

# *Studying the Impact of Media Coverage on the Stock Market Using Mediating Effects*

Zhang Ziyue<sup>[0009-0000-4503-6128]</sup> 1,a,\*

<sup>1</sup>*Sichuan International Studies University*

a. 3452593485@qq.com

\*corresponding author

**Abstract:** As a publisher of information on capital market transactions, media coverage has become a hot topic of research for modern scholars. In this paper, stocks with trading data within 2013.1.1-2020.1.1 on the SSE and SZSE are used as research samples, and the number of media reports, investor sentiment, and stock returns are used as core variables, to investigate the transmission relationship between these three things by using a mediating effect model. The relationship between the three variables is reported systematically and directly. This study concludes that investor sentiment plays a partially mediating role in the impact of media attention on the stock market. Investor sentiment as a medium of media information translates perceptions into behavior and thus influences investors' investment decisions. The news gives investors some informational advantage reduced the level of information asymmetry and has the most pronounced impact on investors, media involvement diminishes the role of investor sentiment on stock investments.

**Keywords:** media attention, investor sentiment, stock reporting rate, information asymmetry.

## 1. Introduction

The role of the media is becoming increasingly non-negotiable with the rapid development of the internet and is particularly important in the capital markets. As the main channel for investors to receive information, the media plays a key role in the stock market by disclosing information about listed companies and exposing scandals or other factors that influence investors' decisions.

On July 20, 2015, the China Securities Regulatory Commission (CSRC) issued an urgent disinformation notice, stating that the report of Caijing that "the CSRC is studying the exit plan of stabilization funds is untrue". The CSRC spokesperson indicated that it is irresponsible for the media to report on the market by events with significant impact without verifying with the regulator and that the CSRC will continue to complete the work related to stabilizing the market in the next phase. After the SEC clarifying lagged, the form of the market index decline reversed and rose sharply. This incident illustrates that media coverage and evaluation of state sector decisions guide investors' investment choices on the stock market.

This paper investigates the transmission mechanism of media coverage on stock market changes by using the number of news reports as a proxy variable for media attention, stock turnover rate as a proxy variable for investor sentiment, and stock return rate as a proxy variable for stock market changes, and investor sentiment as a mediating variable. The existing literature has more often studied any two of the three variables or studied the impact of media on IPO pricing either that or media

sentiment's influence on investor behavior, etc. Few systematic and direct studies have been conducted on all three. In this paper, we discuss them two by two separately discussions and then analyze the three variables together. So that readers can have a better understanding of how much mediating effect investor sentiment plays as a mediating variable. How does it play a mediating effect?

The structure of this paper is arranged: Chapter 1 presents the research questions and the innovation points of the paper based on the research background. Chapter 2 is a literature review, based on the efficient market theory, behavioral finance theory, and information asymmetry theory, and collects relevant literature from two perspectives respectively, a literature review on media coverage and investor sentiment and a literature review on investor sentiment and the stock market. Chapter 3 is the theoretical analysis and research hypothesis, which proposes three hypotheses based on the research questions the effect of media attention on investor sentiment, the effect of investor sentiment on stock market changes, and the mediating role of investor sentiment. Chapter 4 is the introduction of the data and data definitions, which first proposes to use stocks with trading data from 2013.1.1 to 2020.1.1 on SSE and SZSE as the research sample. In Chapter 5, descriptive statistical analysis and mediated effects regression analysis are performed, and finally, the regression results are analyzed. Chapter 6 gives a conclusion based on the research.

## **2. Literature Review**

### **2.1. A literature review on media coverage and investor sentiment**

The media is a branch independent of politics and law and is self-contained, but it has an important influence on the financial market. With the development of the internet, the role of media in reporting public information and transmitting sentiment has become more and more prominent. It also has become a research hotspot for domestic and foreign scholars. In EMH, media coverage changes the information structure of investors to further influence the stock market. But in behavioral finance, media coverage affects the stock market by influencing investors' behavior, because investors are the medium through which media coverage acts on the stock market. News about fundamental stock information can have a long-term impact, and investors react after the neutral publication of information by the media, and this reaction time causes the media not to act on stocks immediately. However, if there is too much emotional element in media coverage, it can lead to a synchronized change in stocks immediately after a shock of news coverage, but also a reversal phenomenon afterward [1],[2]. These reactions create volatility in investor sentiment and trading markets, respectively [3].

Investors in the stock market are usually divided into two categories: institutional investors and individual investors. According to the China Securities Investor Protection Foundation (SIPF) data as of the end of 2020, the number of retail investors in China reached 320 million, so individual investors account for a relatively large share of the country. News information is the most widely available channel for them to obtain external information, but the behavior of such investors tends to aggregate, and irrational behavior of individuals hit by news may lead other investors and lead to a herding effect. However, more information leads to more opportunities for profitable trading when media articles make information public leading to a decrease in the frequency of insider trading and a decrease in information asymmetry between managers and investors [4]. The role of media coverage is reflected in providing information value mainly in the primary market, which reduces the degree of information asymmetry, and providing sentiment value in the secondary market, which promotes irrational sentiment and reduces the efficiency of asset pricing [5]. Soon-Ho Kim Dongcheol Kim [6] collect 32 million data on yahoo message boards about financial manned companies, and find that when investor sentiment is high, retail asset allocation demand expands, making prices higher than asset values, but prices also return to fundamental values when investor sentiment recovers.

In addition, some researchers classify media sentiment based on salient tone words in media coverage Hanna, A. J., Turner, J. D. and Walker, C. B. [7] quantifying investor sentiment using Financial Times tone words as an indicator of investor sentiment finds that negative sentiment is typically smaller in bull markets and that the standard deviation of pessimism is inversely proportional to investment returns. Engelberg [8] models media information and media sentiment, and then classifies investor behavior and news coverage by region, with local media coverage tendencies correlated with local stock trading volume. However, instead of focusing on media sentiment, this paper uses the number of media reports as a proxy variable for social concern.

## **2.2. A literature review on investor sentiment and stock markets**

In the classical financial theory, investors were perfectly rational and mistakes could cancel each other out, and investor sentiment did not play a role in realized and expected stock returns. Since some anomalous effects in the stock market cannot be explained by EMH, behavioral finance has been increasingly promoted. Behavioral finance supports the idea that there is an interaction between investor sentiment and stock volatility [9]. When there is negative or positive news in the market, the resulting investor sentiment tends to lead to the simultaneous bullish or bearish sentiment among other investors in the market, who then make simultaneous buying or selling transactions, and stock prices will thus produce abnormal fluctuations, which may in turn cause changes in investor sentiment. Nowadays, investor sentiment affects the stock market and has become a consensus among some scholars. Sayim [10] proved through research that stock index returns are lower when investor sentiment is high, while there is no significant effect when investor sentiment is low. Rishad [11] finds that irrational investor sentiment leads to asymmetric excessive stock market volatility.

Baker and Wurgler [12] confirm that broad-based investor sentiment has a cross-sectional effect, with less preference for more volatile and riskier stocks when investor sentiment is high but reverses when investor sentiment is low. Baek [13] uses a composite sentiment maker indicator to examine the relationship between investor sentiment and stock returns, prices, and dividends. They find that investor sentiment and stock returns are closely related and are more pronounced under extreme markets. This effect is significantly positive, and the higher the investor sentiment, the more pronounced the stock market volatility and negatively related to the market interest rate [14].

However, scholars have inconsistent views on the predictive effect of investor sentiment on the stock market. Chung, Mei-Ling[15] and Yin, H. [16] argue that investor sentiment had a better predictive effect on future stock market volatility, that is the lagged effect of investor sentiment is stronger. Maik Schmeling [17] confirms that investor sentiment and stock reporting are correlated in an international context and that sentiment predicts stock market reporting negatively. However, Soon-Ho Kim [6] argues against the predictive effect of investor sentiment on future stock returns, volatility, and trading volume.

## **3. Theoretical analysis and formulation of hypotheses**

In efficient markets, investors are rational and it is impossible to obtain excess returns by predicting stock prices. Fama[18] classifies efficient markets into weak efficient, semi-strong efficient, and strong efficient forms. Returns are obtained through all past information in weak EMH, all public information in semi-strong EMH, and all public and private information in strong EMH. The possibility of gaining excess returns under each type of market is almost zero. As EMH gradually fails to account for anomalies such as calendar effect, scale effect, and equity premium, more scholars find that behavioral finance can provide a more reasonable explanation for investor behavior, and traditional finance is thus greatly impacted, and the media is gaining importance as a distributor of information in the market.

Behavioral finance argues that markets are not fully efficient, which is expressed through irrational investors' emotions and limited arbitrage. Irrational investor sentiment and limited information cause pessimistic or optimistic judgments about the future value of stocks, while limited arbitrage is caused by imperfect market mechanisms.

There is information asymmetry in irrational markets, or information asymmetry is one of the causes of investor sentiment. Akerlof [19] proposed the theory of information asymmetry, which rejects the assumption that investors have full access to public information in the market. In behavioral finance theory, media coverage affects investor sentiment, which in turn affects investor behavior and finally capital markets. The emergence of media coverage has, to a certain extent, weakened the degree of information asymmetry between managers and investors, weakened the agency problem, and to a certain extent, compensated for the information deficit of individual investors when trading in the capital market and reduced investors' uncertainty about the company. However, due to the limited attention span of rational investors, the media can direct the attention of investors on the one hand, and on the other hand, they convey media sentiment to investors, which influences their judgment and causes volatility in the stock market. Maslyuk-Escobedo Svetlana[20] by studying the impact of the U.S. media sentiment index on energy market returns concludes that futures and spot returns of energy commodities fluctuate along with the correlation, but large sentiment-driven investment behavior with high investor sentiment may lead to overvalued stock prices, causing an overreaction to push up stock prices in the short term. Based on the above research and theory, this paper proposes that.

H1: Media attention is positively correlated with investor sentiment

H2: There is a significant effect of investor sentiment on stock market returns

Combining the two relational hypotheses above, it is further proposed that

H3: Investor sentiment plays a mediating role in the impact of media coverage on the stock market.

## 4. Study Design

### 4.1. Sample selection and data sources

This paper selects Chinese listed companies on the Shanghai Stock Exchange and Shenzhen Stock Exchange since their inception from 2013.1.1 to 2020.1.1 as data samples, and the data time of this paper ends at the beginning of 2020 to better circumvent the impact of the outbreak of the epidemic on the Chinese economic market in 2020. In addition, for the convenience of data processing, the research period of this paper is quarterly, and all individual stock trading data are unified into quarterly data. Finally, there are a total of 71512 valid data involved in the regression.

We get the data from the Chinese Research Data Services (CNRDS) Platform for media reports, stock turnover rates, and individual stock returns used in this article.

The following describes the retention and exclusion of data in this paper.

1. In this paper, the number of media reports is selected as a proxy variable for the most media attention. For the selection of media attention refers to Zhang, Lijuan[21], the field of "total number of news about the company appearing in the content" is selected from the quantitative statistics of newspaper financial news.
2. This paper uses individual stock turnover as a proxy for the sentiment of investors[22].
3. The stock codes disclosed in the individual stock return data are used as the benchmark, and the stock codes that do not correspond to them in other statistics are excluded. In this paper, missing values are manually removed when collating individual stock return data, and other missing values are automatically excluded from the regression after combining the data.

4. In this paper, only the data with the trade status of "successful" are retained to better reflect the status of stock trading.

## 4.2. Variable Definition

### 4.2.1. Explanatory Variables - Media Attention (News).

With the development of Internet technology, the coverage and influence of media have increased, and the greater the intensity of media coverage proves the higher the attention. The CNRDS database covers financial news data of listed companies from more than 400 online media and more than 600 newspaper publications, including twenty mainstream online financial news media and eight mainstream financial newspapers. We download the processed data from the database to avoid any omission in manual collation. The daily news is processed into quarterly news data, and the data of media reports are retained according to the valid stock codes. Considering the number of companies reported is equal to zero and the normality of the data distribution, the number of media reports is taken as a logarithm plus one.

$$\text{News} = \ln(\text{news} + 1)$$

### 4.2.2. Explanatory variable - individual stock return (Rate).

Since there is a lag in investor sentiment feedback to the media in the stock market, individual stock returns are selected as a proxy for stock market volatility. In this paper, we exclude data with a trading status other than "normal trading".

### 4.2.3. Intermediary Variables - Investor Sentiment (Turnover).

As a proxy variable representing market liquidity, the higher the investor sentiment, the greater the stock turnover rate, and the lower the investor sentiment, the smaller the stock turnover rate. In this paper, the individual stock turnover rate is used to represent investor sentiment.

### 4.2.4. Control variables.

*Total company size (Size)*. The larger the company, the more public information is available, the lower the information asymmetry between managers and investors, and the more stable source of returns. And because investors are risk averse, they prefer to choose larger companies with better stability and profitability when making stock investments.

$$\text{Size} = \ln(\text{asset})$$

*Total Market Capitalization Outstanding (Mkt cap)*. Generally, the larger the company is, the higher the price of the stock in circulation and the larger the market capitalization in circulation. Therefore, the total outstanding market capitalization is also one of the indicators to judge the profitability of a company, and investors prefer to choose stocks with a larger total outstanding market capitalization.

$$\text{Market capitalization} = \text{outstanding share capital} * \text{stock market price}$$

*Book-to-market ratio B/M(B/M)*. B/M is equal to the book value divided by the market value. Fama and French concluded that there is a book-to-market effect in the stock market and one of the stock selection criteria for BM value investors, is that stocks with smaller B/M are growth stocks and stocks with larger B/M are value stocks, which investors consider more worthy of investment.

*CPI*. The composite indicator of investor sentiment also contains macro factors. The consumer price index, as a macroeconomic indicator, reflects the changes in the purchasing power and consumption level of China's residents and is an important reference indicator for making macroeconomic decisions. The CPI level also influences the changes in the capital market at the macro level.

## 5. Empirical model construction

### 5.1. Descriptive Statistics

Table 1: descriptive statistics.

Stats	news	Turn over	RATE	B/M	CPI	Size	Mkt cap
N	73495	85668	83384	85590	85668	85592	85668
Min	0.560	0.0298	-0.0121	0.0160	101.2	19.58	19.67
Mean	0.818	1.718	0.00129	0.461	102.0	22.22	22.20
p50	0.731	1.252	0.000103	0.351	102.1	22.01	22.13
p50	0.731	1.252	0.000103	0.351	102.1	22.01	22.13
Max	1.965	7.506	0.0436	3.081	102.9	27.10	25.57
SD	0.222	1.503	0.00679	0.422	0.432	1.428	1.106

Table 1 presents descriptive statistics for variables other than time and stock code. The mean value of the number of media reports is 0.818 and the median value is 0.731, indicating that there are differences in the intensity of media coverage of different companies. The maximum value of the turnover rate is 7.506, the minimum value is 0.296, and the standard deviation is 1.502, indicating that investor sentiment is more volatile across time, with a mean value of 1.718, indicating that investor sentiment is relatively high during the period 2013-2019, market liquidity is high, and retail investors have more uncertainty when trading, which also indicates the lack of perfection in our stock market. The maximum value of the stock return is 0.436 and the minimum value is -0.121, indicating that the return profit and loss is unstable, which is in line with the volatile characteristics of the stock market. The minimum value of company size (Size) is 19.576 and the maximum value is 27.101, and the minimum value of the book-to-market ratio (B/M) is 0.160 and the maximum value is 3.081, the data indicate that the size and value of the listed companies vary widely, but the fixed size of companies is not easy to change in the short term. In addition, the maximum value of CPI is 101.2, the minimum value is 101.2, and the mean value is 101.990, which indicates that the level of consumption of the population has been growing during 2013-2019, which is in line with the well-developed economic status of China. However, due to the small growth of CPI and the two-way fixed effects applied in the regression model of this paper, CPI is automatically ignored in the regression, and to avoid the existence of multicollinearity among variables, the correlation analysis of variables is conducted in this paper, and none of them has multicollinearity, and the maximum absolute value of CPI correlation coefficient is 0.248. However, it is still retained in this paper, because the residential consumer index is still one of the important reference indicators of stock market changes.

### 5.2. Construction of the empirical model

$$\text{Rate} = c - \text{news} + \alpha_1 \text{Mkt cap} + \alpha_2 \text{CPI} + \alpha_3 \text{Size} + \alpha_4 \text{B/M} + e_1 \quad (1)$$

$$\text{Turnover} = a(\text{news}) + \alpha_1 \text{Mkt cap} + \alpha_2 \text{CPI} + \alpha_3 \text{Size} + \alpha_4 \text{B/M} + e_2 \quad (2)$$

$$\text{Rate} = c'(\text{news}) + b(\text{Turnover}) + \alpha_1 \text{Mkt cap} + \alpha_2 \text{CPI} + \alpha_3 \text{Size} + \alpha_4 \text{B/M} + e_3 \quad (3)$$



This paper utilizes a three-step regression method stepwise regression, (1) regression of the explanatory variable news on the explanatory variable Rate (2) showing the regression of the explanatory variable news on the intermediate variable turnover, and (3) showing the regression of the explanatory variable news and the intermediate variable turnover on the explanatory variable Rate. a,b,c,c' are the respective regression coefficients of the various regression coefficients of the core variables.

According to Wen, C.F.[23], the derivation process of the mediating effect is as follows.

1. Test coefficient c, if it is significant, should be used to argue for a mediating effect, otherwise, it should be used to argue for a suppressing effect.
2. The coefficients a and b are tested in turn. If they are significant, the indirect effect ab is significant and the confidence interval is reported. If at least one of them is not significant, then test ab by the bootstrap method, and if ab is still not significant, then the indirect effect is not significant, and vice versa.
3. Test the direct effect c', significant then the direct effect is significant, insignificant then the full mediation effect holds.
4. Testing ab and c' under the premise that c' is significant, if ab and c' have the same sign, the partial mediating effect holds and the report accounts for  $|ab/c'|$ , if ab and c' have different signs, the suppressing effect holds and the report accounts for  $|ab/c'|$ .

### 5.3. Regression results

The coefficients in the regressions were subjected to 1%-99% tailoring, and \*, \*\*, and \*\*\* indicate significant at 1%, 5%, and 10% significance levels, respectively (two-tailed). Since the coefficients of media coverage on stock reporting rate in both the first and third regressions are 0.005 with three decimal places retained, it is not possible to conclude that the partial mediation effect holds, so their regression coefficients are retained with four decimal places.

Table 2: Stepwise regression of mediating effects and bootstrap test

	(1) Rate	(2) Turnover	(3) Rate
News	0.0054*** (0.000)	0.484*** (0.035)	0.0048*** (0.000)
Mkt cap	-0.001*** (0.000)	0.395*** (0.023)	-0.002*** (0.000)
CPI	0.000 (...)	0.000 (...)	0.000 (...)
B/M	0.000 (0.000)	-0.783*** (0.058)	0.001*** (0.000)
Size	-0.001*** (0.000)	-0.389*** (0.028)	-0.000*** (0.000)
Turnover			0.001*** (0.000)
_cons	0.045*** (0.002)	1.564** (0.608)	0.041*** (0.002)
Bootstrap test confidence interval		0.0001719-	
0.0002848	0.0031129-		
0.0038249			
N	71512.000	73373.000	71512.000
r2	0.298	0.524	0.332

Standard errors in parentheses

\* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

From the regression results of model (1), the total effect  $c=0.0054$ , which is significant at the 1% level of significance, so the theory is established according to the mediating effect. From the regression results of model (2),  $a=0.484$ , which is significant at 1% level of significance, and from the regression results of model (3),  $b=0.001$  and  $c'=0.0048$ , both significant at 1% level of significance and the confidence interval does not include 0, so the indirect effect is significant. H1 and H2 are supported. the direct effect is 0.0048 and indirect effect is 0.00484, and  $c'<c$ , so the partial mediating effect holds, and the mediating effect accounts for 11.11%, which supports H3.

In the regression of media coverage, the regression coefficient of the model (1) is 0.0054, model (2) is 0.484, and model (3) is 0.0048, indicating that an increase in the number of news reports can cause an increase in stock returns and that media coverage has the most significant effect on investor sentiment. The regression coefficients of the model (3) are 0.0048 and 0.001, which decrease after adding mediating variables, indicating that the transmission mechanism weakens the direct effect of media coverage and investor sentiment on the stock market. According to the partial mediating effect, there is a transmission relationship between media coverage, investor sentiment, and stock market changes, media coverage reduces information asymmetry to some extent, increases investors' decision advantage, and reduces investor sentiment acting on investment, indicating the strong influential role of media, the function of self-regulation and external regulation of investors and stock market response to external factors.

## 6. Conclusion

This paper discusses media coverage, investor sentiment, and stock returns together and examines the transmission of the relationship between the three. It also investigates that investor sentiment plays a partially mediating role in the influential relationship between media coverage and stock market changes using a mediating effect model. This shows that media reports may cause fluctuations in investor sentiment and capital markets, so attention should be paid to news content so that investors are more rational in the investment process and stocks fluctuate within a reasonable range.

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