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Investor Sentiment and Chinese: A-Share Stock Market Returns

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Abstract

In this paper, we create an investor sentiment index for Chinese A-share stock market, and use it to predict future market returns. Consistent with studies on the U.S. stock market, we find investor sentiment has a positive relationship with contemporaneous aggregate market returns and can be considered as a contrary predictor of future aggregate market returns in Chinese stock market as it drives current price of stocks extremely far away from their fundamental value. Our study will complement previous work as an important supplementary for theories on Chinese and global investor sentiment and for investors to make their investing decisions.

JEL classification numbers: G24
Keywords: Investor sentiment; Investor sentiment index; Market return; Behavioral finance; Chinese stock market

1 Introduction

In the 1960s, Paul A. Samuelson and Eugene F. Fama (Samuelson, 1965; Fama, 1963, 1965, 1995, 1970) developed the Efficient Market Hypothesis (EMH), which has become the fundamental basis for later methodological studies and empirical research (Lo, 2007). However, the EMH and even traditional finance theories are now facing a variety of unprecedented theoretical and empirical challenges in recent years.

Based on numerous psychological studies and a plurality of empirical results, such as noise traders (Black, 1986), market anomalies (Schwert, 2003) and behavioral biases (Ritter, 2003), more people are starting to believe that investor sentiment affects stock

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prices and causes arbitrage to be risky business to a certain extent. Besides, the measurement of investor sentiment by creating investor sentiment indexes has gradually changed from direct to indirect approaches. By far, Baker and Wurgler (2006) and Baker and Wurgler (2007) have put forth and perfected a new yet indirect approach to estimate investor sentiment.

The economy of China is developing at a rapid pace and is larger in scale. As documented in the studies of Chen, Kim, Nofsinger and Rui (2003), Fan, Shi and Wang (2006) and Li, Rhee and Wang (2015), individual investors in China are deemed to lack sophistication in their technical skills and experiences in investment, and therefore display behavioral biases. 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) verify that investor sentiment plays a role in the Chinese markets but did not use investor sentiment to explain for the market performance.

This study therefore focuses on the Chinese A-share stock market to investigate the relationship between investor sentiment and market-level returns. We follow the method from Baker, Wurgler and Yuan (2012) and decompose the investor sentiment indexes into four orthogonal sets by using the first principal component analyses to generate an investor sentiment index of the Chinese A-share stock market and in turn, make comparisons with previous work. After that, we will use the generated investor sentiment index to find the relationship between the investor sentiment and the aggregate market returns, and we select four indexes to represent the market-level returns. We find a positive co-movement of the investor sentiment with synchronous market returns and stock price changes; however, investor sentiment is also a good negative predictor of future market returns.

Our study contributes to the literature in various ways. First, we use the most current method to generate an investor sentiment index in the Chinese stock market which can be regarded as complementing previous studies. Secondly, we find that investor sentiment be regarded as a contrary predictor of future aggregate market returns in the Chinese A-share stock market. This finding has implications for both investors and market regulators. Thirdly, our findings are consistent with those of previous studies on the U.S. stock market, which results can be regarded as a comparison for academics who are doing research in both China and other countries. Finally, we complement the studies on both theoretical and empirical analyses of investor sentiment and market returns.

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

2 Literature Review

2.1 Investor sentiment

According to traditional finance theories, the Efficient Market Hypothesis (EMH) is actually the foundation and mainstay of modern financial theory. However, behavioral finance challenges the EMH and focuses on perceiving and interpreting the actual behaviors of investor and the market, especially those of individual investors (Baltussen, 2009). Behavioral finance holds the idea that investors and the market are normal but may

not be perfect (Montier, 2002; Pompian, 2012). In other words, behavioral finance is the application of psychology to finance, under the context that both the market and its participants (including individual and institutional investors) are not fully rational (Ritter, 2003; Statman, 1999). As Ritter (2003) and Shleifer (2000) have pointed out, the two building blocks of behavioral finance are the limits to arbitrage and investor sentiment.
Baker and Wurgler (2006, 2007) talk about investor sentiment driven by emotions, and that it affects the cross-section of stock returns. By examining six local and six global indexes, Baker et al. (2012) argue that investor sentiment indexes have a negative impact on future market returns. Other studies that have reviewed investor sentiment, such as Qiu and Welch (2004) and Lemmon and Portnaiguina (2006) indicate that investor sentiment indexes have influence and prediction ability for the U.S. stock market. Joseph, Wintoki and Zhang (2011) forecast and predict trading volume and abnormal stock returns by using investor sentiment, Chung, Hung and Yeh (2012) study the timing when investor sentiment can be used to predict stock returns, and Bathia and Bredin (2013) examine the effect of investor sentiment on G7 stock market returns. Qian (2014) argues that a negative relationship between small trade imbalances and future stock returns only exists when stocks have been initially mispriced and pricing takes place before the sentimental trading of small investors.

2.2 Investor Sentiment Index

Until now, academics have mainly used two methods to assess and evaluate investor sentiment: direct measurement or the 'bottom-up' method, and indirect measurement or the 'top-down' method, named by Baker and Wurgler (2007). Direct measurement usually uses surveys and polls, and is mainly based on the cognition and psychology of individual investors, including their direct sense and opinions, and even behavioral biases, such as herding, overreacting, over confidence, etc. However, the data acquired from surveys and polls by using the direct measurement method have unavoidable problems in terms of immediacy, accuracy and integrity.
The indirect measurement has been increasingly accepted and adopted more often by behavior financial academics. Baker and Wurgler (2006) first put forth 'top-down' method and this method was brought to fruition in Baker and Wurgler (2007). This method combines economic indexes and the characteristics of the variables of individual stocks (investor sentiment indices) to estimate market investor sentiment. In this study, we adopt this method to estimate the aggregate market investor sentiment in the Chinese stock market.

2.3 The Chinese Stock Market

China has two stock markets: the Shanghai Stock Exchange which was established on December 19th, 1990 and the Shenzhen Stock Exchange which was established on July 3rd, 1991. Both stock exchanges are supervised by the China Securities Regulatory Commission. Compared with those of developed countries, Chinese capital markets have a shorter trading history and are considered to be immature and inefficient (Ng & Wu, 2007; Kling & Gao, 2008). Due to the small amount of stocks that are traded on the capital market, the data analysis in this study starts from the year of 1997.
Chinese investors are regarded as unsophisticated, more irrational and lack professional knowledge and experience, as indicated in the studies by Chen et al. (2003), Fan et al.

(2006) and Li et al. (2015). These characteristics mean that investor sentiment should play a role in the Chinese markets (Kang, Liu & Ni, 2002). Also, Chen et al. (2003) indicate that Chinese investors have behavioral biases, such as overconfidence which cannot be fully extenuated by lack of cognitive sophistication. The Chinese participant investors in a study (Chen, Kim, Nofsinger & Rui, 2007) are revealed to have representativeness bias (Shefrin, 2008) and impacted by the disposition effect (Baker & Nofsinger, 2002). The representativeness bias refers to individual investors prone to be influenced more by current situations, which we can observe in the behavior of Chinese investors since they are inclined to buy recent short-term stocks which have increased in price. The disposition effect refers that people seeking actions that will bring them pride and avoid taking actions that will let them feel regret, and thus investors are inclined to selling winners too early and riding losers too long, which effect can be observed in Chinese investors' preference to realize paper gains than paper losses.

A large number of studies have confirmed that investor sentiment has the effect of forecasting market returns. Gong and Shan (2012) argue that stock returns are affected by the interaction of local bias and investor sentiment, Chi, Song and Zhuang (2012) show that investor sentiment has a significant impact on stock returns in the Chinese stock market, and Yang and Zhang (2014) demonstrate that mixed-frequency investor sentiment has impacts on stock returns in China. Li et al. (2015) indicate that individual investors are found to have a negative relation with the contemporaneous market premium and a positive relation with market trading volume. However, the studies in in the Chinese stock market are somewhat different from this study as all of the current studies on Chinese stocks do not use the measurement that is utilized in this study.

3 Data and Research Methodology

3.1 Data Resource

We have collected our data from the China Stock Market & Accounting Research (CSMAR) database including stock prices, trading volume and returns. We calculate the monthly risk-free rate (RF) in the form of a monthly bank deposit interest rate that is fairly transformed by 1-year bank deposit interest rates taken from the website of the Bank of China (http://www.boc.cn/finadata/lilv/fd31/). Table 1 provides information on all of the raw data in this study and description of raw time-series data from 1996 to 2009. 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 'Description' gives the explanation of each data.

Table 1: Description of Raw Data

Item	Description
RTN	monthly stock return with cash dividend reinvested of each stock
DV	yearly dollar volume
MV	year-end market value
MTB	year-end market to book ratio calculated as market value divided by the shareholder's equity
FRTN	market adjusted first-day return of each IPO
NOIPO	yearly total number of the IPOs
EW	equal-weighted market returns with cash dividend reinvested
TW	total-value-weighted market returns with cash dividend reinvested
CW	current-value-weighted market returns with cash dividend reinvested
Item	Description
SSE	SSE Composite Index contains all the listed stocks at Shanghai Stock Exchange
SZSE	SZSE Composite Index contains all the listed stocks at Shenzhen Stock Exchange
SSE-A	composite index of all the listed A-sharess at Shanghai Stock Exchange
SZSE-A	composite index of all the listed A-sharess at Shenzhen Stock Exchange
IND	average index return of SSE and SZSE
IND-A	average index returnof SSE-A and SZSE-A
AVG	average return of EW, TW, CW, IND and IND-A
RF	monthly bank deposit interest rate that fairly transformed by 1-year bank deposit interest rates

Table 2 is a summary of all of the descriptive statistics of the raw data from 1996 to 2009. The values are reported in the unit of billions for items such as DV (yearly dollar volume) and MV (year-end market value) as the number is quite large. The data frequency is presented in the last column. "Monthly" means that the data are calculated on a monthly basis, while "Yearly" means that the data are calculated on a yearly basis.

Table 2: Statistics of Raw Data

Item	Mean	Std	D1	Q1	Median	Q3	D9	Frequency
RTN	0.020	0.169	-0.141	-0.068	0.007	0.091	0.193	Monthly
DV	10.302	26.662	0.925	1.635	3.326	8.852	22.906	Yearly
MV	6.830	60.529	0.766	1.225	2.140	4.015	8.250	Yearly
MTB	4.408	15.620	1.250	1.802	2.869	4.609	7.094	Yearly
FRTN	1.911	3.777	0.331	0.653	1.098	1.758	2.878	Yearly
NOIPO	93.154	45.973	63.000	67.000	79.000	106.000	137.000	Yearly
EW	0.018	0.076	-0.064	-0.033	0.008	0.052	0.128	Yearly
TW	0.014	0.090	-0.084	-0.049	0.015	0.064	0.125	Monthly
CW	0.015	0.094	-0.086	-0.048	0.015	0.065	0.130	Monthly
IND	0.012	0.089	-0.085	-0.048	0.012	0.063	0.119	Monthly
IND-A	0.012	0.089	-0.084	-0.048	0.012	0.063	0.122	Monthly
AVG	0.013	0.090	-0.084	-0.048	0.010	0.064	0.124	Monthly
RF	0.002	0.001	0.002	0.002	0.002	0.003	0.004	Monthly

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, '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 in billion.

3.2 Investor Sentiment Indices

The investor sentiment index is generated in this study by mainly following the method in Baker et al. (2012), which used four proxies that are orthogonal to four macro series as the premium for volatility (*PVOL*), the average first-day returns of initial public offerings (*RIPO*), the number of annual initial public offerings (*NIPO*) and annual market turnover (*TURN*). To maintain consistency with the frequency used in the paper of Baker et al. (2012), we calculate investor sentiment on a yearly basis on the simple belief that if the yearly sentiment index does not very much, the same will hold for the monthly sentiment index.

Table 3: Sentiment Indices and Investor Sentiment Index, 1997-2009

	Statistics				Correlations of Raw Sentiment Indices		
	Mean	SD	Min	Max	$PVOL_{raw}$	$NIPO_{raw}$	$RIPO_{raw}$
$PVOL_{raw}$	0.506	0.209	-0.03	0.761	1		
$NIPO_{raw}$	0.528	0.613	2.708	5.328	0.269	1	
$RIPO_{raw}$	0.418	0.804	0.451	2.875	0.280	0.637**	1
$TURN_{raw}$	0.540	0.721	-0.450	1.632	0.580*	0.418	0.157

Correlations of Orthogonal Sentiment Indices						
	$PVOL_{orth}$	$NIPO_{orth}$	$RIPO_{orth}$	$SENT_t$	Eigenvectors	Eigenvalues
$PVOL_{orth}$	1			0.601**	0.506	0.5147
$NIPO_{orth}$	0.242	1		0.797***	0.528	
$RIPO_{orth}$	0.208	0.519*	1	0.644**	0.417	
$TURN_{orth}$	0.604*	0.418	0.123	0.782**	0.540	

This table reports the sentiment indices and investor sentiment index from 1997 to 2009 of China. Descriptive statistics including means, standard deviations, and correlations are represented for the four main sentiment indices. *, **, *** represent 10%, 5% and 1% significant levels respectively.

3.2.1 Premium for Volatility

The first index in this study is that for $PVOL_{raw}$. $PVOL_{raw}$ is a good predictor that would demonstrate the stability of a firm. If the volatility premium is high, the corresponding firm's stability is low and individual investors may be more likely to speculate on this firm's stock. $PVOL_{raw}$ is calculated as the log of the annual value-weighted average market-to-book ratios of stocks with high volatility divided by the annual value-weighted average of the market-to-book ratios of stocks with low volatility. The raw data of RTN (monthly stock return with cash dividend reinvested of each stock) is shown in Table 1, and Table 2 shows the calculations of the yearly variance of the monthly stock returns in the previous year. All of the stocks are ranked by the variance in the previous year and the averages are categorized into ten groups for each year. The top three groups of stocks are defined as those with higher volatility stock portfolios while the bottom 30% of the stocks are defined as the low volatility stock portfolios. The raw data of the MV and MTB (year-end market to book ratio calculated as market value divided by the shareholder's equity) in Tables 1 and 2 are used to calculate the log ratio of the value-weighted average market-to-book ratios of high variance portfolios against low variance portfolios.

According to Table 3, we can see that the mean of $PVOL_{raw}$ is 0.506 which is a good indicator of a general relationship in which high volatility stocks have higher market-to-book ratios as opposed to low volatility stocks. We argued that $PVOL_{raw}$ has a positive relationship with investor sentiment.

3.2.2 Number of IPOs

The second sentiment index is $NIPO_{raw}$. $NIPO_{raw}$ is created as the log ratio of the annual number of IPOs. The raw data of NOIPO (yearly total number of the IPOs) in Tables 1 and 2 are employed to calculate this figure. Furthermore, the number of issuances of IPOs ($NIPO_{raw}$) also has a close correlation with first-day IPO returns ($RIPO_{raw}$). If the return is high, then underwriters are prone to issue more IPOs into a 'hot' market.
The original statistic figures of NOIPO and the log ratios of the NOIPO which present the trend and development of the annual number of IPOs are provided in Tables 2 and 3, respectively. The largest number of IPOs that are listed in a year is 206, as shown in Table 2 (5.328 as the log ratio in Table 3) which was in 2009, while the smallest number of annual published IPOs is 15 (2.708 as the log ratio in Table 3) which was 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 D9 (the ninth decile data) 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 is mostly found in the last few years and also show the substantial growth of the Chinese stock market and Chinese IPOs.

3.2.3 Initial Returns of IPOs

The third sentiment index is $RIPO_{raw}$. $RIPO_{raw}$ is obtained as the annual log ratio of the equally weighted average first-day returns of IPOs. The raw data of the FRTN (market adjusted first-day return of each IPO) in Tables 1 and 2 are used to calculate this figure. The first-day return of IPOs is calculated as the excess return rate of the closing price on the first-day divided by the issuing price.
As indicated the data presented in Table 3, the min and max values of the log RIPO are 0.451 and 2.875, respectively, which is far more larger than the normal stock returns as the mean of the RTN in Table 2 is only 0.025 (Ln (0.02) = -3.912). These excessively high returns on the first trading day of the IPOs really cannot be explained by independent factors without taking into consideration 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% significance level as the p-value is 0.019. If the first-day returns of the 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. Under the context of short-sell limit and transaction fees, irrational investors have to think about the cost and the returns that they buy in the portfolios. Individual investors would increase their magnitude of trading only when they have positive sentiment about the market. Market turnover can be regarded as a symptom of the overestimation of irrational investors (Jones, 2002; Scheinkman & Xiong, 2003 and Baker & Stein, 2004). 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 and

[5]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.

MV in Tables 1 and 2 respectively are used to calculate this log ratio.
Under the condition of short-selling limits in the Chinese stock market, trading turnover is a good sign of investor sentiment as it explicitly shows the preferences and mood of the investors towards stocks, hence affecting the trading volume of the stocks.

3.2.5 Investor Sentiment Index

We first obtain an orthogonal measure to eliminate the effect of the macro-economy. The growth ratios of the industry gross domestic product (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, in order to abstract the common part from $PVOL_{orth}$, $NIPO_{orth}$, $RIPO_{orth}$, $TURN_{orth}$, we use the first principal component analysis method on these four sentiment indices in line 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:

$$SENT_t = 0.51PVOL_{orth} + 0.53NIPO_{orth} + 0.42RIPO_{orth} + 0.54TURN_{orth} \quad (1)$$

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

3.3 Theoretical and Empirical Approaches

This study explores the time-series relationship of investor sentiment with market tendency and tests the hypothesis that the generated investor sentiment has a negative relationship with the subsequent time-series of aggregate market returns.
As both investor sentiment and market data are time-series figures, we use correlation and regression to clarify the relationship. To increase the validity and dependence of the results, we select various types of market returns. To show the relationship between investor sentiment and the market tendency, we use three methods, including a linear diagram, the Pearson's correlation and regression.
First, we use a line graph to provide a distinct and intuitive description of the time-series data. Secondly, the Pearson correlation's is calculated to present the correlations (linear dependence) among Chinese investor sentiment, U.S. investor sentiment and Chinese

market-level returns. Lastly, we conduct a regression of the Chinese investor sentiment index on different time-series of aggregate market-level returns independently or with the U.S. investor sentiment index[6] as a variable.
The regression equations are as follows:

$$R_{mkt} = a_1 + b_1 SENT + e \quad (2)$$
$$R_{mkt} = a_1 + b_1 SENT + b_2 SENT^{US} + e \quad (3)$$

4 Empirical Results

4.1 Investor Sentiment with Contemporaneous Market Tendency

After the investor sentiment index is generated, it is examined to determine whether the index reflects the fluctuations from actual sentiment.
We use two figures to show the variation tendencies of the generated investor sentiment index. Figure 1 is the generated investor sentiment index ($SENT_t$) with the contemporaneous stock indexes of Chinese stock market. Figure 2 is the generated investor sentiment index ($SENT_t$) with the contemporaneous returns of the stock indexes of Chinese stock market. The stock indexes include the SSE (Shanghai Stock Exchange Composite Index), SSE-A (Shanghai Stock Exchange A-share Index), SZSE (Shenzhen Stock Exchange Composite Index), SZSE-A (Shenzhen Stock Exchange A-share Index), IND (average index of SSE and SZSE) and IND-A (average index of SSE-A and SZSE-A).

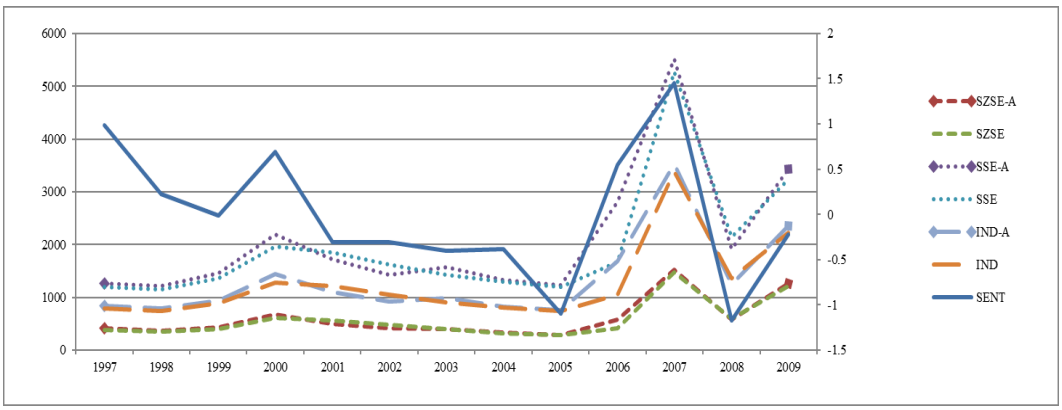

Figure 1: Investor Sentiment Index with Contemporaneous Stock Index

Figure 1 shows the investor sentiment index along with the contemporaneous stock indexes of China stock market. Here, SSE is the SSE Composite Index which contains all the listed stocks at Shanghai Stock Exchange, SSE-A is the SSE A-share Index which is the composite index of all the listed A-share at Shanghai Stock Exchange, SZSE is the

[6] $SENT^{US}_t$ is the U.S. investor sentiment index found in Baker and Wurgler (2006); refer to 'Investor sentiment data (annual and monthly), 1934-2010' on website: http://pages.stern.nyu.edu/~jwurgler/main.htm.

SZSE Composite Index which contains all the listed stocks at Shenzhen Stock Exchange, SZSE-A is the SZSE A-share Index which is the composite index of all the listed A-share at Shenzhen Stock Exchange, IND is the average index of SSE and SZSE, and IND-A is the average index of SSE-A and SZSE-A. SENT is the investor sentiment index. All the stock indexes are selected as the year-end value.

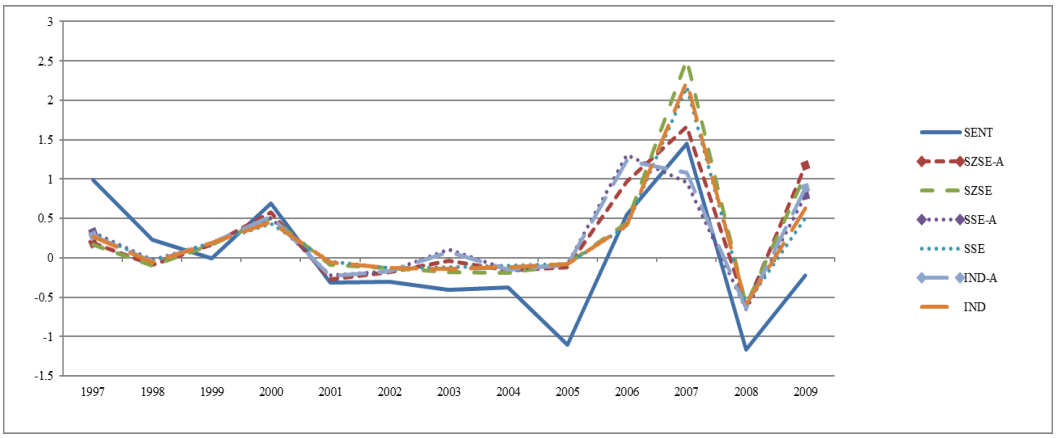

Figure 2: Investor Sentiment Index with Contemporaneous Returns of Stock Index

Figure 2 shows the investor sentiment index along with the contemporaneous returns of the stock indexes of China stock market. Here, SSE is the yearly return of SSE Composite Index which contains all the listed stocks at Shanghai Stock Exchange, SSE-A is the yearly return of SSE A-share Index which is the composite index of all the listed A-share at Shanghai Stock Exchange, SZSE is the yearly return of SZSE Composite Index which contains all the listed stocks at Shenzhen Stock Exchange, SZSE-A is the yearly return of SZSE A-share Index which is the composite index of all the listed A-share at Shenzhen Stock Exchange, IND is the average index return of SSE and SZSE, and IND-A is the average index return of SSE-A and SZSE-A. SENT is the investor sentiment index.

In both Figures 1 and 2, we can observe the time-series tendency of investor sentiment. In the time period from 1997 to 2009, investor sentiment has three distinctive declines respectively in the years of 1997, 2005 and 2008.

In 1997, the whole Asia experienced the disaster of the Asian financial crisis. This crisis started from Thailand and flooded almost all the Asia countries, and Chinese investors lost their confidence during this period. From Figure 1 and Figure 2, the investor sentiment remains low for almost three years to get back since this crisis.

During the period from 2000 to 2004, the investor sentiment had a modest increase together with the recovery of Chinese economy. However, in the year of 2005, the Chinese government issued a series of policies to cool down the overheated economy. The investor sentiment in the figures shows a drop and reflects this change.

In 2008, the global financial crisis exploded. This crisis swept the whole world's financial system and caused uncounted loss. Although China has a strong and powerful momentum of development, it is not an isolated country from the rest of the world or free from the global economic recession. The investor sentiment in the figures also presents the largest drawdown in this period.

According to the affairs in the Chinese stock market during those periods, the investor sentiment corresponds well with the tendencies of the Chinese economy. Besides, in both

Figures 1 and 2, the proven investor sentiment index presents a close trend to the tendencies of the stock indexes and their returns. The consistency of the market trend and the investor sentiment support the results in Baker and Wurgler (2007) in that investor sentiment has a co-movement with the contemporaneous market trend, and a positive relation is shown between investor sentiment and contemporaneous tendencies in the market.

To verify whether investor sentiment has a positive relation with the time-series of aggregate market returns, we select different market-level returns and use investor sentiment to conduct correlation and regression. In addition, as the U.S. market is regarded as the leader and forerunner of the world, we also add in U.S. investor sentiment ($SENT^{US}_t$) into the calculation.

Table 4: Correlations of Investor Sentiment Index and Contemporaneous Market-Level Returns

	$SENT_t$	$SENT^{US}_t$	EW	TW	CW	IND	IND-A
$SENT^{US}_t$	0.345***						
EW	0.432***	0.128					
TW	0.355***	0.101	0.182**				
CW	0.365***	0.100	0.195**	0.993***			
IND	0.346***	0.101	0.177**	0.999***	0.990***		
IND-A	0.343***	0.104	0.176**	0.998***	0.990***	0.999***	
AVG	0.420***	0.121	0.373***	0.980***	0.978***	0.978***	0.978***

This table reports the correlations among the investor sentiment index of China ($SENT_t$), investor sentiment index U.S. ($SENT^{US}_t$) and the contemporaneous market-level returns (Represented respectively by EW, TW, CW, IND-A, IND and AVG). In the table, the sign of ***, ** and * respectively represent the significance at the level of 1%, 5%, and 10%.

Table 4 presents the result of the Pearson's correlations of the two investor sentiment indexes with different market-level returns and correlations among the market returns. The Chinese investor sentiment index has significantly positive correlations with the investor sentiment index of the U.S. and all the time-series market-level returns as all the P-values are less than 0.001. The significant results confirm that Chinese investor sentiment has a positive relation with the contemporaneous aggregate market returns and the tendencies of the global investor sentiment. Furthermore, U.S. investor sentiment also has positive relations with different Chinese market-level returns; however, the correlation is not that significant as the lowest P-value for all of the correlations is 0.13, but it is still significant enough.

Table 5: Time-series Regressions for Contemporaneous Market-Level Returns

Panel A: Excluding U.S.						
	EW	TW	CW	IND	IND-A	AVG
a_1	0.018***	0.014**	0.015**	0.012*	0.012*	0.014**
b_1	0.045***	0.043**	0.047**	0.042**	0.041**	0.043**
Adj.R^2	0.181	0.12	0.128	0.114	0.112	0.171
Panel B: Including U.S.						
	EW	TW	CW	IND	IND-A	AVG
a_1	0.018***	0.014**	0.016**	0.013*	0.013*	0.015**
b_1	0.046***	0.044***	0.048***	0.042***	0.042***	0.044***
b_2	-0.003	-0.004	-0.005	-0.003	-0.002	-0.003
Adj.R^2	0.176	0.115	0.123	0.108	0.106	0.166

This table reports the regressions of contemporaneous market-level returns including market returns and stock index returns on contemporaneous sentiment index ($SENT_t$), or on contemporaneous sentiment index ($SENT_t$) and lagged sentiment index of U.S. ($SENT^{US}_t$). In the table, the sign of ***, ** and *respectively represent the significance at the level of 1%, 5%, and 10%.

The figures in Table 5 are the regression results of the Chinese investor sentiment index with different time-series of aggregate market-level returns respectively or with the U.S. investor sentiment index as another independent variable.

The regression formulas are as follows:

$$R_{mkt,\,t} = a_1 + b_1 SENT_t + e_t \quad (4)$$

$$R_{mkt,\,t} = a_1 + b_1 SENT_t + b_2 SENT^{US}_t + e_t \quad (5)$$

In Panel A, the results are the regressions of Formula (4) which is the regression of Chinese investor sentiment with different market-level returns respectively without the influence of global investor sentiment[7]. All of the coefficients of Chinese investor sentiment are significantly positive at a significance level of 0.05 or even less. In Panel B, the results are the regressions of Formula (5) which is the regression of both Chinese investor sentiment and global investor sentiment with different market-level returns respectively. All of the coefficients of Chinese investor sentiment are significantly positive at a significance level of 0.01. However, the coefficients of global investor sentiment are not significant.

Based on the results above, the hypothesis can be verified that investor sentiment has significantly positive relations with the contemporaneous aggregate market returns. The

[7]Global investor sentiment is represented by the U.S. investor sentiment.

effect of investor sentiment on the market is distinct and interactive: high investor sentiment may drive the market price away from the fundamental value and high market returns also strengthen the sentiment of investors. Moreover, when global investor sentiment is added into the analysis, the results indicate the possibility that global investor sentiment actually has some influence or connection with Chinese investor sentiment but limited effects on Chinese market returns.

4.2 Prediction on Market returns with Investor Sentiment

The analysis for the prediction effect of investor sentiment in China is the same as the methods that are used above.

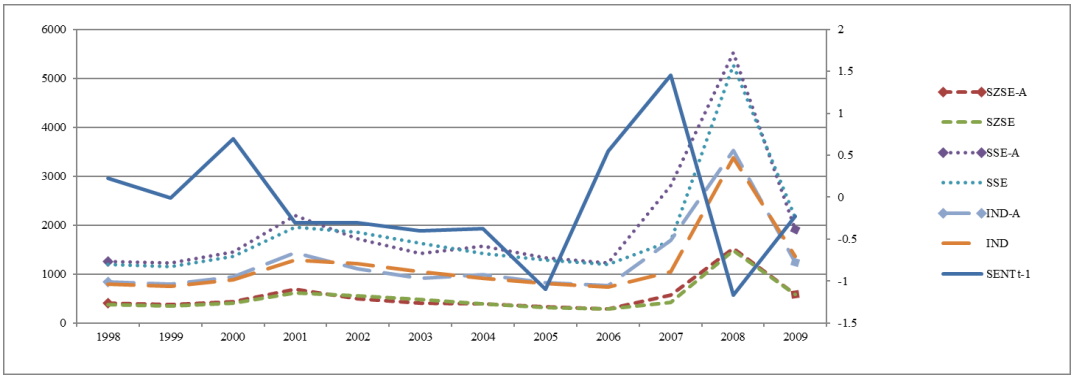

Figure 3: Investor Sentiment Index with Future Stock Index

Figure 3 shows the investor sentiment index along with the future stock indexes of China stock market. Here, SSE, SSE-A, SZSE, SZSE-A, IND, and IND-A have the same meaning as Figure 1. $SENT_{t-1}$ is the previous investor sentiment index. All the stock indexes are selected as the year-end value. Figure 3 is the generated previous-year investor sentiment index ($SENT_{t-1}$) on the stock indexes including the SSE, SSE-A, SZSE, SZSE-A, IND, and IND.

Figure 4: Investor Sentiment Index with Future Returns of Stock Index

Figure 4 shows the investor sentiment index along with the future returns of the stock indexes of China stock market. Here, SSE, SSE-A, SZSE, SZSE-A, IND, and IND-A

have the same meaning as Figure 2. $SENT_{t-1}$ is the previous investor sentiment index. Figure 4 is the generated previous-year investor sentiment index ($SENT_{t-1}$) on the returns of the stock indexes including the SSE, SSE-A, SZSE, SZSE-A, IND, and IND.
In both Figures 3 and 4, we can observe that the time-series of investor sentiment has the negative trend with the tendencies of the stock indexes and their returns.
To further verify that investor sentiment negatively predicts the time-series of future aggregate market returns, market-level returns (EW, TW, CW, IND-A, IND, and AVG), U.S. investor sentiment ($SENT^{US}_t$) and China investor sentiment are chosen to carry out the Pearson's correlations and regressions.

Table 6: Correlations of Investor Sentiment Index and Future Market-Level Returns

	$SENT_{t-1}$	$SENT^{US}_{t-1}$	EW	TW	CW	IND	IND-A
$SENT^{US}_{t-1}$	0.341***						
EW	-0.232***	-0.078					
TW	-0.272***	-0.098	0.192**				
CW	-0.249***	-0.094	0.204**	0.992***			
IND	-0.270***	-0.098	0.187**	0.999***	0.990***		
IND-A	-0.270***	-0.095	0.185**	0.998***	0.989***	1.000	
AVG	-0.297***	-0.106	0.383***	0.979***	0.978***	0.978***	0.977***

This table reports the correlations among the investor sentiment index of China ($SENT_{t-1}$), investor sentiment index U.S. ($SENT^{US}_t$) and the future market-level returns (Represented respectively by EW, TW, CW, IND-A, IND and AVG). In the table, the sign of ***, ** and *respectively represent the significance at the level of 1%, 5%, and 10%.
Table 6 presents the result of the Pearson's correlations of two investor sentiment indexes with different subsequent market-level returns and correlations among the market returns. The Chinese investor sentiment index has significantly negative correlations with all of the time-series of the market-level returns as all of the P-values are less than 0.001. The significant results verify that Chinese investor sentiment has a negative relation with the future aggregate market returns. Furthermore, U.S. investor sentiment also has negative relations with different Chinese market-level returns; however, the correlation is not that significant.

Table 7: Time-series Regressions for Future Market-Level Returns

Panel A: Excluding U.S. sentiment index

	EW	TW	CW	IND	IND-A	AVG
a_1	-0.018***	-0.013*	-0.014*	-0.012*	-0.012*	-0.014**
b_1	-0.045***	-0.032***	-0.030***	-0.031***	-0.031***	-0.030***
Adj.R^2	0.047	0.067	0.055	0.066	0.066	0.082

Panel B: Including U.S. sentiment index

	EW	TW	CW	IND	IND-A	AVG
a_1	-0.018***	-0.013*	-0.014*	-0.012	-0.012	-0.014**
b_1	-0.023***	-0.032***	-0.030***	-0.031***	-0.031***	-0.029***
b_2	0.000	-0.001	-0.002	-0.001	0.000	-0.001
Adj.R^2	0.041	0.061	0.049	0.06	0.06	0.075

This table reports the regressions of future market-level returns including market returns and stock index returns on future sentiment index ($SENT_{t-1}$), or on future sentiment index ($SENT_{t-1}$) and lagged sentiment index of U.S. ($SENT^{US}_{t-1}$). In the table, the sign of ***, ** and *respectively represent the significance at the level of 1%, 5%, and 10%.

In Table 7, the data are the regression results of the previous-year investor sentiment index in China with different time-series of aggregate market-level returns with or without the previous-year investor sentiment index of the U.S. The regrssion equations are as follows:

$$R_{mkt,t} = a_1 + b_1 SENT_{t-1} + e_t \quad (6)$$

$$R_{mkt,t} = a_1 + b_1 SENT_{t-1} + b_2 SENT^{US}_{t-1} + e_t \quad (7)$$

The figures in Panel A are the regression results of Chinese investor sentiment with different future market-level returns without the influence of global investor sentiment by following Formula (6). All of the coefficients of Chinese investor sentiment are significantly negative at a significance level of 0.01. In Panel B, the results are the regressions of both Chinese investor sentiment and global investor sentiment with different subsequent market-level returns respectively by following Formula (7). All the coefficients of Chinese investor sentiment remain significantly negative at a significance level of 0.01 while the coefficients of global investor sentiment are not significant.

We find robust results that demonstrate that Chinese investor sentiment has negative relations with future market-level returns. The significantly negative relations also demonstrate that Chinese investor sentiment has a good forecasting effect on future aggregate market returns. Furthermore, results show that global investor sentiment actually does not play a role on Chinese investor sentiment.

5 Conclusions

With the development of behavioral finance and empirical physiological studies of investor sentiment, the research direction of finance is becoming more interdisciplinary. More financial academics are foregoing traditional financial theories which are built on the flawed assumptions of the EMH and concentrate on real situations and phenomena, such as market anomalies.

In this study, the investor sentiment index of the Chinese A-share stock market is generated by using the method in Baker et al. (2012). Then, we use the generated investor sentiment index to find the relations between investor sentiment and aggregate market returns. We demonstrate that investor sentiment is a good negative predictor of subsequent market returns and has a positive co-movement with contemporaneous market returns and stock price changes.

This study does not only use investor sentiment to explain for aggregate market tendencies, but also the investor sentiment index for Chinese A-share stocks in this study can be considered as a supplement to the global investor sentiment index and support the conclusion that investor sentiment negatively predicts subsequent market returns. We believe that the negative relations of investor sentiment with future aggregate market returns is important as they are not only important complements to the theories on global investor sentiment with the use of the Chinese A-share stock market but also efficient means for investors to use in their strategies to catch the movement of stock returns and make their investing decisions.

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