(1.85)	(-0.83)	(0.88)
β_2	0.0565**	0.0009	0.0955**	0.0280
	(2.07)	(0.02)	(2.14)	(0.41)
β_3	0.0404	-0.0790*	0.1105**	-0.1268*
	(1.23)	(-1.77)	(2.06)	(-1.84)
α	0.0101***	0.0097***	0.0149***	0.0140***
	(11.90)	(7.86)	(10.74)	(7.37)
Observations	295	292	295	292
R^2	0.02	0.03	0.03	0.02

Table 7: This table reports the values of the three factor regression $R_{i,t} = a_{i,t} + \beta_1 \text{MKT} + \beta_2 \text{SMB} + \beta_3 \text{HML} + \epsilon_{i,t}$. Where $R_{i,t}$ are monthly expected returns. α is the constant in the regression and β_1 is the coefficient of the value returns on the market excess return. β_2 is the coefficient from the returns on the (Fama and French, 1993) SMB (Small-Minus-Big) factor and β_3 the coefficient on their HML (High-Minus-Low) factor. The tables show the returns from the HML and P5-1 strategies following either a month where the preceding month SENTIMENT$^\perp$ index was below the sample median (following low sentiment) or where the preceding month SENTIMENT$^\perp$ was above the sample median (following high sentiment).The first table shows the results for value-weighted returns, the bottom table shows equally-weighted returns. T-values are in parentheses and *,** and *** show significance at the 10%, 5% and 1% level respectively.

The overall finding seems to be that the expected value premium is larger following periods of high sentiment than following periods of low sentiment, consistent with the larger deviation of expectations regarding value and growth stocks story. The reverse effect can be found for realized returns. These results hold for both raw returns and benchmark-adjusted returns, only the realized returns sometimes become insignificant when adjusting them with the three-factor model.

5.4 P/E proxy

I also investigate whether the effect stays the same when using another proxy for value and growth stocks. In this case, instead of B/M, Price-to-Earnings (P/E) is used. Low P/E stocks are now value stocks and high P/E stocks are growth stocks. This means the value strategy becomes P1-5.

In table 8 the raw returns and three-factor alphas for the P1-5 strategy are listed following high or low sentiment. With regard to the expected value premium, the effect remains, however now the difference is only considerable for the value-weighted returns. Realized returns show the same pattern as for B/M. In table 9 the three-factor adjusted returns are shown. The three-factor alphas are higher following high sentiment for the expected returns, confirming the existence of the expected value premium when using P/E. For realized returns, the alphas disappear when using the three-factor model.

High sentiment					
	count	mean	sd	min	max
EW expected P1-5	207	.0276171	.0303767	-.0362017	.1369771
VW expected P1-5	207	.002079	.0126009	-.0522939	.0664618
EW realized P1-5	207	-.0047081	.0319362	-.1138559	.1668243
VW realized P1-5	207	.001681	.0377204	-.1051491	.1965254
N	207				

Low Sentiment					
	count	mean	sd	min	max
EW expected P1-5	153	.0256007	.0340021	-.029292	.2511601
VW expected P1-5	153	.0012144	.0100011	-.0454736	.0347053
EW realized P1-5	153	.0017785	.0269523	-.0579147	.0956108
VW realized P1-5	153	.005069	.0344641	-.06609	.1738565
N	153				

Table 8: This table shows the count, mean monthly return, standard deviation, minimum and maximum following either a low sentiment month or a high sentiment month. The values are shown for the expected and realized P1-5 strategy (Portfolio 1 - Portfolio 5). Both the equally-weighted and value-weighted returns are listed. The returns are classified as following a high sentiment month if the SENTIMENT$\perp$ index in the previous month was above the sample median and classified as following a low sentiment month if the SENTIMENT$\perp$ index was below the sample median in the preceding month.

Expected				
	High sentiment EW P1-5	Low Sentiment EW P1-5	High sentiment VW P1-5	Low Sentiment VW P1-5
β_1	-0.0309	-0.0192	0.0187	0.0196
	(-0.59)	(-0.29)	(0.86)	(1.04)
β_2	-0.0064	0.0619	0.0071	-0.0029
	(-0.10)	(0.56)	(0.26)	(-0.09)
β_3	0.0492	0.0410	-0.0027	0.0649**
	(0.59)	(0.38)	(-0.08)	(2.11)
α	0.0275***	0.0257***	0.0020**	0.0012
	(12.57)	(9.04)	(2.22)	(1.43)
Observations	207	153	207	153
R^2	0.01	0.00	0.01	0.04

Realized				
	High sentiment EW P1-5	Low Sentiment EW P1-5	High sentiment VW P1-5	Low Sentiment VW P1-5
β_1	0.0793*	0.1791***	0.2049***	0.3061***
	(1.78)	(4.08)	(4.22)	(5.95)
β_2	0.5007***	0.3727***	0.6898***	0.3791***
	(8.83)	(5.05)	(11.18)	(4.38)
β_3	-0.0158	0.0493	0.1626**	0.3551***
	(-0.22)	(0.69)	(2.11)	(4.23)
α	-0.0046**	-0.0006	0.0004	0.0022
	(-2.48)	(-0.31)	(0.21)	(0.96)
Observations	207	153	207	153
R^2	0.34	0.29	0.44	0.40

Table 9: This table reports the values of the three factor regression $R_{i,t} = a_{i,t} + \beta_1 \text{MKT} + \beta_2 \text{SMB} + \beta_3 \text{HML} + \epsilon_{i,t}$. Where $R_{i,t}$ are monthly expected returns in the first table and monthly realized returns in the second table. α is the constant in the regression and β_1 is the coefficient of the value returns on the market excess return. β_2 is the coefficient from the returns on the (Fama and French, 1993) SMB (Small-Minus-Big) factor and β_3 the coefficient on their HML (High-Minus-Low) factor. The tables show the equally-weighted and value-weighted returns from the P1-5 strategy following either a month where the preceding month SENTIMENT$^\perp$ index was below the sample median (following low sentiment) or where the preceding month SENTIMENT$^\perp$ was above the sample median (following high sentiment). T-values are in parentheses and *,** and *** show significance at the 10%, 5% and 1% level respectively.

5.5 Predictive regressions

Table 10 shows the regressions of the 1-month lagged sentiment index on the expected and realized value strategies. The results do not disprove my earlier findings, they rather strongly support these findings.

The beta of lagged sentiment is significant and positive for all expected value strategies, indicating a significant positive relationship. The R-squared statistic is small, indicating low explanatory power, however the coefficients have the predicted sign. Lagged sentiment does not seem to have a significant effect when regressed on realized returns, which means that the previously found reverse relationship between sentiment and realized value premium is less strong than the relationship between sentiment and the expected value premium.

Expected				
	VW-HML	EW-HML	VW-p5-1	EW-p5-1
β	0.0009***	0.0022***	0.0015***	0.0038***
	(4.57)	(2.88)	(5.00)	(3.24)
α	0.0028***	0.0101***	0.0032***	0.0147***
	(14.08)	(13.79)	(10.94)	(12.85)
Observations	584	584	584	584
R^2	0.03	0.01	0.04	0.02

Realized				
	VW-HML	EW-HML	VW-p5-1	EW-p5-1
β	-0.0009	0.0003	-0.0028*	-0.0005
	(-0.69)	(0.24)	(-1.74)	(-0.32)
α	0.0074***	0.0064***	0.0092***	0.0090***
	(5.94)	(5.69)	(5.92)	(5.98)
Observations	584	584	584	584
R^2	0.00	0.00	0.01	0.00

Table 10: This table shows the values from the predictive regression $R_{i,t} = a_{i,t} + \beta_{i,t} S_{t-1} + \epsilon_{i,t}$. Where $R_{i,t}$ are the value returns, α is the constant in the regression and β is the coefficient of the value returns on the one month lagged SENTIMENT$\perp$ index S_{t-1}. The results are listed for both the HML and P5-1 strategies. The first table shows expected returns and the second table shows realized returns. T-values are in parentheses and *,** and *** show significance at the 10%, 5% and 1% level respectively.

To delve further into the source of the expected value premium, the HML and P5-1 strategies are split in the long and short leg in table 11. One month lagged sentiment is then regressed on these components. The results are listed for the HML strategy first and the P5-1 strategy second. The results show the expected sign for both the legs, i.e. a positive sign for the long leg and a negative sign for the short leg. The lagged sentiment index however has no significant effect on the long leg of the HML strategy, but does have a significant negative effect on the short leg. This means that the expected value return is caused by lower expected returns on the growth stocks during times of higher sentiment. This can be explained by investors moving their investments to riskier stocks and demanding lower returns for growth stocks.

The results are different when considering the P5-1 strategy. The coefficients still have the expected sign, however in this case they are both significant. This means that both the value stocks have higher expected returns and the growth stocks have lower returns, during periods with higher sentiment.

HML		
	Long-leg HML	Short-leg HML
β	0.0002	-0.0008***
	(0.84)	(-5.18)
α	0.0131***	0.0103***
	(64.65)	(72.88)
Observations	584	584
R^2	0.00	0.04

P5-1		
	Long-leg P5-1	Short-leg P5-1
β	0.0008***	-0.0007***
	(2.72)	(-4.61)
α	0.0138***	0.0106***
	(47.74)	(74.39)
Observations	584	584
R^2	0.01	0.04

Table 11: This table shows the values from the predictive regression $R_{i,t} = a_{i,t} + \beta_{i,t} S_{t-1} + \epsilon_{i,t}$. α is the constant in the regression and β is the coefficient of the value returns on the one month lagged SENTIMENT$\perp$ index S_{t-1}. The results are listed for both the HML and P5-1 strategies. The first table shows coefficients for expected returns of the long leg of the HML strategy (S/H + B/H)/2 and the short leg of the HML strategy (S/L + B/L)/2. The second table shows coefficient for expected returns of the long leg of the P5-1 strategy (Portfolio 5) and of the short leg of the P5-1 strategy (Portfolio 1). T-values are in parentheses and *,** and *** show significance at the 10%, 5% and 1% level respectively.

6 Conclusion

To sum up, in this paper I have researched the presence of the expected and realized value premium and their relationships to investor sentiment. I find evidence that the (expected) value premium exists in the 1965-2015 sample both in raw returns and bench-mark adjusted. In addition I find that investor sentiment has a positive relationship with the expected value premium which means that during times of high market sentiment, the expectations of investors more strongly deviate with regard to value and growth stocks. During those times, investors seem to have higher expectations of the riskier, value stocks and expect lower from safer growth stocks. These findings are in line with earlier research on investor sentiment effects (Stambaugh et al., 2012). This painfully rebounds to investors through lower realized returns as the realized value premium does not have a significant positive relation with investor sentiment but rather a negative one, which is also in line with (Baker and Wurgler, 2006).

Therefore I conclude that investors update their expectations if sentiment increases, seeking value stocks and hereby increasing the expected value premium. However this leads to over- and undervaluation which in turn leads to decreasing realized returns, therefore these realized returns show a reverse relationship with investor sentiment. However this relationship is less strong as indicated by the predictive regressions.

I am not able to draw the conclusion that both the long and the short leg cause the expected value premium to be stronger during times of high sentiment as the results show that for HML only the short leg is affected, meaning that investors expect less from growth stocks than that they expect value stocks to increase. The results hold when using P/E as a proxy for value, however the magnitude decreases.

My results are limited in the sense that they only show returns following high and low sentiment months and do not give empirical explanations for why investors seem to update their expectations. I also do not explain why investors would only update their expectations with regard to the growth stocks. Furthermore the value measure is limited to B/M and P/E only and other proxies could shed more light on the type of stocks that investors select.

I would suggest future research to delve deeper in how investors update their expectations and which stocks are prone the most to these updates. A good step would be to compare high limits-to-arbitrage stocks to low limits-to-arbitrage stocks and compare how expected and realized returns change with investor sentiment. Based on the findings in this paper, it is my strong belief that it is clear that investor sentiment is an important market force, whose effects on returns could possibly be enhanced to develop better investing strategies.

References

Ali, A., Hwang, L.-S., and Trombley, M. A. (2003). Arbitrage risk and the book-to-market anomaly. *Journal of Financial Economics*, 69(2):355–373.

Baker, M., Stein, J. C., and Wurgler, J. (2003). When does the market matter? stock prices and the investment of equity-dependent firms. *The Quarterly Journal of Economics*, 118(3):969–1005.

Baker, M. and Wurgler, J. (2006). Investor sentiment and the cross-section of stock returns. *The journal of Finance*, 61(4):1645–1680.

Basu, S. (1977). Investment performance of common stocks in relation to their price-earnings ratios: A test of the efficient market hypothesis. *The journal of Finance*, 32(3):663–682.

Benjamin, G. and Dodd, D. L. (1934). Security analysis. *Me Graw Hill Ine, New York*.

Blanchard, O. J., Shiller, R., and Siegel, J. J. (1993). Movements in the equity premium. *Brookings Papers on Economic Activity*, 1993(2):75–138.

Chen, L., Petkova, R., and Zhang, L. (2008). The expected value premium. *Journal of Financial Economics*, 87(2):269–280.

Davis, J. L., Fama, E. F., and French, K. R. (2000). Characteristics, covariances, and average returns: 1929 to 1997. *The Journal of Finance*, 55(1):389–406.

De Bondt, W. F. and Thaler, R. (1985). Does the stock market overreact? *The Journal of finance*, 40(3):793–805.

De Long, J. B., Shleifer, A., Summers, L. H., and Waldmann, R. J. (1990). Noise trader risk in financial markets. *Journal of political Economy*, 98(4):703–738.

Fama, E. F. and French, K. R. (1992). The cross-section of expected stock returns. *the Journal of Finance*, 47(2):427–465.

Fama, E. F. and French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of financial economics*, 33(1):3–56.

Fama, E. F. and French, K. R. (1995). Size and book-to-market factors in earnings and returns. *The journal of finance*, 50(1):131–155.

Fama, E. F. and French, K. R. (1998). Value versus growth: The international evidence. *The journal of finance*, 53(6):1975–1999.

Fama, E. F. and French, K. R. (2002). The equity premium. *The Journal of Finance*, 57(2):637–659.

Keynes, J. M. (1936). *The General Theory of Employment, Interest and Money*. Macmillan. 14th edition, 1973.

Lakonishok, J., Shleifer, A., and Vishny, R. W. (1994). Contrarian investment, extrapolation, and risk. *The journal of finance*, 49(5):1541–1578.

Lintner, J. (1965). Security prices, risk, and maximal gains from diversification. *The journal of finance*, 20(4):587–615.

McLean, R. D. and Zhao, M. (2014). The business cycle, investor sentiment, and costly external finance. *The Journal of Finance*, 69(3):1377–1409.

Miller, E. M. (1977). Risk, uncertainty, and divergence of opinion. *The Journal of finance*, 32(4):1151–1168.

Rosenberg, B., Reid, K., and Lanstein, R. (1985). Persuasive evidence of market inefficiency. *The Journal of Portfolio Management*, 11(3):9–16.

Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *The journal of finance*, 19(3):425–442.

Stambaugh, R. F., Yu, J., and Yuan, Y. (2012). The short of it: Investor sentiment and anomalies. *Journal of Financial Economics*, 104(2):288–302.

Zhang, L. (2005). The value premium. *The Journal of Finance*, 60(1):67–103.