International Journal of Economics and Finance; Vol. 7, No. 9; 2015
ISSN 1916-971X E-ISSN 1916-9728
Published by Canadian Center of Science and Education

Investor Sentiment and Chinese A-Share Stock Markets Anomalies

Yiwei Zhao[1,2], Zheng Yang[1] & Xiaolin Qian[1]

[1] Faculty of Business Administration, University of Macau, Macau SAR

[2] Lattice Engines (Beijing) Technology Co., Ltd, Beijing, China

Correspondence: Zheng Yang, Faculty of Business Administration, University of Macau, Macau SAR. Tel: 853-6217-4242. E-mail: mb34403@umac.mo

Received: June 23, 2015 Accepted: July 11, 2015 Online Published: August 25, 2015

doi:10.5539/ijef.v7n9p293 URL: http://dx.doi.org/10.5539/ijef.v7n9p293

Abstract

This paper creates an investor sentiment index for the Chinese A-share stock market. We document the details of this index and use it to explain about asset pricing anomalies in the Chinese stock markets. We test the effect of investor sentiment on 13 asset pricing anomalies in the Chinese stock markets. Out of the 13 anomalies, 9 of them are significantly affected by investor sentiment. In particular, the factors of firm size (Size), total risk (Sigma), stock issuance growth (Issue), total accruals (Accruals), net operating assets (Opa), profit premium (Profit), growth of assets (GA), return on assets (ROA), and return on equities (ROE) are significantly positive, which mean that there are positive relations between market abnormal returns with lagged investor sentiment. Therefore, following high investor sentiment, the profits from a long-short strategy will be more and short leg portfolios will mostly provide gains at the same time. We consider the findings of this study to be not only an important supplementary of the Chinese A-share stock market to the existing theories on global investor sentiment, but also efficient strategies for investors to determine the movement of stock returns and make their investing decisions.

Keywords: stock market, investor rationality, irrational behavior, stock market anomalies, international financial markets

1. Introduction

From the view of behavioral finance, stock prices are affected by the actions of irrational investors who are subjective in making decisions. Their irrational actions are costly and risky to arbitrage, especially in terms of stocks that are more speculative and have arbitrage constraints. A large number of psychological studies and empirical results, such as those on noise traders (Black, 1986), behavioral biases (Ritter, 2003) and market anomalies (Schwert, 2003) indicate that increasingly more people are believing that investor sentiment does affect prices and make arbitrage risky to a certain extent.

As confirmed by Baker, Wurgler and Yuan (2012) and Stambaugh, Yu and Yuan (2012), investor sentiment not only affects aggregate market returns (Qiu & Welch, 2004; Baker & Wurgler, 2006, 2007) but also has an influence on abnormal market returns that are caused by market anomalies. Stambaugh et al. (2012) discover that long-short portfolio returns that are formed by both of their market anomalies are higher following high investor sentiment than those following low investor sentiment, and the short leg returns of market anomalies are more profitable than the long leg returns with high lagged levels of investor sentiment. Moreover, the measurements of investor sentiment have also undergone a series of changes. The methods of generating investor sentiment indexes have gradually changed to indirect from direct. Recently, a new indirect method was put forth in Baker and Wurgler (2006) and refined in Baker and Wurgler (2007).

China is now recognized as the one of the most significantly developing countries in the world, and China will become an important market to global investors increasingly. However, China has capital controls on limitations in both foreign ownership of domestic equity and domestic investment in foreign capital market. The two classes of different shares as A-shares (established for domestic investors) and B-shares (established for foreign investors) listed on stock exchanges make this capital control realized and restrict Chinese stock market freely flow and this is considered as China is not an open market, thus can affect the investors' behavior accordingly. Due to the apparently unlimited growth potential, the lack of material interests among global investors, less openness of the capital market and the short of an earnings history in China, there is little rigorous investigation

on Chinese stock anomalies and the role of investor sentiment should be tremendous. Although the Chinese economy has been developing at a fast pace and is large in scale, Hu (1999) argues that it is very different between the Chinese stock market and that of other countries, especially in terms of the extent of government regulations and the investor composition. In China, the quality of financial data about listed companies are not reliable and it is not fully developed about the stock market's framework of regulatory. One of the most special institutional characters of the Chinese A-share stock market is the absolute dominance of individual investors, which results in the profitability of contrarian and momentum strategies. Most of the individual investors only have fundamental knowledge about investments in stocks and they are trading as noise traders who purely speculate in the stock market, yet Chinese investors, markets and regulations seem to be lagging behind (Allen, Qian & Qian, 2005). For instance, according to Chen, Kim, Nofsinger and Rui (2003), Fan, Shi and Wang (2006) and Li, Rhee and Wang (2015), individual investors in China are thought to be unsophisticated, lack investment experience and exhibit behavioral biases, such as overconfidence and herding. The Chinese stock market is also regarded to be less efficient compared with that of other developed countries. Therefore, it should not be surprising that investor sentiment has an effect on the Chinese stock market.

This study therefore focuses on the A shares of the Shanghai Stock Exchange (SSE) and the Shenzhen Stock Exchange (SZSE) in China. The main objective of this study is to investigate the relationship between investor sentiment and market anomalies in the Chinese A-share stock market. In particular, we study 13 asset pricing anomalies, namely, firm size (Size), total risk (Sigma), book-to-market (BM) ratio, sales growth (SG), Ohlson O-score (O-score), stock issuance growth (Issue), total accruals (Accruals), net operating assets (Opa), profit premium (Profit), growth of assets (GA), return on assets (ROA), return on equities (ROE) and investment to assets (ITA). We also investigate the relationship between investor sentiment and abnormal stock returns.

First, we have generated an investor sentiment index of Chinese A-share stock markets by using the "top down" method which focuses on a measurement to reduce the component indices of aggregate sentiment and explain the effect of investor sentiment on both individual stocks and whole market returns, which is in line with the work of Baker et al. (2012). We calculate the first principal component of four orthogonal sentiment indices which are obtained by regressions of four raw sentiment indices on the growth rate of the consumer price index and the industry gross domestic product (GDP).

In the following, we work on the relationships between investor sentiment and market abnormal returns caused by market anomalies, including Size, Sigma, BM ratio, SG, O-score, Issue, Accruals, Opa, Profit, GA, ROA, ROE, and ITA.

To test the effect of investor sentiment on market anomalies, we construct long-short portfolios by ranking 13 factors of market anomalies. For each of the 13 factors, we calculate the value-weighted average portfolio returns with each decile of the ranked variable. The long portfolio is the highest-performing decile while the short portfolio is the lowest-performing one.

While some articles have focused on the effect of investor sentiment on the Chinese stock market, such as Chen et al. (2003), Chen, Rui and Wang (2005), Fan et al. (2006), Kling and Gao (2008), Chen, Kim, Yao and Yu (2010) and Li et al. (2015), who all verified that investor sentiment should play a role in the Chinese markets, they failed to actually use investor sentiment to explain for the market anomalies in the Chinese stock markets.

Consequently, in this study, we have created an investor sentiment index of the Chinese A-share stock market and find that following high investor sentiment, the returns of long-short strategies and short-leg are more profitable in the Chinese A-share stock market. We find that the factors of Size, Sigma, Issue, Accruals, Opa, Profit, GA, ROA, and ROE are significantly positive which means that there are positive relations between market abnormal returns and lagged investor sentiment. The factors of BM ratio, SG, O-score and ITA are also positive, but not significant. Due to short-selling limits, the long-short strategies shall be stronger under high investor sentiment in the assumption that most of the mispricing is overpricing. In agreement with the results of Stambaugh et al. (2012) on the U.S. market, this study supports both of the hypotheses that abnormal market returns caused by market anomalies are stronger following high investor sentiment than low investor sentiment, and the average returns of short-leg are more profitable with high lagged levels of investor sentiment.

Our study contributes to the literature in several ways. First, we have created an investor sentiment index for the Chinese A-share stock market to study the investor sentiment in China, and we find a positive relationship between high investor sentiment and the returns of long-short strategies and short-leg in China. Secondly, we contribute to the literature on asset pricing anomalies in the Chinese stock markets by examining the effect of investor sentiment on 13 anomalies, and we find positive relations between market abnormal returns and lagged investor sentiment. Thirdly, our findings are consistent with those of Stambaugh et al. (2012) on the U.S. market

which can be regarded as a comparative study for academics to use in investigations in China as well as other countries. Finally, we summarize the studies on both theoretical and empirical analyses of investor sentiment and market anomalies.

This paper is organized as follows: Section 2 provides a review on the existing literature and the development of the hypotheses. Section 3 provides a description of the data sample and the regression model. Section 4 is a discussion on the primary empirical results. Finally, Section 5 concludes the paper.

2. Literature Review

2.1 Market Anomalies

As investor sentiment reflects the attitude and propensity of individual investors to speculate, investor sentiment has a strong positive relationship with the returns of so-called 'speculative stocks'. The contemporaneously higher returns with increased investor sentiment suggest the prediction ability of investor sentiment as it may drive the current prices of 'speculative stocks' much higher to the distributing of overvalued shares.

The question that follows is then to ask which types of stock are 'speculative'. According to Baker and Wurgler (2006, 2007), stocks of firms which are difficult to value are more speculative. In normal circumstances, firms that are small in size, young, unprofitable yet have potential profitability and even those that have higher volatility of returns (Note 1) are thought to be hard to value and predict. Besides, the stocks of these firms are also costly to trade (D'Avolio, 2002) so that investor sentiment may be more effective than arbitrage.

In past studies, academics have only studied the difference in portfolio returns from stocks ranked with different characteristics and provided empirical evidence that different stock portfolios ranked by various characteristics have higher returns than others. The "extra" profit generated from these portfolios cannot be explained by exposure to systematic risk and is therefore called an "anomaly". The following is a review of 13 of the most influential anomalies that have been identified in recent asset pricing studies.

Despite that the firm characteristics, such as Size, Sigma, BM ratio, SG, O-score, Issue, Accruals, Opa, Profit, GA, ROA, ROE, and ITA, which have caused abnormal returns for stocks, there are other impact factors which are related to abnormal returns. These abnormal returns which are by different impact factors and cannot be explained by traditional finance are collectively called market anomalies (Schwert, 2003).

Chen, Novy-Marx and Zhang (2010) have failed to use traditional asset pricing models including the capital asset pricing model (CAPM) and the Fama and French 3-factor model to interpret market anomalies. However, Stambaugh et al. (2012) successfully demonstrate that investor sentiment plays a role in market anomalies, and prove that investor sentiment has a positive relationship with market anomalies.

Therefore, this study selects 13 impact factors: Size, Sigma, BM ratio, SG, O-score, Issue, Accruals, Opa, Profit, GA, ROA, ROE and ITA as the market anomalies for investigating the relationship between investor sentiment and abnormal stock returns.

2.2 Investor Sentiment and Sentiment Indices

Since investor sentiment was introduced into finance studies, many psychological and empirical economic models have proven that individual investors have cognitive biases and they may not be very sophisticated (Ritter, 2003; Shleifer, 2000).

Psychological biases are found in many investors and markets, and researchers have come up with many different types of such biases (Hirshleifer, 2001; Ritter, 2003; Lo, 2005; Baltussen, 2009) such as loss aversion (Kahneman & Tversky, 1979, Kahneman & Tversky, 1984; Kahneman, Knetsch & Thaler, 1990), overconfidence (Fischoff, Lichtenstein & Slovic, 1980; Wang, 2001; Trivers, 2010); hyperbolic discounting (Laibson, 1997; Frederick, Loewenstein & O'Donoghue, 2002); heuristic simplification (Benartzi & Thaler, 2001); herding behavior (Huberman & Regev, 2001; Brunnermeier, 2001; Hirshleifer & Teoh, 2003); the disposition effect (Baker & Nofsinger, 2002); representativeness bias (Shefrin, 2008) and so on and so forth. Besides, most of these psychological biases have been demonstrated to take place in Chinese investors (Chen et al., 2003, 2007; Li et al., 2015).

Empirical results show that investor sentiment does exist (Wang, 2001) and affects market equilibrium. In the work by De Long, Shleifer, Summers, and Waldmann (1990) and Shleifer and Vishny (1997), it is said that investors are subject to sentiment and arbitrage against the volatility of irrational investors ('noise traders'), in that trading is costly and risky because investor sentiment is partly unpredictable (Barberis, Shleifer & Vishny, 1998). Joseph, Wintoki and Zhang (2011) use investor sentiment to forecast abnormal stock returns and trading volume, Chung, Hung and Yeh (2012) examine the timing when investor sentiment predicts stock returns, and

Bathia and Bredin (2013) examine the effect of investor sentiment on G7 stock market returns. Qian (2014) finds that small trade imbalances are negatively associated with future stock returns and only exists when stocks have been initially mispriced and the mispricing occurs before the sentimental trading of small investors.

By far, researchers have mainly used two means to estimate investor sentiment: direct measurement or the 'bottom-up' method which usually uses surveys and polls, and the indirect measurement or the 'top-down' method, as established by Baker and Wurgler (2007). Most countries (Note 2), from the U.S. (MCSI, CCI) (Note 3) to India, have their own consumer confidence surveys. However, as the data from the direct measurement method are from surveys and polls, there are unavoidable problems in terms of the integrity, immediacy and accuracy.

The indirect measurement method is now adopted more often by behavioral financial academics due to the limitations of the direct measurement method. This so-called 'top-down' or indirect measurement method was first put forth in Baker and Wurgler (2006) and refined in Baker and Wurgler (2007). Baker and Wurgler (2006) select closed-end fund discount ($CFED_t$), NYSE share turnover ($TURN_{t-1}$), number of annual initial public offerings (IPOs) ($NIPO_t$), average first-day returns of IPOs ($RIPO_{t-1}$), firm supply response (S_t) (Note 4) and dividend premium ($P^{D\text{-}ND}_{t-1}$) (Note 5) as the six proxies for the time-series conditioning of investor sentiment. Then they use the statistic method of the first principal component analysis (Note 6) to obtain the aggregate investor sentiment. In this study, we also adopt the 'top-down' method found in Baker and Wurgler (2006, 2007) and Baker et al. (2012) to estimate the aggregate market investor sentiment in the China stock market.

2.3 Chinese Stock Market

There are currently two stock markets in China: the SSE which was established on December 19th, 1990 and the SZSE, which was established on July 3rd, 1991. Both are administrated by the China Securities Regulatory Commission. Compare to the stock market of developed countries, China has limitation on capital flow and regulations on capital control. China has restriction on the access by foreign investors and establishes different types of shares for domestic investors and for foreigner. A-share are listed in either Shanghai or Shenzhen as domestic-only shares, B-share are listed in Shanghai or Shenzhen as foreign-only shares. In 1997, about ninety listed firms had both a domestic and a foreign type of shares. However, foreign investors cannot purchase A-share legally, and domestic investors cannot purchase B-share until around 2001 with authorized foreign-currency account. As the establishment of the stock exchanges in China is late and the relatively closed capital market compared with developed countries, Chinese markets have a short trading history and are thought to be younger and less efficient (Ng & Wu, 2007; Kling & Gao, 2008). As the stock trading on these markets involve small amounts of stocks, the data analysis of this study will actually start from the year of 1997.

Chen et al. (2003) also confirm that Chinese investors have behavioral biases, such as overconfidence which cannot be fully excused by the lack of cognitive sophistication. Generally speaking, factors that have been demonstrated to have prediction effects on stock returns are firm size (Wang & Xu, 2004), price momentum (Kang, Liu, & Ni, 2002; Naughton, Truong, & Veeraraghavan, 2008), trading volume (Wang and Chin, 2004; Wang and Cheng, 2004) and so on. Besides, Eun and Huang (2007) and Chen et al. (2010) test more firm-specific variables that predict cross-sectional stock returns. According to Chen et al. (2003), Fan et al. (2006) and Li et al. (2015), Chinese investors are recognized as unsophisticated, more irrational and less knowledgeable and experienced. Thus, it could be assumed that investor sentiment has a role in the Chinese markets (Kang et al., 2002). Gong and Shan (2012) indicate that the interaction of local bias and investor sentiment affects stock returns, Chi, Song, and Zhuang (2012) indicate that investor sentiment has a significant impact on stock returns in the Chinese stock market, and Yang and Zhang (2014) argue that mixed-frequency investor sentiment has impacts on stock returns in China.

3. Data and Research Methodology

3.1 Data Source

The data on the firm characteristics, stock price, stock trading volume and stock returns are from the China Stock Market & Accounting Research (CSMAR) database. The monthly risk-free rate (RF) which is calculated as the monthly bank deposit interest rate that is fairly transformed by 1-year bank deposit interest rates is taken from the website of the Bank of China (Note 7).

Table 1. Description of raw data

Item	CSMAR code	Description
RTN	Yretwd	monthly stock return with cash dividend reinvested of each stock
DV	Ynvaltrd	yearly dollar volume
MV	Ysmvttl	year-end market value
Price	Yclsprc	year-end stock price
NOSH	Nshrttl	year-end shares outstanding
MTB	-	year-end market to book ratio calculated as market value divided by the shareholder's equity
TA	A001000000	year-end total assets
TL	A002000000	year-end total liabilities
TE	A003000000	the year-end shareholder's equity
CA	A001100000	year-end total current assets
NCA	A001200000	year-end non-current assets
CL	A002100000	year-end current liabilities
NCL	A002200000	year-end non-current liabilities
Cash	A001101000	cash and cash equivalents which contains cash on hand, bank and overseas deposits, bank draft deposits
INV	A001123000	net inventories which equals to inventories minus the provision for decline in value of inventories
PPE	A001212000	the net fixed assets which is the difference between the fixed assets and the accumulated depreciation and impairment
Sales	B001100000	year-end total operating revenue
DEPR	B001212000	impairment losses
PF	B001000000	year-end total profit
E	B002000000	year-end net profit
CFO	C002001000	net cash flow from operating activities
FRTN	Retnfstd	market adjusted first-day return of each IPO
NOIPO	-	yearly total number of the IPOs
RF	-	monthly bank deposit interest rate that fairly transformed by 1-year bank deposit interest rates

Note. This table presents all the description of the raw time-series data from 1996 to 2009.

The 'Item' is the abbreviation that used in this study. The 'CSMAR Code' represents the codes of the data in the CSMAR data base. The 'Stock code' are the listing code of the data in Shanghai Stock Exchange and Shenzhen Stock Exchange. The 'Description' gives the explanation of each data.

Table 1 provides details on all of the raw data, including the CSMAR codes and description for the raw time-series data from 1996 to 2009.

Table 2. Statistics of raw data

Item	Mean	Std	Min	Max	N	D1	Q1	Median	Q3	D9	Frequency
RTN	0.020	0.169	-0.919	22.053	206517	-0.141	-0.068	0.007	0.091	0.193	Monthly
DV	10.302	26.662	0.000	828.402	16031	0.925	1.635	3.326	8.852	22.906	Yearly
MV	6.830	60.529	0.076	5013.108	16031	0.766	1.225	2.140	4.015	8.250	Yearly
Price	9.574	8.253	0.500	249.740	13840	3.330	4.850	7.630	11.775	17.165	Yearly
NOSH	0.551	4.360	0.050	250.962	13840	0.109	0.158	0.250	0.410	0.742	Yearly
MTB	4.408	15.620	0.210	992.654	14792	1.250	1.802	2.869	4.609	7.094	Yearly
TA	12.527	222.026	0.000	11785.053	16641	0.430	0.727	1.343	2.829	6.455	Yearly
TL	10.128	207.265	0.000	11106.119	16641	0.141	0.286	0.629	1.492	3.519	Yearly
TE	2.399	19.630	-11.065	908.111	16641	0.191	0.374	0.686	1.358	2.942	Yearly
CA	1.349	4.300	0.000	181.535	13421	0.187	0.338	0.638	1.252	2.532	Yearly
NCA	1.686	11.514	0.000	604.228	13421	0.135	0.262	0.523	1.157	2.567	Yearly
CL	1.208	5.341	0.000	261.757	13421	0.112	0.225	0.486	1.051	2.241	Yearly
NCL	0.395	3.103	-0.081	158.056	13421	0.000	0.004	0.040	0.170	0.571	Yearly
Cash	0.491	2.096	0.000	129.205	13350	0.026	0.080	0.195	0.428	0.921	Yearly
INV	0.575	3.009	-0.004	141.611	13299	0.020	0.062	0.162	0.408	1.046	Yearly
PPE	0.575	3.009	-0.004	141.611	13350	0.020	0.062	0.162	0.408	1.046	Yearly
Sales	3.224	27.542	-0.098	1452.101	15458	0.130	0.292	0.714	1.781	4.513	Yearly

DEPR	1.362	10.008	-0.345	465.182	13350	0.065	0.151	0.335	0.806	1.985	Yearly
PF	0.187	1.530	-13.985	82.911	12216	-0.034	0.014	0.050	0.126	0.340	Yearly
E	0.143	1.141	-14.046	57.153	12216	-0.035	0.011	0.041	0.103	0.279	Yearly
CFO	0.372	3.702	-40.071	158.796	12216	-0.052	0.003	0.055	0.173	0.495	Yearly
FRTN	1.911	3.777	-0.800	49.000	1414	0.331	0.653	1.098	1.758	2.878	Yearly
NOIPO	93.154	45.973	15.000	206.000	13	63.000	67.000	79.000	106.000	137.000	Yearly
RF	0.002	0.001	0.002	0.006	156	0.002	0.002	0.002	0.003	0.004	Monthly

Note. This table presents descriptive statistics for the raw time-series data from 1996 to 2009.

Here, 'Mean' is the mean value of the data, 'Std' is the standard deviation of the data, 'Min' is the minimum value of the data, 'Max' is the maximum value of the data, 'N' is the number of the data, 'D1' and 'D9' are the first and ninth decile data, 'Q1' and 'Q3' are the first and third quartile data and 'Median' is the median data. The last column of the table represents the data frequency, "Monthly" means the data is monthly calculation while "Yearly" means the data is yearly calculation.

Here, we report DV, MV, TA, TL, TE, Sales, NOSH, CA, NCA, CL, NCL, PF, E, Cash, INV, PPE, Depr and CFO in billion.

Table 2 is a summary of all the descriptive statistics of the raw data from 1996 to 2009. For items such as yearly dollar volume (DV), year-end market value (MV), year-end total assets (TA), year-end total liabilities (TL), the year-end shareholder's equity (TE), year-end total operating revenue (Sales), year-end shares outstanding (NOSH), year-end total current assets (CA), year-end non-current assets (NCA), year-end current liabilities (CL), year-end non-current liabilities (NCL), year-end total profit (PF), year-end net profit (E), cash and cash equivalents which contains cash on hand, bank and overseas deposits, bank draft deposits (Cash), net inventories which equals to inventories minus the provision for decline in value of inventories (INV), the net fixed assets which is the difference between the fixed assets and the accumulated depreciation and impairment (PPE), impairment losses (Depr) and net cash flow from operating activities (CFO), the values are reported in unit of billions as the numbers are too large. The last column of the table provides the data frequency. "Monthly" means that the data is calculated monthly while "Yearly" means that the data is calculated on an annual basis.

3.2 Investor Sentiment Indices

Baker and Wurgler (2006) use $CFED_t$, $TURN_{t-1}$, $NIPO_t$, $RIPO_{t-1}$, S_t (Note 8) and $P^{D\text{-}ND}_{t-1}$ (Note 9) as the six proxies for the time-series conditioning of investor sentiment. Then they use the first principal component analysis to obtain the aggregate investor sentiment. To avoid the effect of the macro-economy, they used the respective residuals of the regressions of the six proxies with five macroeconomic indices (the growth rate of industrial production, consumer durables, nondurables, services and recession dummy variable) to form another market investor sentiment index also with the first principal component analysis.

This study mainly follows the method of Baker et al. (2012), which is an international study on investor sentiment, to generate an investor sentiment index, with 4 macro proxies that are orthogonal as the premium for volatility (*PVOL*), number of annual IPOs (*NIPO*), average first-day returns of IPOs (*RIPO*) and annual market turnover (*TURN*). In line with the frequency found in Baker et al. (2012), we calculate investor sentiment yearly based on the simple belief that if the yearly sentiment index does not vary much, the same will apply to the monthly index.

Table 3. Sentiment indices and investor sentiment index, 1997-2009

	Statistics				**Correlations of Raw Sentiment Indices**			**P-value**		
	Mean	SD	Min	Max	$PVOL_{raw}$	$NIPO_{raw}$	$RIPO_{raw}$	$PVOL_{raw}$	$NIPO_{raw}$	$RIPO_{raw}$
$PVOL_{raw}$	0.506	0.209	-0.03	0.761	1			(.)		
$NIPO_{raw}$	0.528	0.613	2.708	5.328	0.269	1		(0.374)		
$RIPO_{raw}$	0.418	0.804	0.451	2.875	0.280	0.637**	1	(0.354)	(0.019)	
$TURN_{raw}$	0.540	0.721	-0.450	1.632	0.580*	0.418	0.157	(0.038)	(0.156)	(0.610)
Correlations of Orthogonal Sentiment Indices				**P-value**			**Correlation with $SENT_t$**		**Eigenvectors**	**Eigenvalues**
	$PVOL_{orth}$	$NIPO_{orth}$	$RIPO_{orth}$	$PVOL_{orth}$	$NIPO_{orth}$	$RIPO_{orth}$	$SENT_t$	P-value		
$PVOL_{orth}$	1			(.)			0.601**	(0.030)	0.506	0.5147
$NIPO_{orth}$	0.242	1		(0.426)			0.797***	(0.001)	0.528	
$RIPO_{orth}$	0.208	0.519*	1	(0.495)	(0.069)		0.644**	(0.018)	0.417	
$TURN_{orth}$	0.604*	0.418	0.123	(0.029)	(0.155)	(0.688)	0.782**	(0.018)	0.540	

Note. This table reports the sentiment indices and investor sentiment index from 1997 to 2009 of China.

The orthogonal four sentiment indices ($PVOL_{orth}$, $NIPO_{orth}$, $RIPO_{orth}$, $TURN_{orth}$) are obtained as the residuals by the orthogonal measure which respectively uses the original sentiment indices ($PVOL_{raw}$, $NIPO_{raw}$, $RIPO_{raw}$, $TURN_{raw}$) to do regressions with both the growth ratio of Consumer Price Index and the growth ratio of GDP Indices of Industry. $SENT_t$ is formed by a linear function of the four orthogonal indices ($PVOL_{orth}$, $NIPO_{orth}$, $RIPO_{orth}$, $TURN_{orth}$) from the method of first principal component analysis. We calculate the correlations among the four raw sentiment indices ($PVOL_{raw}$, $NIPO_{raw}$, $RIPO_{raw}$, $TURN_{raw}$), the correlations of final sentiment index ($SENT_t$) with the four orthogonal proxies ($PVOL_{orth}$, $NIPO_{orth}$, $RIPO_{orth}$, $TURN_{orth}$) and among themselves.

3.2.1 Premium for Volatility

The first index in the study is *PVOL*, which has the same effect as the dividend premium ($P^{D\text{-}ND}$). The paying of dividends is regarded as a sign of stability of the firm (Note 10) in the U.S. However, in China and other emerging markets, the situation may be not the same, so Baker et al. (2012) calculate the *PVOL* as the reverse index of a firm's stability.

When investors have high sentiment, they will prefer to speculate on stocks with high volatility and therefore, the premium of highly volatile stocks is high. In accordance with the method in Baker et al. (2012), $PVOL_{raw}$ is calculated as the log of the value-weighted average market-to-book ratios of stocks with high volatility divided by annual value-weighted average of the market-to-book ratios of stocks with low volatility. The raw data of RTN (Yretwd) as shown in Tables 1 and 2 are selected to calculate the yearly variance of the monthly stock returns of the previous year. All of the stocks are ranked by the variance of the previous year and the averages are divided into ten groups for each year. The top three groups of the stocks are defined as higher volatility stock portfolios while the bottom 30% stocks are defined as the low volatility stock portfolios.

As shown in Table 3, the mean of $PVOL_{raw}$ is 0.506 which is a good indicator of a general relationship where high volatility stocks have higher market-to-book ratios as opposed to low volatility stocks. As market-to-book ratio is a good predictor of future growth opportunity, it can be argued that *PVOLraw* has a positive relationship with investor sentiment.

3.2.2 Number of IPOs

The second sentiment index is $NIPO_{raw}$. $NIPO_{raw}$ is generated as the log ratio of the annual number of IPOs. The Chinese stock market is a newly developing and rapidly burgeoning market compared to that of western countries. The two main stock exchanges, the SSE and SZSE, were both founded in late 1990. The issuance and development of IPOs in China substantially grew in the meantime in line with the rapidly developing economy in China. The number of issuance of IPOs ($NIPO_{raw}$) also has a close connection with first-day IPO returns ($RIPO_{raw}$). If the return is high, then underwriters are prone to issue more IPOs into a 'hot' market.

In both Tables 2 and 3, the original statistic figures of NOIPO and the log ratios of the NOIPO present the trend and development of the annual number of IPOs, respectively. The largest number of IPOs that are listed in a year is 206 in Table 2 (5.328 as the log ratio in Table 3) in 2009, while the smallest number of annual published IPOs is 15 (2.708 as the log ratio in Table 3) in 1996. There is a large gap between the Min and the Max number of annual IPOs and the standard deviation is also very large (45.973 in Table 2 and 0.613 in Table 3). The ninth decile data (D9) of NOIPO in Table 2 is only 137, which is almost half of the largest number. These figures verify that the large and rapid increase in the number of annual IPO issuance has been mostly in the last few years and also show the significant growth of the China stock market and China IPOs.

3.2.3 Initial Returns of IPOs

The third sentiment index is $RIPO_{raw}$. The underpricing of the IPOs (Note 11) of stocks is a good sign of the market and its participants. The first-day returns of IPOs are excellent representatives of investor enthusiasm and low long-run returns is also a sign of market timing (Stigler, 1964; Ritter, 1991; Loughran, Ritter & Rydqvist, 1994). $RIPO_{raw}$ is the annual log ratio of the equally weighted average first-day returns of IPOs. The first-day return of IPOs is the so-called initial return which is calculated as the excess return rate of the first-day closing price divided by the issuing price.

As the statistics show in Table 3, the min and max values of log *RIPO* are 0.451 and 2.875, respectively far more larger than the normal stock returns as the mean of RTN in Table 2 is only 0.02 (Note 12) (Ln (0.02) = -3.912). These excessively high returns on the first trading day of IPOs really cannot be explained by some independent factors without considering investor sentiment. The correlation of $RIPO_{raw}$ and $NIPO_{raw}$ is significantly positive as the Pearson's correlation coefficient is 0.637 at a 95% level of significance as the p-value is 0.019. If the first-day returns of IPOs are high, underwriters are willing to issue more IPOs as this signals that the market is 'hot'.

3.2.4 Market Turnover

The last sentiment index is $TURN_{raw}$. $TURN_{raw}$ is equal to the log ratio of the annual total market turnover. Market turnover or the trading volume is a good indicator of market liquidity. Individual investors would increase the magnitude of their trading only if when they have positive sentiments about the stock market. In other words, market turnover can be regarded as a symptom of the overestimation of irrational investors (Jones, 2002; Scheinkman & Xiong, 2003; Baker & Stein, 2004). It should be mentioned that the calculation of the annual market turnover (*TURN*) in Baker et al. (2012) has a detrending step of the market turnover to avoid unirooting and long-position biases and other distortions that can occur in long-term analysis. However, as the trading history in the Chinese stock market is very short and there is the lack of evidence of unirooting, we have not conducted detrending in this study. The index is calculated as the log ratio of the dollar volume over the whole year divided by the previous year-end market value. The raw data of DV (Ynvaltrd) and MV (Ysmvttl) in Tables 1 and 2 are used to calculate this ratio.

Under short-selling limits in the Chinese stock market, trading turnover is a good sign of investor sentiment as it explicitly demonstrates the preferences and emotions of the investors towards the stocks, hence affecting the trading volume of the stocks.

3.2.5 Investor Sentiment Index

In consideration of the influence of the trend of the entire market and the business cycle, we first obtain an orthogonal measure that would eliminate the effect of the macro-economy. The growth ratios of industry GDP and consumer price indexes are selected as the representatives of the macro-economy from the CSMAR. The original sentiment indices ($PVOL_{raw}$, $NIPO_{raw}$, $RIPO_{raw}$, $TURN_{raw}$) are regressed with these two growth ratios respectively and the corresponding residuals are regarded as the four orthogonal sentiment indices ($PVOL_{orth}$, $NIPO_{orth}$, $RIPO_{orth}$, $TURN_{orth}$).

Then, to abstract the common part from $PVOL_{orth}$, $NIPO_{orth}$, $RIPO_{orth}$, $TURN_{orth}$, we follow the first principal component analysis method on these four sentiment indices, in accordance with Brown and Cliff (2004), Baker and Wurgler (2006, 2007) and Baker et al. (2012). The final investor sentiment index ($SENT_t$) is constructed as a linear function of the four orthogonal sentiment indices:

$$SENT_t = 0.51\ PVOL_{orth} + 0.53\ NIPO_{orth} + 0.42\ RIPO_{orth} + 0.54 TURN_{orth}$$

The column of Eigenvectors in Table 3 shows the coefficients of the four orthogonal sentiment indices in the linear function of the investor sentiment index. The eigenvalues of the correlation matrix is 0.5172 which means that the first principal component explains for 51.72% of the sample variance of the four orthogonal indices. The second principal component is not used as the first one already represents most of the sample variance. Compared with the results of Baker et al. (2012), the investor sentiment index in China is reasonable and similar to the indexes of the six countries as well as the global index in their study.

We also calculate the correlations among the four raw sentiment indices ($PVOL_{raw}$, $NIPO_{raw}$, $RIPO_{raw}$, $TURN_{raw}$) and the correlations among the four orthogonal proxies ($PVOL_{orth}$, $NIPO_{orth}$, $RIPO_{orth}$, $TURN_{orth}$). They all have positive correlations with each other. The positive correlations sustain the application of the first principal component analysis as the ordinary average method may increase the effects of investor sentiment as partial indices are highly correlated with each other.

Besides, the results of the correlations of the four orthogonal proxies ($PVOL_{orth}$, $NIPO_{orth}$, $RIPO_{orth}$, $TURN_{orth}$) with investor sentiment index ($SENT_t$) are significantly positive which indicate that if investor sentiment is high, the potential propensity to speculate, IPO volume, IPO original returns and stock market turnover are simultaneously high.

As to the proxy of close-end fund discount ($CFED_t$) used in Baker and Wurgler (2006), actually, $CFED_t$ is the average difference between the net asset values (NAV) of closed-end stock fund shares and their market prices. In most practical situations, the difference is at a discount. According to an abundance of studies, including Zweig (1973), Thaler (1980), Lee and Shleifer (1991), Neal and Wheatley (1998), Scheinkman and Xiong (2003), and Baker and Stein (2004), if investor sentiment is negative, then the discount will increase under the situation that the closed-end funds are held unevenly by individual investors. The reason why Baker et al. (2012) and our study don't use the proxies of the $CFED_t$ and S_t is that the data for these two proxies are difficult to obtain. Besides, as in the paper of Baker et al. (2012), which mainly talks about the effect of global investor sentiment, we really want to do the same with their measurement but on a comparison between a Chinese investor sentiment index with their global investor sentiment index and the investor sentiment indexes of other countries.

3.3 Market Anomalies

Results of empirical studies and economics have demonstrated that the stocks of firms with specific characteristics are detected to have abnormal returns compared with normal stocks. These abnormal fluctuations have been studied by financial academics and professional investors for quite some time since they have been found. From the view of behavioral finance, these anomalous results are caused by the psychology and emotions of individual investors who are not as rational as traditional finance theories have assumed. Experts in behavioral finance have therefore introduced market anomalies to interpret volatilities through the psychology and behavior of investors.

In previous work, abnormal returns are found in the Chinese markets. In this study, we select thirteen typical factors as the market anomalies and attempt to find the relations between the generated investor sentiment and these abnormal stock returns (Stambaugh et al., 2012; Chen et al., 2010), as follows.

3.3.1 Firm Size (Size)

Size is measured as the market value of a firm. As mentioned before, the size effect has been demonstrated to affect the stock returns in that stocks of companies that are small in size are supposed to have higher potential returns than those of firms that are large in size (Keim, 1983; Horowitz, Loughran & Savin, 2000; Mathur, Pettengill & Sundaram, 2002). The abnormal returns cannot be explained by traditional asset pricing models, so that some academics have attempted to do so in other ways (Amihud & Mendelson, 1991; Vassalou & Xing, 2004; Hwang, Min, McDonald, Kim, & Kim, 2010), as well as by using investor behavior (Van, 2011). This study will follow their line of thought by using investor sentiment.

3.3.2 Total Risk (Sigma)

Sigma is calculated as the annual variance of the monthly returns for each stock. This factor is thought to be a good indicator of the stability of a firm. It is commonly known that high volatility suggests high risk which calls for high returns for compensation (Ali et al., 2003). Investors may expect more returns and invest in high risk stocks when they are confident about the market and the individual stocks.

3.3.3 Book-to-Market Ratio (BM Ratio)

The BM ratio is equal to the equity of shareholders divided by the market value of a firm. The stock with a high BM ratio is called a 'value stock'. The value effect is that stocks with a higher BM ratio are found to have higher subsequent returns than those with a lower BM ratio (Fama & French, 1992, 1998; Lakonishok et al., 1994). There are different kinds of explanations for this effect. However, in summarizing all of the explanations, investor sentiment is the crucial element that links these explanations. As academics believe that value stocks are underestimated (Skinner & Sloan, 2002) and thought to be riskier and costlier for arbitragers (Fama & French, 1992; Ali et al., 2003; Shleifer & Vishny, 1997), individual investors may be more prone to speculate on value stocks while the speculation is difficult for arbitrageurs to eliminate.

3.3.4 Sales Growth (SG)

The SG is the annual growth ratio of the sales of a firm. According to the theory of the Enterprise Life Cycle (Mueller, 1972), when the SG rate of a firm is high, it is implied that the firm is young and may be under a growth phase in their life cycle. With the development and expansion of the company, the firm gradually matures and is supposed to have higher returns. Thus, if the firm is young, investors are more willing to invest in it and expect high returns in the future.

3.3.5 Financial Distress (Ohlson O-Score)

The O-score is a measurement that indicates the probability of firm bankruptcy (Ohlson, 1980). This study uses the O-score to indicate financial distress.

The O-score model equation (1) is as follows:

$$\begin{aligned}\text{O-Score} = {} & -1.32 - 0.407\log\left(\frac{\text{total assets}}{\text{GNP price-level index}}\right) + 6.03\left(\frac{\text{total liabilities}}{\text{total assets}}\right) \\ & - 1.43\left(\frac{\text{working capital}}{\text{total assets}}\right) + 0.076\left(\frac{\text{current liabilities}}{\text{total assets}}\right) - 1.72(1 \text{ if total liabilities} > \text{total assets, else } 0) \\ & - 1.83\left(\frac{\text{funds from operations}}{\text{total liabilities}}\right) + 0.285(1 \text{ if a net loss for the last two years, } 0 \text{ otherwise})\end{aligned} \tag{1}$$

If a firm is evaluated by using this model, the score can predict the possibility that a company will default. If the score is high, the firm has a higher risk of default. According to Ohlson (1980), the cutoff point is 0.038.

3.3.6 Stock Issue Growth (Issue)

Issue is thought to be a factor that has effects on the market returns. Companies are more willing to issue shares when they think that their stocks are overvalued by investors (Ritter, 1991; Loughran & Ritter, 1995). Thus, if the Issue ratio is high, the market can probably be regarded as being overestimated. In this study, the Issue ratio is equal to the growth rate of the number of shares outstanding of the previous year.

3.3.7 Total Accruals (Accruals)

Investors may overvalue the accrual part of the earnings of a firm when they make their investment decisions. The empirical results in Sloan (1996) show that stocks of firms with low accruals will have higher potential returns than those with high accruals. We calculate the Accruals as the variation of noncash working capital minus depreciation expenses divided by average total assets for the previous two years.

3.3.8 Net Operating Asset (Opa)

According to Hirshleifer et al. (2004), investors are thought to have the tendency to focus on accounting profits while neglecting cash profits if they are making decisions with limited attention. The Opa is an indicator of the difference between the operating income and free cash flow, and in turn, has a strong negative relation with future returns. The Opa is equal to the difference of the total operating assets and total operating liabilities divided by the total assets.

3.3.9 Profit Premium (Profit)

Novy-Marx (2013) put forth the idea that Profit which equals to gross profit divided by total assets is the cleanest accounting method of true profit calculation. In considering Profit as a factor that causes market anomaly, Novy-Marx (2013) finds that firms with higher Profit are demonstrated to have higher subsequent returns. This study has also added Profit into the analysis.

3.3.10 Growth of Assets (GA)

GA is calculated as the growth rate of the total assets in the previous year. According to Cooper et al. (2008), GA has been demonstrated to cause mispricing of the market returns as firms with a high GA are found to have lower returns in the future. The probable reason is because of the overreaction of individual investors on the expansion of the assets of the company.

3.3.11 Return on Assets (ROA)

Both Fama and French (2006) and Chen et al. (2010) confirm that subsequent returns of more profitable firms will be higher than those of less profitable firms. ROA is calculated as the earnings of the current year divided by the total assets of the previous year.

3.3.12 Return on Equities (ROE)

There is no study on whether ROE have caused market anomalies. As ROE is similar to ROA, we have added this factor in our analysis to determine if investor sentiment also plays a role. ROE is measured as the earnings of the current year divided by the equity of the shareholders of the previous year.

3.3.13 Investment to Assets (ITA)

According to previous studies, the ratio of ITA has a negative relationship with future returns (Titman, Wei, & Xie, 2004). The main reason that can explain this phenomenon is that the overinvestment in assets by managers is under-reacted by individual investors. However, in the paper of Stambaugh et al. (2012), they do not find that investor sentiment significantly affects this factor with data from the U.S. market. In this study, we have added this factor to determine what the situation would be like in the Chinese stock market.

3.4 Theoretical and Empirical Approaches

To test the prediction effect of investor sentiment on the long-short strategy of portfolio returns of market anomalies, the long-short portfolio is built first by the ranking of each factor of market anomaly. For each abnormal factor, the value-weighted portfolio returns are calculated for each decile of the ranked variable. The long portfolio is the highest-performing decile while the short portfolio is the lowest-performing one.

To distinctively show the difference of the market anomalies that are caused by the factors, we follow the method in Stambaugh et al. (2012). We rank all of the stocks by using specific variables of market anomalies and then categorize all of the stocks into ten portfolios. For each factor of the market anomalies, the value-weighted

portfolio returns are calculated for each decile of the ranked variable. The long-short strategy is that the long portfolio is the highest-performing decile while the short portfolio is the lowest-performing one.

The empirical analysis for investor sentiment and long-short strategy comprise two parts. The first part focuses on the relationship of investor sentiment with the portfolio returns of the long-short strategy. The second part concentrates on the predictive regression of the long-short strategy.

In Part 1, the main objective is to confirm that investor sentiment plays a role in the abnormal returns caused by market anomalies. The Pearson's correlation and simple weighted mean are applied.

First, we calculate the Pearson's correlations of all the long-short portfolio returns formed by market anomalies respectively to detect them. As there is the assumption that investor sentiment affects abnormal returns which is calculated by the long-short strategy, it is believed that portfolio returns should have some common trends or the same patterns. Furthermore, to eliminate the mutual effect that comes from the variation of aggregate market returns, we take the residuals of long-short portfolio returns from the regression with the Fama-French 3-factor model. The equation (2) is as follows:

$$R_{i,t} = a_i + b_1 MKT_t + b_2 SMB_t + b_3 HML_t + e_{i,t} \quad (2)$$

Here, the portfolio returns for long and short legs are excess returns minus the RF (Note 13) MKT_t is the market premium which is calculated as the difference between the average index returns of the SSE and the SZSE Composite Indexes and the monthly bank deposit interest rate that is fairly transformed by 1-year bank deposit interest rates. SMB_t is the return spread between small and large firms and defined as the monthly average return difference between three small sized portfolios and three large sized portfolios. HML_t is the return spread between stocks with high and low BM ratios, equal to the monthly average return difference between value and growth portfolios.

Secondly, we calculate the excess value-weighted monthly portfolio returns of long and short legs and long minus short spread in the cases where the lagged investor sentiment is high, low and high minus low. Here, the investor sentiment index is ranked in value. If the investor sentiment index is higher than the median value, it is defined as high and vice versa. Besides, the t-statistic test is added to see if the results are significant.

In Part 2, we mainly use regressions to demonstrate the predictive effect on the portfolio returns formed by market anomalies.

First, to see if there is some relationship between investor sentiment and portfolio returns, we carry out time-series regressions of portfolio returns of long and short legs and long-short spread on the lagged investor sentiment index.

The predictive regression model equation (3) is as follows:

$$R_{i,t} = a_{i,t} + bSENT_{t-1} + e_{i,t} \quad (3)$$

Secondly, to determine the influence of market fluctuations, we add in the factor of market premium into the equation.

The modified predictive regression model equation (4) is as follows:

$$R_{i,t} = a_{i,t} + bSENT_{t-1} + b_1 MKT_t + e_{i,t} \quad (4)$$

Here, MKT_t is the market premium which is calculated as the difference between the market returns and the monthly bank deposit interest rate that is fairly transformed by 1-year bank deposit interest rates. The market return is represented respectively by IND and IND-A. IND is the average index returns of the SSE and the SZSE Composite Indexes, IND-A is calculated as the average index returns of the SSE and the SZSE Composite A-Share Indexes.

4. Empirical Results

4.1 Investor Sentiment with Portfolio Returns

The hypothesis of this study is to ask whether investor sentiment has positive relations with the abnormal returns caused by market anomalies. The long-short strategy is used to test the relationship. The long-short portfolios are formed by the ranking of variables including Size, Sigma, Size, Sigma, BM ratio, SG, O-score, Issue, Accruals, Opa, Profit, GA, ROA, ROE, and ITA.

The long-short strategy is that the long portfolio is the highest-performing decile while the short portfolio is the lowest-performing one. Then the value-weighted portfolio return is calculated for each decile of the ranked variable.

Table 4. Long-short strategies of market anomalies with high or low investor sentiment

	Long Leg			Short Leg			Long-Short		
	H-$SENT_{t-1}$	L-$SENT_{t-1}$	HL-$SENT_{t-1}$	H-$SENT_{t-1}$	L-$SENT_{t-1}$	HL-$SENT_{t-1}$	H-$SENT_{t-1}$	L-$SENT_{t-1}$	HL-$SENT_{t-1}$
Size	2.269*	0.999	1.27	-0.781	1.667**	-2.448**	3.05***	-0.668	3.718***
t-statistic	(1.79)	(1.10)	(0.81)	(-0.82)	(2.38)	(-2.06)	(3.58)	(-0.97)	(3.39)
Sigma	0.733	1.245*	-0.511	-1.161	0.837	-1.999*	1.895**	0.407	1.488*
t-statistic	(0.71)	(1.84)	(-0.41)	(-1.11)	(1.06)	(-1.68)	(2.42)	(0.81)	(1.69)
BM	-0.136	0.667	-0.803	0.914	1.885**	-0.971	-1.05	-1.219**	0.169
t-statistic	(-0.13)	(0.97)	(-0.65)	(0.78)	(2.39)	(-0.69)	(-1.57)	(-2.58)	(0.21)
GS	0.805	0.774	0.032	0.141	1.383*	-1.242	0.664	-0.609	1.273*
t-statistic	(0.69)	(0.86)	(0.02)	(0.13)	(1.81)	(-0.94)	(1.29)	(-1.49)	-1.93
O-score	1.29	0.489	0.801	0.346	1.724**	-1.379*	0.944	-1.235*	2.179**
t-statistic	(0.87)	(0.54)	(0.48)	(0.28)	(2.41)	(-1.90)	(1.09)	(-1.74)	-1.96
Issue	1.174	1.04	0.134	-0.221	1.285*	-1.506*	1.395**	-0.245	1.640**
t-statistic	(0.97)	(1.24)	(0.09)	(-0.21)	(1.75)	(-1.69)	(2.54)	(-0.71)	-2.53
Accruals	1.055	0.907	0.149	0.425	1.405*	-0.980*	0.63	-0.499	1.129**
t-statistic	(0.62)	(1.26)	(0.08)	(0.29)	(1.85)	(-1.89)	(1.19)	(-1.66)	(1.99)
Opa	1.171	0.934	0.237	0.619	1.225*	-0.606	0.551	-0.291	0.842*
t-statistic	(0.79)	(1.15)	(0.15)	(0.50)	(1.71)	(-1.44)	(1.09)	(-0.81)	(1.69)
Profit	1.391	0.579	0.813	0.482	1.898**	-1.416*	0.909	-1.320*	2.229**
t-statistic	(0.96)	(0.66)	(0.50)	(0.39)	(2.61)	(-1.82)	(1.04)	(-1.92)	(2.03)
GA	1.081	1.206	-0.125	-0.112	1.783**	-1.895*	1.193**	-0.577*	1.770***
t-statistic	(0.65)	(1.56)	(-0.08)	(-0.07)	(2.40)	(-1.73)	(2.29)	(-1.77)	(3.04)
ROA	1.33	0.567	0.763	0.309	1.845**	-1.536*	1.022	-1.278	2.299**
t-statistic	(0.90)	(0.65)	(0.46)	(0.25)	(2.51)	(-1.81)	(1.26)	(-1.90)	(2.20)
ROE	1.065	0.354	0.711	0.138	2.087***	-1.949**	0.928	-1.733**	2.660***
t-statistic	(0.74)	(0.42)	(0.44)	(0.11)	(2.71)	(-1.99)	(1.24)	(-2.59)	(2.66)
ITA	0.692	1.188	-0.496	0.238	1.364*	-1.126	0.454	-0.176	0.63
t-statistic	(0.54)	(1.58)	(-0.35)	(0.19)	(1.91)	(0.81)	(1.13)	(-0.54)	(1.22)

Note. This table reports the average excess returns of long-short strategies of market anomalies under high or low investor sentiment.

For each of the market anomalies, the value-weighted portfolio returns are calculated for each decile of the ranking variable. The long-short strategy is manipulated by buying the portfolio which is the highest-performing decile and selling the portfolio which is the lowest-performing decile. Figures in the table are the value-weighted monthly returns of the long leg, the short leg and the long-short spread in the cases that the previous year's investor sentiment ($SENT_{t-1}$) is high (H-$SENT_{t-1}$), low (L-$SENT_{t-1}$) and high minus low (HL-$SENT_{t-1}$).

Here, if the investor sentiment index is higher than the median value then the sentiment of next year is defined as high and vice versa.

The $SENT_{t-1}$ indices are from 1997 to 2008 while the corresponding excess returns are from 1998 to 2009.

All the *t*-statistics are based on the T-test.

In the table, the sign of ***, ** and * respectively represent the significance at the level of 1%, 5%, and 10%.

Table 4 reports the value-weighted average excess returns of the long and short legs and the long-short spread of the long-short strategies formed by market anomalies in the cases where the investor sentiment of the previous year is high, low and high minus low.

From Table 4, it is found that all of the long-short spreads are higher following high sentiment. All the figures in the last column represent that the difference in the long-short spreads of high and low sentiments is positive. Among all the firm characteristics, the long-short spread of the high-low sentiment is optimal at 16.9 bps. Except for the BM ratio and ITA, all of the long-short spreads significantly gain more following high sentiment as opposed to low sentiment by the t-test. These significantly positive values support the hypothesis in that abnormal market returns caused by market anomalies will be higher following high sentiment.

Besides, all of the figures in the column of high-low sentiment of short leg are negative. The short leg returns of high-low sentiment range from -244.8 bps to -97. bps for all of the anomaly variables. Except for the factors of the BM ratio, SG, Opa, and ITA, all of the values of the other factors are significantly negative after carrying out the t-test. It is verified that the short leg portfolio returns are much lower following high sentiment as opposed to low sentiment. The long-short strategy is that the long portfolio is the highest-performing decile while the short

portfolio is the lowest-performing one. Thus, it is supported that following high sentiment, the short leg portfolios will be in a more advantageous position as the returns are much lower.

4.2 Predictive Regression of Investor Sentiment and Portfolio Returns

For further studies on the relationships and the predicted effect of investor sentiment on market abnormal returns that are caused by market anomalies, we regress the time-series data of the portfolios.

Table 5. Investor sentiment and market anomalies portfolios

	Long Leg		Short Leg		Long-Short	
	b	*t*-statistic	*b*	*t*-statistic	*b*	*t*-statistic
Size	2.243 *	-1.67	-3.494 ***	(-3.18)	1.25 *	-1.73
Sigma	2.575 **	-2.26	-3.15 **	(-2.51)	0.575 **	-2.04
BM	2.58 **	-2.12	-2.984 **	(-2.32)	0.404	-1.02
GS	2.786 **	-2.15	-3.269 ***	(-2.60)	0.483	-1.36
O-score	-2.577 *	(-1.91)	-3.435 ***	(-2.88)	0.858	-1.48
Issue	-2.469 *	(-1.91)	-2.904 **	(-2.37)	0.436 *	-1.68

Note. This table reports the estimations in the regressions of long-short strategies returns of portfolios formed by the rank of market anomalies with lagged investor sentiment index ($SENT_{t-1}$).

For each of the market anomalies, the value-weighted portfolio returns are calculated for each decile of the ranking variable. The strategy long the portfolio which is the highest-performing decile and short the portfolio which is the lowest-performing decile.

In the table, the sign of ***, ** and * respectively represent the significance at the level of 1%, 5%, and 10%.

Table 5 presents the regressions of the time-series portfolios returns of long and short legs and long-short spread on lagged investor sentiment. The predictive regression model equation (5) is as follows:

$$R_{i,t} = a_{i,t} + bSENT_{t-1} + e_{i,t} \quad (5)$$

In Table 5, the coefficients of the long-short spreads for Size, Sigma, Issue, Accruals, Opa, Profit, GA, ROA, ROE are significantly positive which mean that there are positive relations between the market abnormal returns with lagged investor sentiment. For the factors of BM ratio, SG, O-score and ITA, the coefficients are also positive but not significant. These results are in agreement with Baker et al. (2012) and Stambaugh et al. (2012) and support the hypothesis that market abnormal returns are higher following high sentiment as there are positive relations between the long-short returns with lagged investor sentiment.

The figures in the second column of the short leg are all significantly negative which represents that when investor sentiment is high, the future short leg return is low. As the market trend and variation are also important factors that affect abnormal market returns caused by market anomalies, we have added in market premium as an independent variable in the regression formula.

The predictive regression model equation (6) is as follows:

$$R_{i,t} = a_{i,t} + bSENT_{t-1} + b_1 MKT_t + e_{i,t} \quad (6)$$

For a more comprehensive and reliable analysis, we have selected two index returns respectively to represent the market return. The IND is the average index returns of the SSE and the SZSE Composite Indexes; IND-A is calculated as the average index returns of the SSE A-Share and the SZSE A-Share Indexes. MKT_t is calculated as the difference between the market returns and the RF.

Table 6. Investor sentiment and market anomalies portfolios (Net of MKTt)

Panel A: IND									
	Long Leg			Short Leg			Long-Short		
	b		*t*-statistic	*b*		*t*-statistic	*b*		*t*-statistic
Size	-2.449		(-1.62)	-3.799	***	(-3.03)	1.35	*	(1.83)
Sigma	-2.914	**	(-2.22)	-3.364	**	(-2.35)	0.45	*	(1.74)
BM	-2.96	**	(-2.15)	-3.324	**	(-2.22)	0.364		(0.89)
GS	-3.133	**	(-2.16)	-3.527	**	(-2.46)	0.394		(1.02)
O-score	-2.971	*	(-1.98)	-3.603	***	(-2.66)	0.631		(1.04)
Issue	-2.732	*	(-1.85)	-3.142	**	(-2.24)	0.413		(1.34)
Accurals	-3.042	**	(-2.02)	-3.288	**	(-2.29)	0.247	*	(1.68)
Opa	-2.593	*	(-1.73)	-3.108	**	(-2.24)	0.533		(1.25)
Profit	-2.439		(-1.64)	-3.336	**	(-2.61)	0.949		(1.43)
GA	-3.101	**	(-2.15)	-3.476	**	(-2.46)	0.379	*	(1.73)
ROA	-2.502	*	(-1.68)	-3.524	***	(-2.63)	1.021		(1.56)
ROE	-2.713	*	(-1.80)	-3.623	***	(-2.64)	0.914		(1.52)
ITA	-3.181	**	(-2.24)	-3.29	**	(-2.29)	0.113		(0.36)
Panel B: IND-A									
	Long Leg			Short Leg			Long-Short		
	b		*t*-statistic	*b*		*t*-statistic	*b*		*t*-statistic
Size	-2.441		(-1.62)	-3.799	***	(-3.03)	1.357	*	(1.84)
Sigma	-2.909	**	(-2.22)	-3.357	**	(-2.34)	0.448	*	(1.73)
BM	-2.956	**	(-2.15)	-3.319	**	(-2.21)	0.364		(0.89)
GS	-3.128	**	(-2.15)	-3.522	**	(-2.45)	0.394		(1.02)
O-score	-2.973	*	(-1.98)	-3.614	***	(-2.67)	0.631		(1.04)
Issue	-2.742	*	(-1.85)	-3.148	**	(-2.25)	0.412		(1.35)
Accurals	-3.051	**	(-2.03)	-3.303	**	(-2.30)	0.254	*	(1.67)
Opa	-2.588	*	(-1.73)	-3.124	**	(-2.25)	0.527		(1.27)
Profit	-2.268		(-0.89)	-3.351	**	(-2.61)	0.948		(1.43)
GA	-3.111	**	(-2.15)	-3.49	**	(-2.46)	0.381	*	(1.73)
ROA	-2.497	*	(-1.68)	-3.523	***	(-2.64)	1.022		(1.56)
ROE	-2.713	*	(-1.80)	-3.621	***	(-2.65)	0.914		(1.52)
ITA	-3.179	**	(-2.25)	-3.288	**	(-2.30)	0.109		(0.36)

Note. This table reports the regressions results net of the market premium of long-short strategies returns of portfolios formed by the rank of market anomalies with lagged investor sentiment index ($SENT_{t-1}$). MKT_t is calculated as the difference between the market returns (IND for Panel A and IND-A for Panel B) and the monthly bank deposit interest rate that fairly transformed by 1-year bank deposit interest rates.

In the table, the sign of ***, ** and * respectively represent the significance at the level of 1%, 5%, and 10%.

In Table 6, Panel A provides the results of the regressions when IND is regarded as the market return. The coefficients for the long-short spread are all positive, which is the same as the results in Table 5. However, only the row of Size is significant with the T-statistics as 1.83, while the figures in the column of the short leg are all significantly negative which confirm a negative relation between the short leg returns and lagged sentiment again.

The results of Panel B are nearly the same as those of Panel A. For the column of the short leg, all the values are significantly negative and for the column of the long-short spread, the row of Size is significantly positive while the other rows are still positive but not significant. However, the positive figures of the long-short spread can still indicate that long-short returns will be higher following high sentiment.

With the results in Tables 4, 5 and 6 taken together, it can be authenticated that long-short portfolio returns constructed by market anomalies are higher with high investor sentiment than those with low investor sentiment in the Chinese A-share stock market as there is a positive relation between lagged investor sentiment and the long-short returns. The results also demonstrate that the short legs of the long-short strategy for both market anomalies have higher returns than the long legs with high investor sentiment as there is a significant negative relation between lagged investor sentiment and short leg returns for all four factors of market anomaly.

5. Conclusions

China is one of the fastest growing and expanding economic entities which has also resisted the disasters of the Asian financial crisis (1997) and the global financial crisis (2008), as well as the domestic issues resultant of its own development. Investors in the Chinese market are considered to have less knowledge and experience as the China market is still globally a young market. The market anomalies in the Chinese stock market are undisputedly related to investor sentiment.

In this study, we have focused on the A-shares of the SSE and the SZSE in China. The investor sentiment index of the Chinese A-share stock market has been generated by using the method in Baker et al. (2012) which is the latest method in the stock market.

Due to short-selling limits, the long-short strategies seem to be stronger under high investor sentiment as it is assumed that most of the mispricing is overpricing. This is in agreement with the results of Stambaugh et al. (2012) on the U.S. market, and this study supports both of the hypotheses that abnormal market returns caused by market anomalies are stronger following high investor sentiment than following low investor sentiment, and average returns of short-leg are more profitable with high lagged levels of investor sentiment. We find that the factor of Size, Sigma, Issue, Accruals, Opa, Profit, GA, ROA, and ROE are significantly positive which mean that there are positive relations between market abnormal returns with lagged investor sentiment. For the factors of BM ratio, SG, the O-score and ITA, they are also positive but not significant. Our study shows that long-short portfolio returns constructed by market anomalies are higher with high investor sentiment than those with low investor sentiment and the short legs of the long-short strategy for both market anomalies have higher returns than the long legs with high investor sentiment.

This study is more than the use of investor sentiment to explain for market anomalies. Compared with the results of Baker et al. (2012), the study can be treated as a supplementary index on investor sentiment in terms of Chinese A-share stocks versus global investor sentiment. Besides, in line with Baker et al. (2012) and Stambaugh et al. (2012) of their study on the U.S. market, this study also confirms that in the Chinese A-share stock market, investor sentiment does play a role on abnormal market returns that are caused by market anomalies.

Therefore, the positive relations of investor sentiment and market anomalies are so significant that they are not only important complements of the Chinese A-share stock market to the theories on global investor sentiment but also strongly support work in behavioral finance to further explain about market anomalies. In addition, this study offers efficient strategies for investors to catch the movement of stock returns and make their investing decisions.

References

Ali, A., Hwang, L. S., & Trombley, M. A. (2003). Arbitrage risk and the book-to-market anomaly. *Journal of Financial Economics*, *69*(2), 355-373, http://dx.doi.org/10.1016/S0304-405X(03)00116-8.

Allen, F., Qian, J., & Qian, M. (2005). Law, finance, and economic growth in China. *Journal of Financial Economics*, *7*(1), 57-116. http://dx.doi.org/10.1016/j.jfineco.2004.06.010.

Amihud, Y., & Mendelson, H. (1991). Liquidity, maturity, and the yields on US Treasury securities. *Journal of Finance*, *46*(4), 1411-1425. http://dx.doi.org/10.1016/j.jfineco.2004.06.01010.1111/j.1540-6261.1991.tb04623.x.

Baker, H. K., & Nofsinger, J. R. (2002). Psychological Biases of Investors. *Financial Services Review*, *11*(2), 97-116. Retrieved from http://www.researchgate.net/profile/John_Nofsinger/publication/230720757_Psychological_Biases_of_Investors/links/0fcfd50d0c09f84410000000.pdf

Baker, M., & Stein, J. C. (2004). Market liquidity as a sentiment indicator. *Journal of Financial Markets*, *7*(3), 271-299. http://dx.doi.org/10.1016/j.finmar.2003.11.005.

Baker, M., & Wurgler, J. (2000). The equity share in new issues and aggregate stock returns. *The Journal of Finance*, *55*(5), 2219-2257. http://dx.doi.org/10.1111/0022-1082.00285.

Baker, M., & Wurgler, J. (2004). A catering theory of dividends. *The Journal of Finance*, *59*(3), 1125-1165. http://dx.doi.org/10.1111/j.1540-6261.2004.00658.x

Baker, M., & Wurgler, J. (2006). Investor Sentiment and the Cross‐Section of Stock Returns. *The Journal of Finance*, *61*(4), 1645-1680. http://dx.doi.org/10.1111/j.1540-6261.2006.00885.x

Baker, M., & Wurgler, J. (2007). Investor Sentiment in the Stock Market. *The Journal of Economic Perspectives*,

21(2), 129-151. Retrieved from http://www.jstor.org/stable/30033721

Baker, M., Wurgler, J., & Yuan Y. (2012). Global, local, and contagious investor sentiment. *Journal of Financial Economics*, *104*(2), 272-287. http://dx.doi.org/10.1016/j.jfineco.2011.11.002

Baltussen, G. (2009). *Behavioral finance: An introduction* (Unpublished). Retrieved from http://ssrn.com/abstract=1488110

Banz, R. W. (1981). The relationship between return and market value of common stocks. *Journal of Financial Economics*, *9*(1), 3-18. http://dx.doi.org/10.1016/0304-405X(81)90018-0

Barberis, N., Shleifer, A., & Vishny, R. (1998). A model of investor sentiment. *Journal of Financial Economics*, *49*(3), 307-343. http://dx.doi.org/10.1016/S0304-405X(98)00027-0

Bathia, D., & Bredin, D. (2013). An examination of investor sentiment effect on G7 stock market returns. *The European Journal of Finance*, *19*(9), 909-937. http://dx.doi.org/10.1080/1351847X.2011.636834

Benartzi, S., & Thaler, R. H. (2001). Naive diversification strategies in defined contribution saving plans. *American Economic Review*, *91*(1), 79-98. Retrieved from http://www.jstor.org/stable/2677899

Black, F. (1986). Noise. *Journal of Finance*, *41*(3), 529-543. http://dx.doi.org/10.1111/j.1540-6261.1986.tb04513.x.

Brown, G. W., & Cliff, M. T. (2004). Investor sentiment and the near-term stock market. *Journal of Empirical Finance*, *11*(1), 1-27. http://dx.doi.org/10.1016/j.jempfin.2002.12.001

Brunnermeier, M. K. (2001). *Asset pricing under asymmetric information: Bubbles, crashes, technical analysis, and herding* (1st ed.). New York, United States: Oxford University Press Inc.

Chen, G., Kim, K. A., Nofsinger, J. R., & Rui, O. M. (2003). *Does investor sophistication influence investing behavior and trading performance? Evidence from China*. Retrieved from http://www.researchgate.net/profile/John_Nofsinger/publication/228704128_Does_investor_sophistication_influence_investing_behavior_and_trading_performance_Evidence_from_China/links/09e41508ea5cf2efa4000000.pdf

Chen, G., Kim, K. A., Nofsinger, J. R., & Rui, O. M. (2007). Trading Performance, Disposition Effect, Overconfidence, Representativeness Bias, and Experience of Emerging Market Investors. *Journal of Behavioral Decision Making*, *20*(4), 425-451. http://dx.doi.org/10.1002/bdm.561

Chen, G., Rui, O. M., & Wang, S. S. (2005). The effectiveness of price limits and stock characteristics: Evidence from the Shanghai and Shenzhen stock exchanges. *Review of Quantitative Finance and Accounting*, *25*(2), 159-182. http://dx.doi.org/10.1007/s11156-005-4247-7

Chen, L., Novy-Marx, R., & Zhang, L. (2010). *An alternative three-factor model* (Unpublished). Retrieved from http://ssrn.com/abstract=1418117

Chen, X., Kim, K. A., Yao, T., & Yu, T. (2010). On the predictability of Chinese stock returns. *Pacific-Basin Finance Journal*, *18*(4), 403-425. http://dx.doi.org/10.1016/j.pacfin.2010.04.003

Chi, L., Song, D., & Zhuang, X. (2012). Investor sentiment in the Chinese stock market: An empirical analysis. *Applied Economics Letters*, *19*(4), 345-348. http://dx.doi.org/10.1080/13504851.2011.577003

Chung, S. L., Hung, C. H., & Yeh, C. Y. (2012). When does investor sentiment predict stock returns? *Journal of Empirical Finance*, *19*(2), 217-240. http://dx.doi.org/10.1016/j.jempfin.2012.01.002

Cooper, M. J., Gulen, H., & Schll, M. J. (2008). Asset Growth and the Cross-Section of Stock Returns. *The Journal of Finance*, *63*(4), 1609-1651. http://dx.doi.org/10.1111/j.1540-6261.2008.01370.x

D'avolio, G. (2002). The market for borrowing stock. *Journal of Financial Economics*, *66*(2), 271-306. http://dx.doi.org/10.1016/S0304-405X(02)00206-4.

De Long, J. B., Shleifer, A., Summers, L. H., & Waldmann, R. J. (1990). Noise Trader Risk in Financial Markets. *The Journal of Political Economy*, *98*(4), 703-738. Retrieved from http://www.jstor.org/stable/2937765

Eun, C. S., & Huang, W. (2007). Asset pricing in China's domestic stock markets: Is there a logic? *Pacific-Basin Finance Journal*, *15*(5), 452-480. http://dx.doi.org/10.1016/j.pacfin.2006.11.002

Fama, E. F., & French, K. R. (1992). The cross-section of expected stock returns. *Journal of Finance*, *47*(2), 427-465. http://dx.doi.org/10.1111/j.1540-6261.1992.tb04398.x

Fama, E. F., & French, K. R. (1998). Value versus growth: The international evidence. *The Journal of Finance*,

53(6), 1975-1999. http://dx.doi.org/10.1111/0022-1082.00080

Fama, E. F., & French, K. R. (2001). Disappearing Dividends: Changing Firm Characteristics or Lower Propensity to Pay? *Journal of Financial Economics*, *60*(1), 3-43. http://dx.doi.org/10.1016/S0304-405X(01)00038-1

Fama, E. F., & French, K. R. (2006). The Value Premium and the CAPM. *Journal of Finance, 61*(5), 2163-2185. http://dx.doi.org/10.1111/j.1540-6261.2006.01054.x.

Fan, H. X., Shi, K., & Wang, X. L. (2006). Psychological mechanisms of investors in Chinese Stock Markets. *Journal of Economic Psychology*, *27*(6), 762-780. http://dx.doi.org/10.1016/j.joep.2006.06.007

Fischoff, B., Lichtenstein, S., & Slovic, P. (1980). Labile values: A challenge for risk assessment. *Society, Technology, and Risk Assessment*, 57-66.

Frederick, S., Loewenstein, G., & O'Donoghue, T. (2002). Time discounting and time preference: A critical review. *Journal of Economic Literature*, *40*(2), 351-401. Retrieved from http://www.jstor.org/stable/2698382

Person, K. (1901). On lines and planes of closest fit to systems of points in space. *The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science*, *2*(11), 559-572.

Gong, S. X., & Shan, L. (2012). Investor sentiment and stock returns: Wenchuan Earthquake. *Finance Research Letters*, *9*(1), 36-47. http://dx.doi.org/10.1016/j.frl.2011.07.002

Hirshleifer, D. (2011). Investor psychology and asset pricing. *The Journal of Finance*, *56*(4), 1533-1597. http://dx.doi.org/10.1111/0022-1082.00379

Hirshleifer, D., & Teoh, S. H. (2003). Herd behaviour and cascading in capital markets: A review and synthesis. *European Financial Management*, *9*(1), 25-66. http://dx.doi.org/10.1111/1468-036X.00207

Hirshleifer, D., Hou, K., Teoh, S. H., & Zhang, Y. (2004). Do investors overvalue firms with bloated balance sheets? *Journal of Accounting and Economics*, *38*, 297-331. http://dx.doi.org/10.1016/j.jacceco.2004.10.002

Horowitz, J. L., Loughran, T., & Savin, N. E. (2000). Three analyses of the firm size premium. *Journal of Empirical Finance*, *7*(2), 143-153. http://dx.doi.org/10.1016/S0927-5398(00)00008-6

Hu, J. (1999). The evolution of China stock market and its institutions. *Economic Science*, Beijing.

Huberman, G., & Regev, T. (2001). Contagious speculation and a cure for cancer: A nonevent that made stock prices soar. *The Journal of Finance*, *56*(1), 387-396. http://dx.doi.org/10.1111/0022-1082.00330

Hwang, Y. S., Min, H. G., McDonald, J. A., Kim, H., & Kim, B. H. (2010). Using the credit spread as an option-risk factor: Size and value effects in CAPM. *Journal of Banking & Finance*, *34*(12), 2995-3009. http://dx.doi.org/10.1016/j.jbankfin.2010.07.005

Jones, C. (2002). *A century of stock market liquidity and trading costs* (Unpublished). Retrieved from http://ssrn.com/abstract=313681

Joseph, K., Wintoki, M. B., & Zelin, Z. (2011). Forecasting abnormal stock returns and trading volume using investor sentiment: Evidence from online search. *International Journal of Forecasting*, *27*(4), 1116-1127. http://dx.doi.org/10.1016/j.ijforecast.2010.11.001

Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1990). Experimental tests of the endowment effect and the Coase theorem. *Journal of political Economy*, *98*(6), 1325-1348. Retrieved from http://www.jstor.org/stable/2937761

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica: Journal of the Econometric Society*, *47*(2), 263-291. Retrieved from http://www.jstor.org/stable/1914185

Kahneman, D., & Tversky, A. (1984). Choices, values, and frames. *American Psychologist*, *39*(4), 341-350. http://dx.doi.org/10.1037/0003-066X.39.4.341

Kang, J., Liu, M. H., & Ni, S. X. (2002). Contrarian and momentum strategies in the China stock market: 1993-2000. *Pacific-Basin Finance Journal*, *10*(3), 243-265. http://dx.doi.org/10.1016/S0927-538X(02)00046-X

Keim, D. B. (1983). Size-related anomalies and stock return seasonality: Further empirical evidence. *Journal of Financial Economics*, *12*(1), 13-32. http://dx.doi.org/10.1016/0304-405X(83)90025-9

Kling, G., & Gao, L. (2008). Chinese institutional investors' sentiment. *Journal of International Financial*

Markets, Institutions and Money, *18*(4), 374-387. http://dx.doi.org/10.1016/j.intfin.2007.04.002

Laibson, D. (1997). Golden eggs and hyperbolic discounting. *The Quarterly Journal of Economics*, *112*(2), 443-478. Retrieved from http://www.jstor.org/stable/2951242

Lakonishok, J., Shleifer, A., & Vishny, R. W. (1994). Contrarian investment, extrapolation, and risk. *The Journal of Finance*, *49*(5), 1541-1578. http://dx.doi.org/10.1111/j.1540-6261.1994.tb04772.x

Lee, C., Shleifer, A., & Thaler, R. H. (1991). Investor sentiment and the closed-end fund puzzle. *The Journal of Finance*, *46*(1), 75-109. http://dx.doi.org/10.1111/j.1540-6261.1991.tb03746.x

Li, W., Rhee, G., & Wang, S. S. (2015). Differences in herding: Individual vs. Institutional investors. Retrieved from http://ssrn.com/abstract=1342209

Ljungqvist, A., Nanda, V., & Singh, R. (2006). Hot Markets, Investor Sentiment, and IPO Pricing. *The Journal of Business*, *79*(4), 1667-1702. Retrieved from http://www.jstor.org/stable/10.1086/503644

Lo, A. W. (2005). Reconciling Efficient Markets with Behavioral Finance: The Adaptive Markets Hypothesis. *Journal of Investment Consulting*, *7*(2), 21-44. Retrieved from http://ssrn.com/abstract=1702447

Loughran, T., & Ritter, J. R. (1995). The new issues puzzle. *Journal of Finance*, *50*(1), 23-51. http://dx.doi.org/10.1111/j.1540-6261.1995.tb05166.x

Loughran, T., Ritter, J. R., & Rydqvist, K. (1994). Initial public offerings: International insights. *Pacific-Basin Finance Journal*, *2*, 165-199. http://dx.doi.org/10.1016/0927-538X(94)90016-7

Mueller, D. C. (1972). A life cycle theory of the firm. *The Journal of Industrial Economics*, *20*(3), 199-219. Retrieved from http://www.jstor.org/stable/2098055

Naughton, T., Truong, C., & Veeraraghavan, M. (2008). Momentum strategies and stock returns: Chinese evidence. *Pacific-Basin Finance Journal*, *16*(4), 476-492. http://dx.doi.org/10.1016/j.pacfin.2007.10.001

Neal, R., & Wheatley, S. M. (1998). Do measures of investor sentiment predict returns? *Journal of Financial and Quantitative Analysis*, *33*(4), 523-547. http://dx.doi.org/10.2307/2331130

Ng, L., & Wu, F. (2007). The trading behavior of institutions and individuals in Chinese equity markets. *Journal of Banking & Finance*, *31*(9), 2695-2710. http://dx.doi.org/10.1016/j.jbankfin.2006.10.029

Novy-Marx, R. (2013). The Other Side of Value: The Gross Profitability Premium. *Journal of Financial Economics*, *108*(1), 1-28. http://dx.doi.org/10.3386/w15940

Ohlson, J. A. (1980). Financial ratios and the probabilistic prediction of bankruptcy. *Journal of Accounting Research*, *18*(1), 109-131. Retrieved from http://www.jstor.org/stable/2490395

Mathur, L., Pettengill, G., & Sundaram, S. (2002). Payment For Risk: Constant Beta Vs. Dual-Beta Models. *Financial Review*, *37*(2), 123-135. http://dx.doi.org/10.1111/1540-6288.00008

Qian, X. (2014). Small investor sentiment, differences of opinion and stock overvaluation. *Journal of Financial Markets*, *19*, 219-246. http://dx.doi.org/10.1016/j.finmar.2014.03.005

Qiu, L., & Welch, I. (2004). *Investor sentiment measures*, *National Bureau of Economic Research* (Unpublished). http://dx.doi.org/10.3386/w10794

Ritter, J. R. (1991). The long-run performance of initial public offerings, *Journal of Finance*, *46*(1), 3-27. http://dx.doi.org/10.1111/j.1540-6261.1991.tb03743.x

Ritter, J. R. (2003). Behavioral finance. *Pacific-Basin Finance Journal*, *11*(4), 429-437. http://dx.doi.org/10.1016/S0927-538X(03)00048-9

Scheinkman, J. A., & Xiong, W. (2003). Overconfidence and speculative bubbles. *Journal of political Economy*, *111*(6), 1183-1220. Retrieved from http://www.jstor.org/stable/10.1086/378531

Schwert, G. W. (2003). Anomalies and market efficiency. *Handbook of the Economics of Finance, Part B, 1*, 939-974.

Shefrin, H. (2008). *A behavioral approach to asset pricing*. Academic Press.

Shleifer, A. (2000). *Inefficient markets: An introduction to behavioral finance*. OUP Oxford.

Shleifer, A., & Vishny, R. W. (1997). The Limits of Arbitrage. *The Journal of Finance*, *52*(1), 35-55. http://dx.doi.org/10.1111/j.1540-6261.1997.tb03807.x

Skinner, D. J., & Sloan, R. G. (2002). Earnings surprises, growth expectations, and stock returns or don't let an

earnings torpedo sink your portfolio. *Review of Accounting Studies*, *7*(2), 289-312. http://dx.doi.org/10.1023/A:1020294523516

Sloan, R. G. (1996). Do stock prices fully reflect information in accruals and cash flows about future earnings? *Accounting Review*, *71*(3), 289-315. http://dx.doi.org/10.2469/dig.v27.n1.5

Stambaugh, R. F., Yu, J., & Yuan, Y. (2012). The short of it: Investor sentiment and anomalies. *Journal of Financial Economics*, *104*(2), 288-302. http://dx.doi.org/10.1016/j.jfineco.2011.12.001

Stigler, G. J. (1964). Public regulation of the securities markets. *The Journal of Business*, *37*(2), 117-142. Retrieved from http://www.jstor.org/stable/2351027

Thaler, R. (1980). Toward a positive theory of consumer choice. *Journal of Economic Behavior & Organization*, *1*(1), 39-60. http://dx.doi.org/10.1016/0167-2681(80)90051-7

Titman, S., Wei, K. C., & Xie, F. (2004). Capital Investments and Stock Returns. *Journal of Financial and Quantitative Analysis*, *39*(4), 677-700. http://dx.doi.org/10.1017/S0022109000003173

Trivers, R. (2010). Deceit and self-deception. *Mind the Gap*, 373-393. http://dx.doi.org/10.1007/978-3-642-02725-3_18

Van Dijk, T. A. (2011). *Discourse Studies: A Multidisciplinary Introduction*. SAGE Publications Ltd.

Vassalou, M., & Xing, Y. (2004). Default risk in equity returns. *The Journal of Finance*, *59*(2), 831-868. http://dx.doi.org/10.1111/j.1540-6261.2004.00650.x

Wang, C., & Chin, S. (2004). Profitability of return and volume-based investment strategies in China's stock market. *Pacific-Basin Finance Journal*, *12*(5), 541-564. http://dx.doi.org/10.1016/j.pacfin.2003.12.002

Wang, C. Y., & Cheng, N. S. (2004). Extreme volumes and expected stock returns: Evidence from China's stock market. *Pacific-Basin Finance Journal*, *12*(5), 577-597. http://dx.doi.org/10.1016/j.pacfin.2004.04.002

Wang, F., & Xu, Y. (2004). What Determines Chinese Stock Returns? *Financial Analysts Journal*, *60*(6), 65-77. http://dx.doi.org/10.2469/faj.v60.n6.2674

Wang, F. A. (2001). Overconfidence, investor sentiment, and evolution. *Journal of Financial Intermediation*, *10*(2), 138-170. http://dx.doi.org/10.1006/jfin.2001.0311

Wurgler, J., & Zhuravskaya, E. (2002). Does Arbitrage Flatten Demand Curves for Stocks? *The Journal of Business*, *75*(4), 583-608. Retrieved from http://www.jstor.org/stable/10.1086/341636

Yang, C., & Zhang, R. (2014). Does mixed-frequency investor sentiment impact stock returns? Based on the empirical study of MIDAS regression model. *Applied Economics*, *46*(9), 966-972. http://dx.doi.org/10.1080/00036846.2013.864041

Zweig, M. E. (1973). An investor expectations stock price predictive model using closed-end fund premiums. *The Journal of Finance*, *28*(1), 67-78. http://dx.doi.org/10.1111/j.1540-6261.1973.tb01346

Notes

Note 1. Refer to Wurgler and Zhuravskaya (2002).

Note 2. The Nielsen Global Consumer Confidence Index contains consumers from 54 countries.

Note 3.The MCSI denotes the University of Michigan Consumer Sentiment Index. The CCI is the Washington–ABC News Consumer Comfort Index.

Note 4. Firm supply response, which is calculated as the gross equity issues divided by the total of the gross equity issues and long-term liabilities, has a negative relation with market returns (Baker & Wurgler, 2000).

Note 5. Dividend premium is the difference of the market-to-book ratio between the payers and nonpayers (Baker & Wurgler, 2004).

Note 6.The first principal component analysis, which originated in the Fellow of the Royal Society by Person (1901), isolates the largest variance by any projection of the data to be the first coordinate (namely 'the first principal component') in the process of orthogonal linear transformation. Brown and Cliff (2004) determine the relationship between survey data for investor sentiment and other commonly cited "sentiment measures" and employ the Kalman filter and principal component analysis as means of extracting composite unobserved sentiment measures to obtain a sentiment index from a batch of noisy variables.

Note 7. http://www.boc.cn/finadata/lilv/fd31/

Note 8. Firm supply response which is calculated as the gross equity issues divided by the total of the gross equity issues and long-term liabilities has a negative relation with market returns (Baker & Wurgler, 2000).

Note 9. Dividend premium is the difference of the market-to-book ratio between payers and nonpayers (Baker & Wurgler, 2004).

Note 10. Fama and French (2001) point out that if dividends are at a premium, then firms are more willing to pay for them so that the firms may have less money to grow.

Note 11. We agree that the reasons as to why IPOs are usually extremely underpriced are still ambiguous. Ritter (2003) and Ljungqvist, Nanda and Singh (2006) argue that investor sentiment on IPOs is too difficult to predict so that underwriters do not want to issue stocks with overestimation of both sentiment and stock price.

Note 12. Except for the daily return limit in the China stock market, the first-day return of IPOs is found to be much larger than normal stock returns in many other countries.

Note 13. Here the RF is the monthly bank deposit interest rate that is fairly transformed by 1-year bank deposit interest rates from the raw returns.