

A study of the impact of investor attention on stock prices ——take new energy concept stocks as an example

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Abstract. In recent years, "new energy" has been the focus of national attention. Under such circumstances, this paper takes new energy concept stocks as an example to explore the impact of investor attention on stock prices in the current period. Among them, there are many indicators in the stock market, and this article measures stock prices from the perspective of stock prices with yield and stock price volatility. The proxy variable of investor attention is Baidu index of new energy concept stocks to explore the impact of investor attention on the price of new energy concept stocks. The study finds that there is a positive relationship between investor attention and the yield and stock price volatility of new energy concept stocks in the current period.

Keywords: Investor attention; New energy; Stock price.

1. Introduction

The term new energy has appeared since 2008. Nowadays, with the continuous advancement of urbanization, the pollution level of cities is getting deeper and deeper, and the country is paying more and more attention to the development of the new energy industry. In this context, investors are also increasingly concerned about the trend of new energy concept stocks. Therefore, starting from the hot topic of "new energy" in recent years, this article studies the impact of investor attention on the market of concept stocks in China.

With the rapid development of the Internet, people have various channels to obtain information, but due to energy and time constraints, they cannot process all the information they receive. This shows that there is a lot of information and limited attention. Similarly, investor attention is scarce in the securities market, which has many listed companies. Investor attention can affect the price of securities and can have a certain impact on the stock market. Many scholars believe that only the information that investors pay attention to can be reflected in the stock price in the process of stock trading, so investor attention is a prerequisite for market performance.

Traditional financial theory holds that markets are efficient and stock prices contain all the information. This happens on the premise that it is impossible for investors to handle all the information related to stocks, especially if the investor has several stocks in his hands. Investors can only process the information they see because investor attention is limited. Therefore, on the basis of existing financial theory, the introduction of attention is also a supplement to the existing theory.

Specifically, the investor attention in this article is measured by the Baidu index, and the investor attention is refined to observe the impact of different types of news reports on stock prices. The chapters of this paper are distributed as follows: the first chapter is an introduction to the article, which describes the background and significance of the topic selection of this paper, and expounds the relevant research content, methods and frameworks, as well as the innovation of the article. The second chapter is a literature review, which introduces the connotation of investor attention, the measurement of investor attention, concept stocks, and the literature related to investor attention and the stock market, and reviews the existing research. Chapter 3 is study design, which introduces the study hypothesis and sample selection and data sources, and explains the construction of variables. The fourth chapter is the model, building the relevant model, and testing the model. Chapter 5 is empirical analysis, starting with descriptive statistical analysis. Then, the fixed-effect model is used to return to the impact of current investor attention on the price of new energy concept stocks. Chapter 6 is the research conclusion, based on the analysis of the previous article, the research conclusions are drawn and recommendations are made to investors, listed companies and regulators.

2. Literature review

Foreign scholars have long paid attention to investor attention and carried out all-round and multi-angle exploration of investor attention. In the 80s, Merton first introduced investor attention into the field of behavioral finance, and believed that investor attention can have a great impact on the stock market. After a deeper empirical analysis, it was found that much of the impact of investor attention on stocks is due to investors' decision-making behavior (Barber et al., 2008). At the same time, scholars hypothesize that small and medium-sized investors are more interested in abnormal information about stock prices, such as the ups and downs of stock prices (Hirshleifer et al., 2009). Yu and Hsieh (2010) proved the above hypothesis by studying the phenomenon of the Shanghai Stock Exchange and the Taiwan stock market during the financial crisis. Based on this, Da et al. (2010) explored the behavior of investors buying stocks and found that investor attention can promote stock prices to rise in a short period of time, a phenomenon called price pressure caused by investor attention. After theoretical and empirical analysis, Yu Yuan (2015) shows that uncertain investor concerns have a considerable impact on asset pricing.

Compared with foreign research, China's research investors pay attention to it later and the research direction is concentrated. Yu Qingjin and Zhang Bing (2012) based on the actual situation of China's search engine market share, used the number of keywords retrieved in Baidu - Baidu Index to measure investor attention and verify the feasibility of Baidu Index. On this basis, Tian Bing (2019) research concluded that when the stock market fluctuates sharply, especially in the bull market stage, the impact of investor attention on the stock market is more obvious. Wang Yaojun (2018) used an empirical analysis tool to use the number of keyword searches in the 360 browser as a proxy variable for investor attention, and found that investor attention had a significant positive impact on the return of stocks, but had no significant relationship with the volatility of stock prices. In addition, measuring investor attention by using the number of comments on the forum of the Shenzhen Stock Exchange can also find that investor attention has a positive impact on the trading volume and yield of stocks (Cen Wei, 2016). Therefore, the increase in investor attention can reduce the liquidity risk and volatility risk of stocks, and reduce the information asymmetry of the stock market.

The proportion of small and medium-sized investors in the Chinese stock market is much larger than that of institutional investors (Zhang Yihao and Li Yuan, 2014), while individual investors have behavioral bias and are more inclined to buy stocks of high concern (Tang Siyuan, 2018). In addition, by studying the impact of investor attention on lagging stock markets, Li Zhenghui found that there may be a causal relationship between investor attention and stock prices, that is, changes in stock market indicators will also bring about changes in investor attention, and even lead to changes in long-term investor attention. Therefore, the exploration of investors' attention can better judge the stock market and help investors reduce trading risks.

Summarizing the above literature, domestic and foreign scholars have carried out a variety of explorations around investor attention and the stock market, but the research results are not completely consistent, more because different scholars put forward different hypotheses and adopt different proxy indicators of investor attention, but they all found that investor attention has an impact on the stock market.

3. Research design

3.1 Research hypotheses

Hypothesis 1: The current investor attention with Baidu index as a proxy variable is positively correlated with the return rate of new energy concept stocks.

Hypothesis 2: Current investor attention with news reports as proxy variables has different effects on the yield of new energy concept stocks, in which positive news will promote yield growth, and negative news will lead to yield decline.

Hypothesis 3: In a certain period in the future, the yield rise caused by positive news will reverse, and the yield decline caused by negative news will continue.

Hypothesis 4: Current investor attention using Baidu index as a proxy variable is positively correlated with the company's stock price volatility.

Hypothesis 5: Current investor attention using news reports as proxy variables is positively correlated with the volatility of a company's stock price.

3.2 Sample selection

In this paper, 50 new energy concept stocks were selected as research objects, as shown in the following table:

Table 1. List of study subjects

Stock	Stock symbol	Stock	Stock symbol	Stock	Stock symbol	Stock	Stock symbol
Zhongtian Technology	SH600522	Shenergy shares	SH600642	Northern International	SZ000065	Jin Kai Xin Neng	SH600821
Silver Star Energy	SZ000862	Suzhou high-tech	SH600736	Hongxun Technology	SH603015	Bao New Energy	SZ000690
ENN shares	SH600803	Huitong Energy	SH600605	Cis sodium shares	SZ000533	Nuclear power in China	SH601985
Poway alloy	SH601137	Dongxu blue sky	SZ000040	Fortis Information	SZ000836	Shenzhen Energy	SZ000027
Desai battery	SZ000049	Fosu Technology	SZ000973	Junzheng Group	SH601216	Tiandi Technology	SH600582
Kingsoft shares	SH600396	Gedian shares	SZ000875	Infore environment	SZ000967	Bao'an, China	SZ000009
Xiangdian shares	SH600416	Tianfu Energy	SH600509	Shanghai Electric Power	SH600021	Huayin Power	SH600744
Lin Yang Energy	SH601222	Colifar	SH600478	COFCO Technology	SZ000930	Chuaneng Power	SZ000155
Ming Tai Aluminum	SH601677	Shanghai Electric	SH601727	Jinkong Power	SZ000767	Yuanxing Energy	SZ000683
Zhongmin Energy	SH600163	Hubei Energy	SZ000883	Shenhua Holdings	SH600653	Guodian Narui	SH600406
Jiahua Energy	SH600273	MeriCloud	SZ000815	Ganneng shares	SZ000899	TBEA electrician	SH600089
AVIC Heavy Aircraft	SH600765	Datang Power Generation	SH601991	NORD shares	SH600110		
Kibing Group	SH601636	Hongfa shares	SH600885	Aerospace electromechanical	SH600151		

3.3 Data

The number of searches for keywords in Internet search engines as a proxy variable to measure investor attention has been widely used in recent years. Because once an investor retrieves the name or symbol of a certain stock on the internet, it can be said that it has attracted the attention of investors. This attention is highly likely to generate actual trading behavior and affect the stock's price, trading volume and other indicators. Baidu, which has the largest market presence in China, offers an open-ended search service, the Baidu Index. This article measures investor attention using the search

volume of keywords in the Baidu index. Regarding keywords, foreign literature commonly uses stock names or stock codes, and domestic stock codes are more inclined to use. Because the domestic stock name and the company name repeat rate is high, when people search for the stock name, it may be only to query the basic information of the company, and the data noise is relatively large.

Since Baidu Index cannot be downloaded directly, this article uses Python software to crawl the daily search volume data of the above 50 stocks in Baidu Index from August 30, 2017 to August 30, 2022. In addition, the number of positive news reports, neutral news reports and negative news reports comes from the China Research Data Service Platform.

3.4 Variable construction

(1) Explanatory variables

Baidu Index: This article uses the Baidu Index of New Energy Stocks to measure investor attention. The Baidu index functions similarly to Gooletrend abroad, using the number of Internet searches for a keyword to measure public interest in that keyword. The Baidu index in the article is the search volume of new energy concept stocks and individual stock symbols.

Number of news stories: Measure investor attention by the number of times each concept stock appears in news stories per day, including positive news (posnews), neutral news (neunews), and negative news (negnews).

Investor Attention (IA): Includes Baidu index and the number of news reports.

(2) The variable being explained

Stock Yield (RI): The daily rate of return of individual stocks of new energy concept stocks.

Stock price volatility (RV): The logarithmic ratio of the highest price to the lowest price of each new energy concept stock.

(3) Control variables

Company market capitalization (marval): The number of logarithms of the circulating market value of each new energy concept stock per day.

Price-to-book ratio (P/B): The ratio of the daily closing price of individual new energy concept stocks to the book value of each share is logarithmic.

Market Return (RM): The daily market return of the stock market in which the sample stocks were located during the study period (unit: %)

The definitions and calculation formulas of explanatory variables, explanatory variables, and control variables in this document are shown in the following table:

Table 2. Variable definitions and formula tables

	Variable	Definition
Explanatory variables	IA	Investor attention is a general term (InvestorAttention)
	Innestock	In(newenergystocks)
	posnews	The number of times each new energy concept stock appears in positive news
	neunews	The number of times each new energy concept stock appears in neutral news
	negnews	The number of times each new energy concept stock appears in negative news
The variable being explained	ri	Stock yield, the daily rate of return of a listed company (unit: %)
	rv	Stock price volatility, the ratio of the highest price to the lowest price of each new energy concept stock every day.
Control variables	marval	The market value of the company (marketvalue), the daily stock circulation value of the listed company is logarithmic (unit: 100 million yuan)
	PB	Price-to-book ratio (P/B), the ratio of the closing price of the trading day to the carrying value of each share, taken as a logarithmic
	rm	Therate of market, the daily market return of the stock market in which the sample stocks were located during the study period (unit: %)

4. Model

4.1 A model of the impact of investor attention on the yield of new energy concept stocks

Fama and French (1996) argue that a company's market capitalization, price-to-book ratio, and market rate of return can affect the return of a stock. Accordingly, add investor attention (IA) to build a model (1). In order to control the "calendar effect" existing in the stock market, the model (1) controls the year fixed effect YearEffect, the month fixed effect Month Effect and the intra-week effect Weekday Effect, where marval, PB, rm are the control variables.

4.1.1 A model of the impact of current investor attention on stock yields

$$ri_t = \alpha_{i,t} + \beta_1 IA_{i,t} + \beta_2 marval_{i,t} + \beta_3 PB_{i,t} + \beta_4 rm_{i,t} + YearEffect + MonthEffect + WeekdayEffect + \varepsilon_{i,t} \quad (1)$$

The first phase of t is August 2017; ri is the yield of new energy concept stocks; $\alpha_{i,t}$ are constant terms; β is the coefficient; IA is the general term for investor attention (Baidu index (Ingcstock) and the number of news reports, of which the number of news reports is further divided into positive news (posnews), neutral news (neunews) and negative news (negnews)); Marval is the company's market capitalization; PB is the price-to-book ratio; RM is the market rate of return; $\varepsilon_{i,t}$ are the residual terms.

4.2 A model of the impact of investor attention on stock price volatility

4.2.1 A model of the impact of current investor attention on stock price volatility

Introduce stock price volatility RV and build the following model:

$$rv_t = \alpha_{i,t} + \beta_1 IA_{i,t} + \beta_2 marval_{i,t} + \beta_3 PB_{i,t} + \beta_4 rm_{i,t} + YearEffect + MonthEffect + WeekdayEffect + \varepsilon_{i,t} \quad (2)$$

The first phase of t is August 2017; RV is the stock price volatility of new energy concept stocks; $\alpha_{i,t}$ are constant terms; β is the coefficient; IA is the general term for investor attention (Baidu index (Ingcstock) and the number of news reports, of which the number of news reports is further divided into positive news (posnews), neutral news (neunews) and negative news (negnews)); Marval is the company's market capitalization; PB is the price-to-book ratio; RM is the market rate of return; $\varepsilon_{i,t}$ are the residual terms.

4.3 Model testing

4.3.1 Smoothness test

To ensure that all variables are stable, a stationarity test is required. In this paper, the FisherADF test method suitable for non-flat panels is used to perform the unit root test. All variables were tested to be stable, and the results are shown in the following table:

Table 3. Stationary test results

	Variable	P	State
The variable being explained	ri	0.0000	smooth
	rv	0.0000	smooth
Explanatory variables	Innestock	0.0000	smooth
	posnews	0.0000	smooth
	neunews	0.0000	smooth
	negnews	0.0000	smooth
Control variables	marval	0.0000	smooth
	PB	0.0000	smooth
	rm	0.0000	smooth

4.3.2 Correlation test

In order to determine the correlation between the variables, this paper tests the correlation of the variables in the model, and the specific results are shown in Table 4. Correlation analysis measures the degree of correlation between two variables. The Pearson correlation coefficient r can be obtained by substituting the data into the Stata software. The absolute value of r is between 0 and 0.3, which means that the two variables are not related; the absolute value of r is between 0.3 and 0.5, indicating a low correlation between the two variables. As can be seen from Table 4, the correlation coefficient between most variables is less than 0.5, which indicates that there is no serious collinear relationship between the variables, thus ensuring the accuracy of the regression. And by observing the significant relationship, this paper can preliminarily determine the relationship between investor attention and the current rate of return and stock price volatility of stocks.

Table 4. Correlation test results

	ri	rv	Innestock	posnews	neunews	negnews	marval	PB	rm
ri	1								
rv	0.035***	1							
Innestock	0.058***	0.066***	1						
posnews	0.092***	0.094***	0.562***	1					
neunews	0.046***	0.025***	0.027***	0.038***	1				
negnews	-0.049***	0.006***	0.061***	0.022***	0.279***	1			
marval	0.064***	0.043**	0.275***	0.256***	0.026***	0.038***	1		
PB	0.265***	0.062***	0.283***	0.067***	0.009***	0.024***	0.004**	1	
rm	0.024***	-0.028***	0.018***	0.004***	-0.002***	-0.004*	0.046*	0.004**	1

5. Empirical analysis

The meaning of the current period of this article is that the proxy variable of investor attention is in the same trading day as the stock yield, stock price volatility, trading volume, and turnover rate. This paper uses a fixed-effect model and Stata14 statistical software to carry out detailed descriptive statistics and empirical analysis of proxy variables of investor attention and related indicators of garbage classification concept stocks and individual stocks. This paper combines a number of stock speculation websites to select stocks defined as new energy concept stocks or stocks with similar names, and selects a total of 50 sample concept stocks. The stock codes of these 50 sample stocks were searched as keywords, and the Baidu index and news reports obtained were used as proxy variables for investor attention, and the impact on stock prices and liquidity was regressionally analyzed, and stock prices were measured by stock yield and stock price volatility.

5.1 Descriptive statistics

Table 5. Descriptive statistical results

The variable type	Variable	Mean	Median	Standard	Min	Max	Number of samples
The variable being explained	ri	0.028	0	3.002	-7.89	6.58	50000
	rv	2.981	2.783	2.675	0.542	17.84	50000
Explanatory variables	Innestock	5.786	5.368	0.627	0	9.27	50000
	posnews	0.297	0	1.091	0	27.35	50000
	neunews	0.109	0	0.762	0	40.09	50000
	negnews	0.134	0	0.672	0	32.93	50000
Control variables	marval	21.98	21.91	0.469	20.89	25.69	50000
	PB	1.004	0.932	0.681	-0.256	5.291	50000
	rm	0.0204	0.0527	1.672	-8.09	6.921	50000

The descriptive statistical results of the variables involved in this paper are shown in Table 5, which can be seen from the table: (1) the maximum yield of new energy concept stocks is 6.58%, the minimum value is -7.89%, and the standard deviation is 3.002; the maximum stock price volatility is 17.84%, the minimum value is 0.542%, and the standard deviation is 2.675. (2) The minimum value of investor attention measured by Baidu Index is 0, the maximum value is 9.27, and the standard deviation is 0.627.

5.2 Empirical analysis of the impact of current investor attention on stock returns

The empirical results of the impact of investor attention on the yield of new energy concept stocks are as follows:

Table 6. The impact of investor attention on the yield of new energy concept stocks in the current period

	(1)	(2)	(3)	(4)
	ri	ri	ri	ri
Innestock	0.478*** (0.070)			
posnews		0.279*** (0.050)		
neunews			0.009 (0.020)	
negnews				-0.069*** (0.040)
PB	0.468*** (0.120)	0.426*** (0.122)	0.480*** (0.101)	0.479*** (0.103)
rm	1.112*** (0.026)	1.105*** (0.026)	1.111*** (0.026)	1.103*** (0.026)
marval	-0.365** (0.168)	-0.068 (0.142)	-0.076 (0.137)	-0.082 (0.129)
year	Yes	Yes	Yes	Yes
month	Yes	Yes	Yes	Yes
weekday	Yes	Yes	Yes	Yes
_cons	3.895 (3.902)	0.698 (3.972)	1.202 (3.029)	1.092 (2.877)

From the overall regression results in Table 6, it can be seen that the impact of Baidu index, positive news and negative news on the yield of new energy concept stocks is significant at the confidence level of 1%, while the impact of neutral news on the yield of new energy concept stocks is not significant.

From the regression results in the first column of Table 6, it can be seen that for every 1% increase in investors' attention to new energy concept stocks, the yield of new energy concept stocks will increase by 0.478%. It can be concluded that the current investor attention with Baidu index as a proxy variable is positively correlated with the yield of new energy concept stocks.

From the regression results in columns 2-4 in Table 6, it can be seen that the number of positive news reports has a significant positive correlation with the return of new energy concept stocks. The amount of negative news reported has a significant negative correlation with the yield of new energy concept stocks; The amount of neutral news coverage does not show a significant relationship with the return of new energy concept stocks.

5.3 Empirical analysis of the impact of current investor attention on stock price volatility

The empirical results of the impact of investor attention on the stock price volatility of new energy concept stocks are as follows:

Table 7. The impact of investor attention on the stock price volatility of new energy concept stocks in the current period

	(1)	(2)	(3)	(4)
	rv	rv	rv	rv
Innestock	2.804*** (0.204)			
posnews		0.164*** (0.032)		
neunews			0.048* (0.028)	
negnews				0.238*** (0.040)
PB	0.784*** (0.286)	0.828*** (0.271)	0.920*** (0.274)	0.932*** (0.260)
rm	-0.224*** (0.010)	-0.228*** (0.010)	-0.225*** (0.010)	-0.217*** (0.010)
marval	-1.260*** (0.390)	-0.039 (0.204)	-0.060 (0.201)	-0.071 (0.190)
year	Yes	Yes	Yes	Yes
month	Yes	Yes	Yes	Yes
weekday	Yes	Yes	Yes	Yes
_cons	17.230* (8.091)	7.489 (3.983)	7.512 (4.002)	8.092 (4.582)

From the overall regression results in Table 7, it can be seen that the impact of Baidu index, positive news and negative news on the yield of new energy concept stocks is significant at the confidence level of 1%, and the impact of neutral news on the yield of new energy concept stocks is significant under the confidence level of 10%.

From the regression results in the first column of Table 7, it can be seen that for every 1% increase in investors' attention to new energy concept stocks, the yield of new energy concept stocks will increase by 2.804%. It can be concluded that the current investor attention using Baidu index as a proxy variable is positively correlated with the stock price volatility of new energy concept stocks.

From the regression results in columns 2-4 in Table 7, it can be seen that the number of positive news reports has a significant positive correlation with the stock price volatility of new energy concept stocks; There is a significant positive correlation between the amount of negative news coverage and the stock price volatility of new energy concept stocks; There is also a significant positive correlation between the volume of neutral news coverage and the stock price volatility of new energy concept stocks.

6. Conclusions

Through empirical analysis, it is concluded that the investor attention based on Baidu index in the current period has a significant positive impact on the yield of new energy concept stocks and a significant positive impact on the stock price volatility, indicating that the pressure of investor attention in the current period can bring stock premium and drive investors' buying behavior.

The investor attention based on positive news in the current period has a significant positive impact on the yield of new energy concept stocks and a significant positive impact on stock price volatility.

It shows that positive news can bring good expectations to investors, drive investors to buy behavior, and lead to stock price increases.

The investor attention based on negative news in the current period has a significant negative impact on the yield of new energy concept stocks and a significant positive impact on stock price volatility. It shows that negative news brings pessimism to investors, drives investors to sell, and leads to a decline in stock prices.

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