The short of it: Investor sentiment and anomalies

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1 Introduction

1.1 Background

Market-wide sentiment:

- Lee, Shleifer and Thaler(1991) conclude that market-wide sentiment contributes to the difference between prices of close-end funds and their net asset values.
- Ritter(1991) concludes the reversals in returns on IPO is consistent with periodic waves of optimism on young stocks.

Short-sale impediments:

- Institutional constraints.
- Liquidity risk on short positions(Shleifer and Vishny(1997))
- Behavior biases, 0.29% short.(Barber and Odean(2008))
- Costly due to low supply(D’Avolio(2002))

1 Introduction

1.1 Background

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- Ritter(1991) concludes the reversals in returns on IPO is consistent with periodic waves of optimism on young stocks.

Short-sale impediments:

- Miller(1977): with short-sale impediments, overpricing should be more prevalent than underpricing. The most optimistic views about a stock are not counterbalanced by the less optimistic ones and they tend to take no positions instead of short positions.

1 Introduction

1.2 Motivation

Classic argument:

- There exists a significant sentiment to cause price depart from the fundamental.
- Those would be eliminated by rational traders.

Two concepts:

- Market-wide sentiment
  - ➢ Investor sentiment contains a market-wide component with the potential to influence prices on many securities in the **same direction** at the **same time**.
- Miller(1977) short-sale argument

1 Introduction

1.2 Motivation

Classic argument:

- There exists a significant sentiment to cause price depart from the fundamental.
- Those would be eliminated by rational traders.

Two concepts:

- Market-wide sentiment
- Miller’s short-sale argument

➢ A market with a large number of well informed investors may not have any grossly undervalued securities, but if investors are unwillingly to sell short(as they often are) their presence is consistent with a few investments being overvalued.

1 Introduction

1.2 Motivation

Classic argument:

- There exists a significant sentiment to cause price depart from the fundamental.
- Those would be eliminated by rational traders.

Two concepts:

- Market-wide sentiment
- Miller's short-sale argument
- Combining the two concepts:

➢ Potentially many overpriced investments when market-wide sentiment is high. In contrast, by Miller's reasoning, periods of low market-wide sentiment should not be accompanied by substantial underpricing.

1 Introduction

1.3 Hypothesis

Hypothesis 1:

- The anomalies should be stronger following high sentiment. If the primary form of mispricing is overpricing, then mispricing should be more prevalent when sentiment is high

Hypothesis 2:

- The returns on the short-leg portfolio of each anomaly should be lower when sentiment is high. The stocks in the short leg should be more overpriced when sentiment is high.

Hypothesis 3:

- Investor sentiment should not greatly affect returns on the long-leg. Since there is no underpricing, returns on the long leg should not be higher following low sentiment.

1 Introduction

1.4 Conclusions

Explore sentiment-related overpricing as at least a partial explanation for 11 anomalies survive the ff3.

- We find that each of the 11 anomalies is stronger following high levels of sentiment.
- We find that return on the short leg of the 11 anomalies is lower following high sentiment.
- We find that none of the 11 long legs exhibits a significant difference between high- and low-sentiment periods.
- Time series regressions confirm those above.

1 Introduction

1.5 Contributions

Research 1: Baker and Wurgler(2006)

- Market sentiment has larger effects on securities which are difficult to value and hard to arbitrage. The study focus on stock characters in the cross-section while we consider short-sale impediments as the major source of mispricing(overpricing.)

Research 2: Yu and Yuan(2011)

- Sentiment traders undermine a positive mean-variance trade-off during high-sentiment periods. We dig deeper under a similar setting, with sentiment affections on the detailed portfolio.

1 Introduction

1.6 Necessary settings

Setting 1: Dispersion of views

- **Underpricing is unlikely** requires the view of rational investors to lie within the cross section of views across all investors especially when sentiment is low and the views of rational investors are the most optimistic.

Setting 2: No variation over time

- We simply assume that the views of the most optimistic investors in the cross-section **are more likely** to be too optimistic when the sentiment measure is high than when it is low.(higher mean or more dispersion.)

2 Research Design

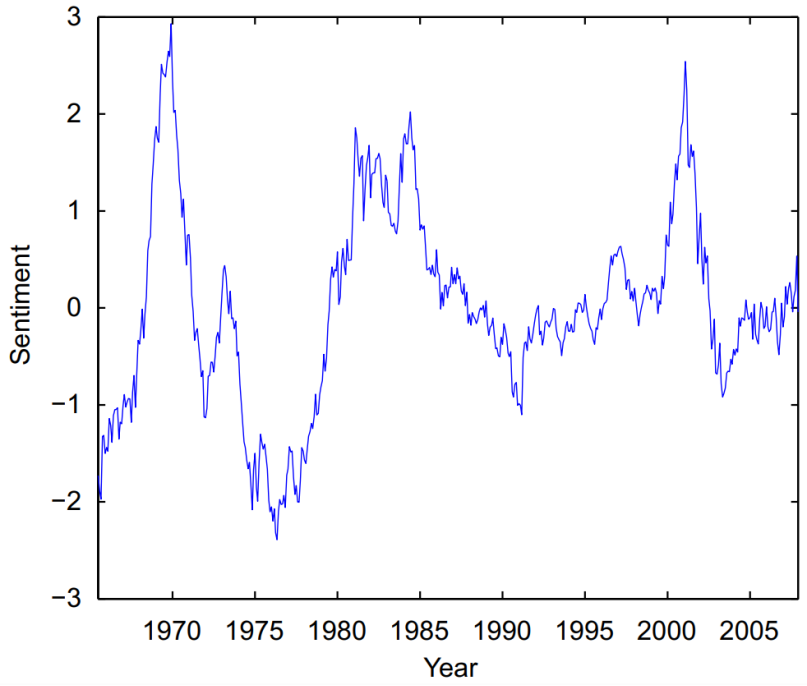
2.1 Sentiment index

Construction:

- Using the monthly market-based sentiment series constructed by Baker and Wurgler(2006), which spans from July 1965 to December 2007.

Validity:

- Sentiment rose to a peak in 1968 and 1969 electronic bubble and fell by the mid-1970s.
- Sentiment reached a new peak in the biotech bubble of the early 1980s and fell again subsequently.
- Sentiment reached its most recent peak during the Internet bubble and fell again.



2 Research Design

2.2 Portfolio sort

Step 1

- For each of the 11 anomalies, constructing value-weighted portfolio returns within each decile, the long-short strategy is constructed using decile 1 and 10.

Step 2

- Define a high/low sentiment month, which is the one in which the value of the BW sentiment index in the previous month is above/below the median value for the sample period.

Step 3

- Compute average returns separately for the high/low-sentiment months.

2 Research Design

2.2 Portfolio sort

Benchmark-adjusted returns

$$R_{i,t} = a_H d_{H,t} + a_L d_{L,t} + bMKT_t + cSMB_t + dHML_t + \epsilon_{i,t}$$

Where $d_{H,t}$ and $d_{L,t}$ are dummy variables indicating high- and low-sentiment periods, $R_{i,t}$ is the excess return in month t on either the long leg, the short leg and the spread.

2 Research Design

2.3 Predictive regression

- In portfolio sort method, high-to-low classification is simply a binary measure. Here we use predictive regression to investigate the effect BW sentiment index has on the portfolio returns.

Regression 1:

$$R_{i,t} = a + bS_{t-1} + u_t$$

Regression 2:

$$R_{i,t} = a + bS_{t-1} + cMKT_t + dSMB_t + eHML_t + u_t$$

- Where $R_{i,t}$ is excess return in each of the portfolios; $S_{t\ -1}$ is the value of BW sentiment index in month t-1; in Regression 2, there includes Fama-French factors.

2 Research Design

2.4 Asymmetry in pricing or in sentiment

Original explanation:

- Sentiment has asymmetric effects on prices, with optimism producing greater mispricing than pessimism.

Alternative:

- Sentiment is asymmetric with high sentiment producing optimism felt more strongly than pessimism produced by low sentiment.(The extreme values are larger for positive values.)

Check:

- Using alternative sentiment indexes: Michigan index.

2 Research Design

2.5 Factor-related spreads

Concerns:

- We could still omit systematic risks that would reduce or eliminate anomalies.
- Premiums earned on the factors also reflect sentiment-driven mispricing.

Check:

- Include a forth factor of liquidity risk.
- Examining these factors under the hypothesis put forward.

2 Research Design

2.6 Controlling for macrovariables

Concern:

- There could still exist a risk-based explanation of our results with following features:

➢ Short leg is sensitive to the factor while long leg is not

➢ Premium on that factor is correlated with sentiment.

Check:

- It seems reasonable to expect that variations of any risk premium would be correlated with some aspect of macroeconomics.
- Control for an additional set of macrovariables beyond the B&W 5 variables.

3 Data and variables

3.1 Sentiment and anomalies

Sentiment:

- The first principal component of 6 measures from July 1965 to December 2007:

➢ Close-end fund discount, the number and first-day returns of IPOs, NYSE turnover, the equity share in total new issues and the dividend premium.

Anomalies:

- 11 documented anomalies:

➢ Failure probability, Ohlson’s O, Net stock issues, Composite equity issues, Total accruals, Net operating assets, Momentum, Gross profitability, Asset growth, Return on assets, Investment-to-assets .

3 Data and variables

3.2 Anomalies validity

Correlation:

- Overall, the anomalies are not highly correlated with each other, the Failure probability exhibits the highest correlation with other anomalies.

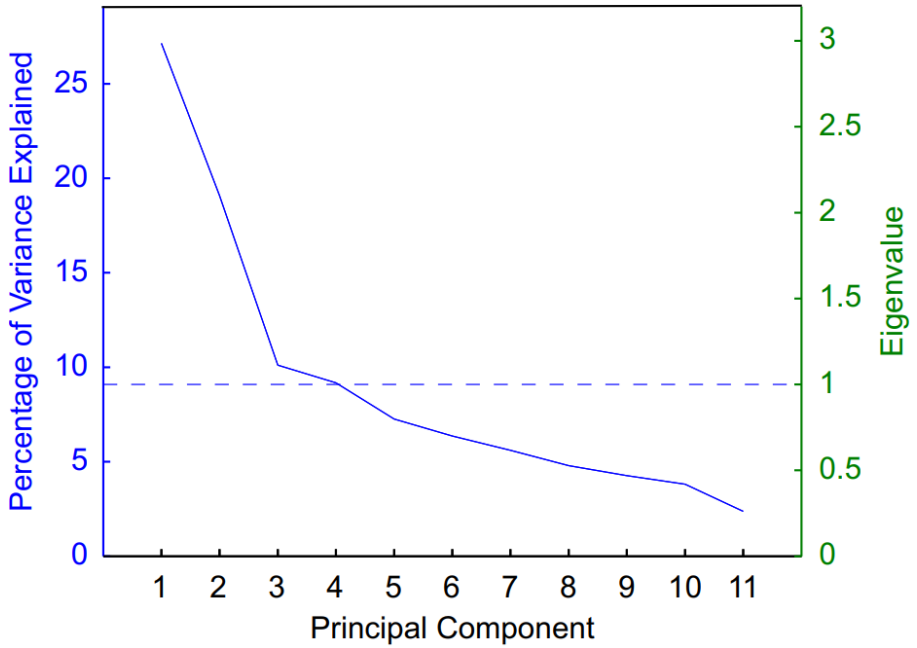
Anomaly		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A. Correlations: long minus short													
(1)	Failure probability	1.00											
(2)	Ohlson's O (distress)	0.47	1.00										
(3)	Net stock issues	0.27	0.20	1.00									
(4)	Composite equity issues	0.20	0.11	0.43	1.00								
(5)	Total accruals	0.15	0.08	0.15	0.11	1.00							
(6)	Net operating assets	0.09	0.16	0.22	0.10	0.26	1.00						
(7)	Momentum	0.62	0.18	0.22	0.25	0.15	0.14	1.00					
(8)	Gross profitability	0.36	0.34	0.21	0.01	−0.12	0.13	0.19	1.00				
(9)	Asset growth	0.09	0.03	0.36	0.22	0.22	0.36	0.17	−0.01	1.00			
(10)	Return on assets	0.58	0.41	0.16	0.01	0.03	0.02	0.31	0.38	−0.03	1.00		
(11)	Investment-to-assets	−0.02	−0.01	0.19	0.12	0.34	0.32	0.08	−0.08	0.51	−0.08	1.00	
(12)	Combination	0.77	0.52	0.52	0.39	0.42	0.42	0.68	0.43	0.44	0.56	0.35	1.00

3 Data and variables

3.2 Anomalies validity

Principal component:

- Computing the principal components for the 11 anomalies.
- If the 11 anomalies were completely independent, we would expect a horizontal line at 1/11 = 9.1%.



4 Empirical Results

4.1 Portfolio analysis

- The difference between high & low sentiment on Short leg and Long-short is significant with expected sign.(Hypothesis 1 and Hypothesis 2)
- The difference between high & low sentiment on Long leg is not significant.(Hypothesis3)

Table 2: Excess returns on each portfolio

Anomaly	Long leg			Short leg			Long–short		
	High sentiment	Low sentiment	High –low	High sentiment	Low sentiment	High –low	High sentiment	Low sentiment	High –low
Failure probability	0.77	1.14	−0.38	−1.10	1.25	−2.34	1.86	−0.10	1.96
	(2.16)	(3.74)	(−0.81)	(−1.54)	(2.26)	(−2.60)	(3.25)	(−0.24)	(2.72)
Ohlson's O (distress)	0.42	0.61	−0.19	−0.98	0.61	−1.59	1.40	−0.00	1.40
	(1.14)	(2.06)	(−0.41)	(−1.69)	(1.33)	(−2.15)	(3.81)	(−0.01)	(2.85)
Net stock issues	0.64	0.75	−0.11	−0.50	0.63	−1.13	1.14	0.12	1.02
	(2.22)	(3.04)	(−0.28)	(−1.26)	(2.10)	(−2.28)	(5.71)	(0.88)	(4.20)
Composite equity issues	0.53	0.72	−0.19	−0.28	0.69	−0.97	0.81	0.02	0.79
	(1.93)	(3.08)	(−0.52)	(−0.72)	(2.13)	(−1.91)	(3.19)	(0.13)	(2.46)
Total accruals	0.37	1.07	−0.71	−0.57	0.84	−1.41	0.94	0.23	0.70
	(0.82)	(3.10)	(−1.25)	(−1.06)	(2.22)	(−2.14)	(3.11)	(1.04)	(1.88)
Net operating assets	0.50	0.92	−0.43	−0.57	0.69	−1.26	1.07	0.24	0.83
	(1.36)	(3.01)	(−0.90)	(−1.37)	(2.20)	(−2.41)	(4.66)	(1.29)	(2.84)
Momentum	0.78	1.43	−0.64	−1.24	0.34	−1.58	2.03	1.09	0.93
	(1.69)	(4.12)	(−1.11)	(−2.14)	(0.76)	(−2.16)	(4.49)	(3.12)	(1.64)
Gross profitability	0.59	0.79	−0.20	−0.06	0.64	−0.70	0.65	0.15	0.50
	(1.84)	(2.73)	(−0.47)	(−0.18)	(2.48)	(−1.62)	(2.93)	(0.64)	(1.53)
Asset growth	0.79	1.22	−0.43	−0.60	0.68	−1.27	1.39	0.54	0.85
	(2.14)	(3.26)	(−0.81)	(−1.30)	(1.92)	(−2.20)	(5.04)	(2.34)	(2.37)
Return on assets	0.61	0.66	−0.05	−1.10	0.44	−1.55	1.72	0.22	1.50
	(1.60)	(2.10)	(−0.10)	(−1.78)	(1.00)	(−2.02)	(4.01)	(0.65)	(2.74)
Investment-to-assets	0.44	1.38	−0.94	−0.47	0.78	−1.25	0.91	0.60	0.30
	(1.19)	(4.13)	(−1.90)	(−1.14)	(2.25)	(−2.32)	(4.48)	(2.93)	(1.06)
Combination	0.56	0.95	−0.39	−0.68	0.65	−1.32	1.23	0.31	0.93
	(1.72)	(3.51)	(−0.93)	(−1.54)	(1.96)	(−2.41)	(6.64)	(2.64)	(4.25)

4 Empirical Results

4.1 Portfolio analysis

- The evidence in table 3 appeared to be consistent with that in table 2.
- The results support the inference that sentiment-driven mispricing is at least a partial explanation for anomalies.

Table 3: Adjusted returns on each portfolio

Anomaly	Long leg			Short leg			Long–short		
	High sentiment	Low sentiment	High –low	High sentiment	Low sentiment	High –low	High sentiment	Low sentiment	High –low
Failure probability	0.43	0.33	0.10	−1.65	−0.58	−1.07	2.08	0.91	1.17
	(2.52)	(2.33)	(0.44)	(−4.33)	(−1.81)	(−2.19)	(4.45)	(2.39)	(1.95)
Ohlson's O (distress)	0.25	0.16	0.09	−1.24	−0.60	−0.64	1.49	0.76	0.73
	(2.70)	(2.09)	(0.72)	(−5.29)	(−3.23)	(−2.16)	(6.13)	(3.77)	(2.32)
Net stock issues	0.28	0.11	0.17	−0.80	−0.12	−0.68	1.08	0.23	0.85
	(3.68)	(1.68)	(1.69)	(−4.86)	(−1.09)	(−3.42)	(6.19)	(1.79)	(3.90)
Composite equity issues	0.08	−0.03	0.11	−0.64	−0.17	−0.47	0.72	0.14	0.58
	(0.69)	(−0.31)	(0.72)	(−3.62)	(−1.57)	(−2.26)	(3.40)	(0.89)	(2.23)
Total accruals	0.19	0.34	−0.14	−0.70	0.02	−0.73	0.89	0.31	0.58
	(0.85)	(2.13)	(−0.53)	(−2.88)	(0.15)	(−2.53)	(3.02)	(1.33)	(1.60)
Net operating assets	0.22	0.27	−0.05	−0.87	−0.15	−0.72	1.09	0.42	0.67
	(1.36)	(2.04)	(−0.24)	(−4.94)	(−1.25)	(−3.40)	(4.78)	(2.20)	(2.30)
Momentum	0.66	0.60	0.06	−1.51	−0.76	−0.75	2.17	1.36	0.81
	(3.64)	(3.46)	(0.23)	(−4.03)	(−3.22)	(−1.69)	(4.46)	(3.87)	(1.35)
Gross profitability	0.46	0.41	0.05	−0.40	−0.06	−0.33	0.85	0.47	0.38
	(3.17)	(3.25)	(0.26)	(−2.43)	(−0.47)	(−1.59)	(3.77)	(2.23)	(1.24)
Asset growth	0.37	0.07	0.30	−0.82	−0.06	−0.76	1.18	0.13	1.05
	(2.23)	(0.38)	(1.29)	(−4.48)	(−0.48)	(−3.43)	(4.81)	(0.60)	(3.35)
Return on assets	0.49	0.27	0.23	−1.26	−0.51	−0.75	1.75	0.78	0.97
	(4.01)	(2.26)	(1.35)	(−3.98)	(−2.01)	(−1.88)	(5.00)	(2.66)	(2.16)
Investment-to-assets	0.01	0.32	−0.31	−0.73	−0.01	−0.72	0.74	0.33	0.41
	(0.09)	(2.53)	(−1.57)	(−4.31)	(−0.07)	(−3.34)	(3.75)	(1.76)	(1.54)
Combination	0.30	0.26	0.04	−0.92	−0.26	−0.66	1.22	0.52	0.70
	(5.62)	(5.40)	(0.62)	(−6.46)	(−2.95)	(−3.89)	(7.92)	(5.01)	(3.74)

4 Empirical Results

4.2 Predictive regressions

Table 4: Excess returns on each portfolio

$$R_{i,t} = a + bS_{t-1} + u_t,$$

Anomaly	Long leg		Short leg		Long–short	
	$\hat{b}$	t-Statistic	$\hat{b}$	t-Statistic	$\hat{b}$	t-Statistic
Failure probability	−0.43	−1.74	−1.80	−2.99	1.37	2.59
Ohlson's O (distress)	−0.24	−0.80	−1.09	−2.31	0.85	2.95
Net stock issues	−0.28	−1.38	−0.84	−2.92	0.55	3.93
Composite equity issues	−0.21	−1.12	−0.68	−2.38	0.47	2.68
Total accruals	−0.59	−1.82	−0.96	−2.49	0.37	1.77
Net operating assets	−0.34	−1.29	−0.83	−2.76	0.49	3.50
Momentum	−0.69	−2.38	−1.02	−2.41	0.33	1.07
Gross profitability	−0.22	−0.94	−0.54	−2.21	0.32	1.81
Asset growth	−0.48	−1.68	−0.91	−2.66	0.44	2.16
Return on assets	−0.20	−0.66	−1.14	−2.35	0.94	2.79
Investment-to-assets	−0.70	−2.46	−0.77	−2.51	0.07	0.49
Combination	−0.43	−1.85	−0.93	−2.90	0.50	3.79

- Returns on the Short leg and Long-short spread were significantly related to sentiment index, with the expected sign.
- Returns on the Long leg were not that significantly related to sentiment index.

4 Empirical Results

4.2 Predictive regressions

Table 5: Adjusted returns on each portfolio

$$R_{i,t} = a + bS_{t-1} + cMKT_t + dSMB_t + eHML_t + u_t,$$

Anomaly	Long leg		Short leg		Long–short	
	$\hat{b}$	t-Statistic	$\hat{b}$	t-Statistic	$\hat{b}$	t-Statistic
Failure probability	−0.01	−0.09	−0.92	−2.79	0.91	2.15
Ohlson's O (distress)	0.07	0.95	−0.52	−2.64	0.59	3.03
Net stock issues	0.01	0.13	−0.38	−3.58	0.39	3.38
Composite equity issues	0.02	0.29	−0.21	−1.89	0.23	1.77
Total accruals	−0.02	−0.12	−0.26	−1.54	0.24	1.21
Net operating assets	0.07	0.72	−0.32	−2.81	0.39	2.86
Momentum	−0.04	−0.30	−0.30	−1.11	0.26	0.76
Gross profitability	0.14	1.40	−0.20	−1.62	0.34	1.94
Asset growth	0.06	0.62	−0.35	−2.88	0.41	2.74
Return on assets	0.14	1.44	−0.58	−2.49	0.71	2.67
Investment-to-assets	−0.21	−2.07	−0.24	−2.22	0.03	0.22
Combination	0.00	0.15	−0.32	−3.01	0.32	2.98

- Results of table 5 were consistent with that in table 4.
- Results from the predictive regressions reported in table 4&5 deliver the same message as table 2&3.

4 Empirical Results

4.3 Asymmetry in pricing or in sentiment

Table 6: Regression with Michigan sentiment index

$$R_{i,t} = a + bS_{t-1} + cMKT_t + dSMB_t + eHML_t + u_t,$$

Anomaly	Long leg		Short leg		Long–short	
	$\hat{b}$	t-Statistic	$\hat{b}$	t-Statistic	$\hat{b}$	t-Statistic
Failure probability	0.23	1.65	−0.45	−1.66	0.68	2.10
Ohlson's O (distress)	0.03	0.52	0.01	0.05	0.03	0.16
Net stock issues	0.07	1.12	−0.36	−2.93	0.43	3.60
Composite equity issues	−0.06	−0.68	−0.21	−1.69	0.16	1.03
Total accruals	0.02	0.14	−0.39	−2.24	0.41	2.03
Net operating assets	0.06	0.53	−0.41	−3.23	0.47	2.82
Momentum	0.11	0.71	−0.32	−1.15	0.42	1.13
Gross profitability	0.35	2.98	−0.08	−0.66	0.44	2.39
Asset growth	−0.23	−1.82	−0.38	−2.75	0.15	0.78
Return on assets	0.13	1.50	0.07	0.28	0.07	0.25
Investment-to-assets	−0.20	−1.72	−0.23	−1.84	0.03	0.23
Combination	0.06	1.40	−0.27	−2.68	0.33	3.00

- 3 Hypothesis were supported with Michigan sentiment index.
- Our results reflect asymmetry in pricing effect instead of in sentiment.

4 Empirical Results

4.4 Factor related spreads

Table 7: Portfolio sort with 4 factors

Spread	Long leg			Short leg			Long–short		
	High sentiment	Low sentiment	High –low	High sentiment	Low sentiment	High –low	High sentiment	Low sentiment	High –low
Panel A. Excess returns									
Beta	−0.45	1.37	−1.81	0.00	0.46	−0.46	−0.45	0.90	−1.35
	(−0.69)	(2.78)	(−2.22)	(0.01)	(2.05)	(−1.31)	(−0.79)	(2.23)	(−1.95)
Size	0.06	1.43	−1.37	0.33	0.44	−0.11	−0.26	0.99	−1.26
	(0.15)	(3.84)	(−2.40)	(1.11)	(1.86)	(−0.29)	(−0.78)	(3.33)	(−2.80)
Book-to-market	0.53	1.23	−0.71	0.15	0.50	−0.35	0.38	0.73	−0.35
	(1.64)	(3.52)	(−1.49)	(0.41)	(1.74)	(−0.76)	(1.35)	(2.52)	(−0.88)
Liquidity beta	0.55	1.05	−0.50	0.03	0.64	−0.61	0.52	0.41	0.11
	(1.39)	(3.15)	(−0.96)	(0.08)	(1.82)	(−1.11)	(2.45)	(1.93)	(0.36)
Panel B. Benchmark-adjusted returns									
Beta	−0.55	0.29	−0.84	−0.35	−0.18	−0.17	−0.20	0.47	−0.67
	(−2.29)	(1.36)	(−2.69)	(−1.90)	(−1.23)	(−0.77)	(−0.62)	(1.59)	(−1.62)
Size	−0.20	0.07	−0.27	0.08	0.03	0.05	−0.28	0.04	−0.32
	(−1.49)	(0.83)	(−1.71)	(2.31)	(0.99)	(1.06)	(−2.08)	(0.51)	(−2.05)
Book-to-market	−0.15	−0.06	−0.08	0.12	0.22	−0.10	−0.27	−0.28	0.02
	(−1.15)	(−0.56)	(−0.48)	(1.40)	(2.72)	(−0.85)	(−1.86)	(−2.27)	(0.09)
Liquidity beta	0.27	0.30	−0.02	−0.18	−0.04	−0.14	0.45	0.34	0.11
	(1.92)	(2.34)	(−0.13)	(−1.20)	(−0.29)	(−0.64)	(2.18)	(1.61)	(0.38)

4 Empirical Results

4.4 Factor related spreads

Table 8: Predictive regression with 4 factors

Spread	Long leg		Short leg		Long–short	
	$\hat{b}$	*t*-Statistic	$\hat{b}$	*t*-Statistic	$\hat{b}$	*t*-Statistic
Panel A. Excess returns						
Beta	−1.40	−3.07	−0.20	−1.10	−1.20	−3.08
Size	−0.92	−3.02	−0.26	−1.23	−0.66	−2.82
Book to market	−0.43	−1.63	−0.42	−1.60	−0.01	−0.05
Liquidity beta	−0.47	−1.65	−0.69	−2.17	0.22	1.36
Panel B. Benchmark-adjusted returns						
Beta	−0.47	−2.76	0.01	0.11	−0.48	−2.23
Size	−0.17	−2.06	0.01	0.49	−0.18	−2.25
Book to market	−0.06	−0.69	0.00	0.03	−0.06	−0.67
Liquidity beta	0.03	0.33	−0.16	−1.34	0.19	1.23

- Beta and size factors produce results very similar to 11 anomalies with long and short legs reversed.
- For high beta stocks investors were too optimistic about the improvement in economy when sentiment is high with those would benefit most overpriced.
- For low size stocks, results are similar to Baker and Wurgler(2006).

5 Additional analysis

Table 9: Predictive regression with macrovariables

$$R_{i,t} = a + bS_{t-1} + cMKT_t + dSMB_t + eHML_t + \sum_{j=1}^{5} m_j X_{j,t} + u_t,$$

Anomaly	Long leg		Short leg		Long–short	
	$\hat{b}$	t-Statistic	$\hat{b}$	t-Statistic	$\hat{b}$	t-Statistic
Failure probability	0.05	0.28	−1.17	−2.97	1.22	2.39
Ohlson's O (distress)	0.07	0.79	−0.52	−2.04	0.58	2.33
Net stock issues	0.02	0.26	−0.44	−3.61	0.46	3.46
Composite equity issues	0.04	0.43	−0.20	−1.82	0.23	1.73
Total accruals	0.06	0.33	−0.30	−1.49	0.35	1.52
Net operating assets	0.05	0.44	−0.34	−2.61	0.39	2.47
Momentum	0.01	0.05	−0.22	−0.72	0.22	0.58
Gross profitability	0.09	0.83	−0.27	−1.93	0.36	1.86
Asset growth	−0.05	−0.46	−0.35	−2.50	0.30	1.81
Return on assets	0.06	0.59	−0.89	−3.24	0.95	3.01
Investment-to-assets	−0.28	−2.65	−0.27	−2.23	−0.02	−0.15
Combination	−0.01	−0.22	−0.35	−2.86	0.34	2.68

- The results remain unchanged after including additional 5 variables.
- There is no evidence of exist of a new risk factor that could explain our results.

6 Conclusion

- **With impediments to short selling,** overpricing becomes more difficult to eliminate, so a firm's stock price can reflect views of investors who are too optimistic; **with market-wide sentiment,** such overpricing can occur for many stocks during periods of high sentiment.
- The study paints the set of anomalies with an intentionally **broad brush** and does not aim to find explanation for each anomalies in more detail.
- Explanations for **greater mispricing in the cross-section** reveals novel evidence consistent with overpricing as at least a partial explanation for many anomalies certainly.