How Does the Network Media Attention Affect Stock Returns? ---Evidence of Listed Company in China

Shen Zun-Huan[1*] and Liu Xiao-Tong[1]

[1]*School of Economics and Management, Xidian University, Xi'an, 710071, China.*

Authors' contributions

This work was carried out in collaboration between both authors. Author SZH designed and managed the analyses of the study. Author LXT performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Both authors read and approved the final manuscript.

Article Information

Original Research Article

ABSTRACT

The influence of network media on social economy becomes more and more important, but the existing literature lacks the analysis of the path about the impact of network media on stock returns. With the listed companies on Shenzhen Stock Exchange of China and the network media reports about them, the paper studies the transfer path of network media attention on stock returns. The results show that the impact of network media attention on stock returns occurs through the middle variables of volume and stock price, implying investors are more likely to be attracted by the high degree of network media attention, which lead to frequent transactions and stock price decline. The paper also shows that the cause and the transmission path are basically in line with the theory of over-attention under performance hypothesis, and the media effect exists.

Keywords: Network media attention; stock returns; media effect; volume; shares; path analysis.

_____

*Corresponding author: E-mail: zunsh03@126.com;

1. INTRODUCTION

With the progress of network technology and the use of World Wide Web, there are lots of network medias. After more than 20 years of development, there are many new kinds of medias, such as electronic newspaper, network news media, portals and so on [1]. With the improvement of internet technology, the influence of information disclosure of network media on social and economic activities is expanding. It has affect the ways of decision-making and group behaviour of investors [2], and as the consequence, it is likely to influence stock returns in the financial market.

With regard to the impact of media coverage on stock prices, the traditional financial theory and behaviour finance theory have explained in different ways. Traditional financial theory holds that stock price reflects the available information in the market, so it is predict that when the new information that reflects the change of corporate value is transmitted to investors through the media, the stock price will rise or fall [3]. As a modern form of media information, network open-source information has attracted the attention of scholars [4]. For example, Sun and Lee [5] found that network open-source information plays an important role in China's SME board inquiry system. Investors have a strong response to the bad network open-source information during the company is listing. It leads to the first day of revenue reduced more and more with bad information. Therefore, the underwriters have adjusted the bad network open-source information, and the investors hold a conservative attitude towards the "good" open source information during this period. In contrast, behaviour finance theory regards that the attention of investor is limited [6]. Because it has not enough time and energy to understand and compare to all of the shares, the investors tend to buy the stock attracting their attention, so that they may face the stock price rises. With Chinese data, Ying [7] verified that stocks with high media concerns are more likely to attract more investors' attention than stocks with lower media attention. The buying pressure caused by higher investor concern will enable the stock to maintain a relatively higher rate of return for a period of time.

Although the traditional finance theory and behaviour finance theory have the different explanations of media influence on the stock price, the researches about the degree of media attention and asset prices have found that media influence on asset prices has its own unique rules. In the case of not distinguish positive and negative reports, the stock returns which is widely reported is lower than not reported, this rule is called "media effect". For example, Rao [8] found that the media on the listed company's attention is higher, the average income of the stock rate is lower in the next month through exploring the relationship between the media attention and stock monthly income. Fang and Peress [9] also pointed out that the stock returns of no media coverage or low media coverage is higher than the high media coverage. On this basis, the latest research had studies the relationship between the network media and the stock volume (such as Wang [10]), the stock price and the stock returns (such as Liu and Zhao [11,12]), but these literature did not specify how the network media influence the stock returns.

In order to answer the question, in this paper, the objection of the paper is to study the influence path of network media on the stock returns with the data of China. As a developing country, China not only has more than 2000 listed company in Shenzhen Stock Exchange in 2017, but also has vast network investors and network medias, which could supply data to analyse the role of network media and to understand its influence in the financial market further.

2. LITERATURE REVIEW AND RESEARCH HYPOTHESIS

2.1 Literature Review

Media is important for investors because it can supply information related with stock price. With the development of Internet technology, various reports are widely spread in the network platform, and investors can obtain different views about listed company through network platform through entering the keywords in the search engine, such as Baidu, Google, etc. Different from the traditional media such as newspaper and TV, network media has the advantages such as low cost and quickly speed. Owing to both the traditional and network media can supply information about listed companies, literature focus on their impacts in the financial market.

From the perspective of traditional media, the existing literature focus on its impact on stock returns. For example, Jiang and Yan [13] found that investors can get excess returns through

buying stocks with low news media reports and selling stocks with high media reports. Fang and Peress [9] found the stock returns with no media coverage or low media coverage is higher than the high media coverage next month in the control of significant risk factors. Ritter [14] found that IPO shares, which are generally concerned, tend to face the long-term returns reverse after a short period of high earnings. As for the research method, some researchers obtain the stock attention in the network media through inputting keyword in the search engine, with which to study its effect on stock returns. For instance, Rao and Wang [15] suggest that media attention has the positive effects on short-term cumulative abnormal returns but the negative effect on long-term abnormal returns through the influence of investor sentiment. At the same time, other researchers use different methods. Zhang [16] took the list of Forbes China Rich List and Hurun Rich List as the research object, and studied the stock returns in the time window before and after, who found that the stock returns of listed companies decreased. This shows that the higher media attention stocks with lower returns later. In general, the literature shows that though the ways of obtaining the media's attention are different, but the high media attention stocks have low returns.

In order to study the cause of the negative correlation between the network media attention and the stock returns, some researchers put forward the risk premium hypothesis and over-attention under performance hypothesis. From the view of risk premium hypothesis, Fang and Peress [9] found that the media effect comes from the risk premium of unreported stocks, while the abnormal returns of the reported stocks is not significant. Owing to investors have the lower awareness to the low media coverage of stock compared with the high coverage of stocks, it is needed to cover the risk of lack of information by providing corresponding risk premium. So the stock return of the low media coverage is higher, this is the interpretation to risk premium hypothesis. However, according to over-attention under performance hypothesis, media effects come from the stock return reversal which is reported. Excessive attention refers to investors may overreact to stock attracting their attention because the number of reports increase suddenly, and it makes the stock concerned face the pressure to buy and stock returns reversal [17]. And there is some literature to support this hypothesis. For instance, Barber [18] thought that people are more likely to pay attention to the type of stock with more reports when they make investment decisions based on the limited attention of investors, which will bring buying pressure to these stocks. Scholars concluded that the abnormal returns of stock mainly come from the weak performance of high concerned stock by empirical tests.

For the causes of the negative correlation between the network media attention and the stock returns, literature find more results. For example, in exploring the impact of media attention on stock returns, researchers found that there is a certain relationship between media attention and stock volume [19,20], which indicates that stock volume is an important intermediate variable when studying media attention on stock returns. Berry [21] found that there is a strong positive relationship between the number of Reuters's reports and the volume of transactions, but the relationship with the price fluctuation is very weak by investigating the UK stock market. To study the relationship between network attention and stock returns, research [10] found that stocks with high attention on that day will have high volume on the day and the next day. In addition, over-attention under performance hypothesis suggests that the size of media attention will cause changes in the volume of investors' stock, and ultimately affect the stock price and yield, which further indicates that the stock volume is an important research variable. Based on the above analysis, we can infer that volume and stock price play an important role in studying the transmission path of the impact of network media attention on stock returns.

To sum up, literature focus on the negative correlation between media attention and stock returns around the world, but few research on the question of how does the network media reports influence sock returns. In this paper, taking the over-attention under performance hypothesis as the theoretical basis, we make an empirical analysis about the internal mechanism of media attention influence stock returns by constructing a complete framework of the influence path, which will benefit to understand the network media attention in financial market.

2.2 Research Hypothesis

Media has important roles in financial market. It not only influences the reputation capital, but also has the function of corporate governance. According to literature [22], corporations are sensitive to media because the media can

influence the reputation capital of firms in the eyes of shareholders and society. Research also demonstrates that the media can play a corporate governance role by exposing wrongdoing and thereby encouraging firms to take remedial actions [23], and literature supply different evidence to support it. For example, research show that media would bringing corporate fraud to light [24,25], improving the quality of corporate boards [26], encouraging managers to abandon value-destroying acquisitions [27], curbing excess executive compensation [28] and insider trading [29,30]. Therefore, media plays an important role in financial markets by processing and disseminating information about firms [31], which implies the information in the media plays an important role in the formation of stock price. In this point, scholars supply evidence to support the information role as media coverage affects stock price formation through different ways [9,32]. Therefore, reports with information about listed company on network media is likely to influence the stock price and stock returns.

In theory, the price of stock with high media coverage is significantly lower than that of low media coverage, which is called media effect. According to literature [8,9], the media attention is negatively correlated with the stock returns. Therefore, we have the hypothesis 1:

Hypothesis 1: The increase in network media attention will lead to a decline in stock returns.

Over-attention under performance hypothesis suggests that the media effect comes from the returns reversal of the reported stocks, and investors will overreact to the stocks which have more media report, which will lead to the buying pressure and the investment returns decline. In this point, literature [21] states that there is a link between media attention and stock volume, implying the company's network reports would attract investors' attention and then lead to an increase in stock volume. Therefore, we put forward the hypothesis 2:

Hypothesis 2: The increase in network media attention will attract investors' attention and increase the stock volume.

According to the above analysis, we suggest that the stock volume and price plays an important role in the transmission mechanism of the effects of the media. The hypothesis 1 and hypothesis 2 state that the network media attention is negatively related to stock returns, and the network media attention is positively related to stock volume. Based on the view, we infer the relation between abnormal stock volume and stock price, and put forward to the hypothesis 3:

Hypothesis 3: The increase in abnormal stock volume will reduce stock prices and thus reduce stock returns.

The effects of the above three hypotheses are different. First, hypothesis 1 verifies the existence of the media effect in the financial market in China. Second, hypothesis 2 and hypothesis 3 are based on the theory of over-attention under performance hypothesis, aiming to analyse the causes and internal mechanism of the negative correlation between network media attention and stock returns. Combined with the above analysis together, the hypothesis of the network media effect transmission path would be showed in Fig. 1.
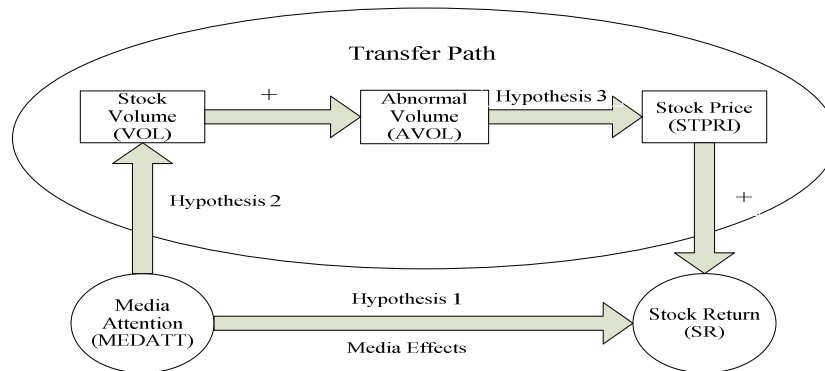

Fig. 1. The hypothesis of media effect transmission path

4

3. RESEARCH DESIGN

3.1 Sample Selection and Data Sources

In order to test the above hypothesis, this paper selects the listed company on Shenzhen Stock Exchange as the research sample, removing the stocks which have incomplete information and abnormal data. After this process, we have 381 listed companies in the paper, and the data period from January 4 to January 31 in 2016. In order to make the study, we research the effects of network media attention within one week from January 4 to January 10 on the stock returns in three weeks, from January 11 to January 17 (the first week), from January 18 to January 24 (the second week) and January 25 to January 31 (the third week) . The data analysis tool is SPSS 21.

As for the source of data, the collection methods of network media attention number and listed company data are as follows:

1. The data of network media attention. The research uses the information in Baidu network platform about listed company. We take the number of report related to key words in Baidu network platform in one week (from January 4 to January 10) as the network media attention [33]. In order to reduce the error of the data, the key words are defined as "Stock Code + Stock". The specific tips of process include different steps such as: Baidu News - Settings - advanced search, entering the keyword and selecting time period (January 4 to January 10), clicking on the "Use Baidu Search". Then the number relevant reports will displayed in the upper right corner of the website page. With the process, we collect the data of the network media attention for each certain stocks of the selected listed company in the paper within one week.

2. The data of listed companies. The financial data of listed companies such as enterprise assets, asset-liability ratio, proportion of large shareholders, volume, stock price, stock returns and so on come from Wind Database, the most important database about financial market in China. Based on the data in the annual report for each listed company in 2015, we collect the enterprise assets, assets-liabilities ratio and the proportion of large shareholders. The time of volume and share price is consistent with the time of stock returns, including three weeks: the first week from January 11 to January 17, the

second week from January 18 to January 24, and the third week from January 25 to January 31.

3.2 Variable Definition

The variables of this research include network media attention, stock income, volume, abnormal volume and stock price etc. Following the selection methods in literature [34], we choose assets, asset-liability ratio and ownership concentration [35-37] as control variables. In the paper, the assets (ASS), asset-liability ratio (ASLIRA) and ownership concentration (TOP 1, the largest shareholder's shareholding ratio) are obtained from Wind Database. The variable assets (ASS) is derived from raw data by taking its natural logarithms, while other variables remain unchanged.

In literature, Zhang Yongjie [38] used Baidu search engine text semantic mining algorithm to get a set of data of stock network open source information content. The research using Baidu during the study period in the news as the stock network media attention based on the number of words related news [39]. In this paper, we will use the method to measure the network media attention (MEDATT).

All the variables include volume (VOL), stock price (STPRI) and stock returns (SR) come from the Wind Database. For the convenience of data processing later, the volume (VOL) is computed by taking the natural logarithm of the original data, and the other variables remain unchanged.

As for abnormal volume (AVOL), it is used to measure the change of stock transaction volume relative to the previous week. The formula is as follows:

$$AVOL_{i,t} = \frac{VOL_{i,t} - VOL_{i,t-1}}{VOL_{i,t-1}} \times 100\%$$

In the formula, the AVOL represents the abnormal volume of the i stock in week t, and the VOL represents the stock volume of the i stock in week t. According to the formula, we would see that the abnormal volume of stock in week t is proportional to the volume. That is to say, in week t, the volume of stock is larger, the abnormal volume will also be larger this week, which is similar to the consistency principle of stock price and stock returns.

3.3 Model Building

According to the research hypothesis and variables, we construct the following three regression models:

$$SR = \alpha + \beta_1 MEDATT + \beta_2 ASS + \beta_3 ASLIRA + \beta_3 TOP1$$
(I)

$$VOL = \alpha + \beta_1 MEDATT + \beta_2 ASS + \beta_3 ASLIRA + \beta_3 TOP1$$
(II)

$$STPRI = \alpha + \beta_1 AVOL + \beta_2 ASS + \beta_3 ASLIRA + \beta_3 TOP1$$
（III）

The above three models have different roles. In order to studies the influence of the media attention on the stock returns or to verify whether the media effect exists in our stock market, model (I) takes the network media attention as the independent variable and the stock return as the dependent variable. Based on over-attention under performance hypothesis, in order to study the influence of the media attention on the investors' behavior, model (II) takes the network media attention as the independent variable, the volume as the dependent variable, to verify the relationship between the network media attention. In addition, in model (III), we take abnormal volume as an independent variable and stock price as dependent variable, and we use it to investigate the relationship between stock volume and stock price. From the purpose of inspection, the model (I) is used to verify the existence of the media effect (Hypothesis 1). The model (II) and (III) are used to test the transmission path of the media effect (Hypothesis 2 and hypothesis 3).

4. EMPIRICAL ANALYSIS AND RESULTS

Based on the above samples and models, the empirical study includes several steps. First, descriptive statistics of samples are carried out; secondly, three models are verified; thirdly, on the basis of the empirical results of three models, we point out the path that network media affects stock value.

4.1 Descriptive Statistics

With the sample we selected and the variables, the descriptive statistics is showed in Table 1.

The data in Table 1 states the characteristics of variables. It shows that the average value of network media attention (MEDATT) is 1.51 and the standard deviation is 2.05. In general, the MEDATT of 381 stocks in the sample locate at the low level. In terms of company size, the average value of assets (ASS) in the last year is 21.24 and the standard deviation is 0.73, which indicates that the difference size of the sample is relatively small. As for the business risk, the average value of asset-liability ratio (ASLIRA) is 29.27, and the standard deviation is 16.25, implying the operational risk of the sample companies is low. However, the difference of asset-liability ratio among the enterprises is great. About the ownership structure, the average share of the largest shareholder (TOP 1)

Table 1. Descriptive statistics of variables

Variable	Minimum value	Maximum value	Average value	Standard deviation
MEDATT	0.00	10.00	1.51	2.05
ASS	19.40	23.74	21.24	0.73
ASLIRA	3.19	84.25	29.27	16.25
TOP 1	4.4	81.2	31.31	12.76
VOL(1)	14.97	19.85	17.18	0.90
VOL(2)	14.67	20.33	17.19	0.93
VOL(3)	12.92	20.05	17.00	0.95
AVOL(1)	-5.14	6.69	0.36	1.47
AVOL(2)	-3.87	7.95	0.05	1.49
AVOL(3)	-26.31	8.71	-1.07	2.05
STPRI(1)	5.12	182.11	28.81	22.41
STPRI(2)	5.40	170.97	29.61	22.66
STPRI(3)	5.07	184.83	27.29	21.52
SR(1)	-35.74	14.95	-12.06	8.92
SR(2)	-10.35	21.52	4.91	5.50
SR(3)	-24.99	4.45	-10.55	5.33

is 31.31%, indicating that the ownership concentration of the sample firms is high. From the data, we can also find that the stock volume (VOL) is basically stable for the first two weeks (mean value are 17.18 and 17.19), and the mean volume (VOL) of the third week decreases to 17. As the investment performance, the average values of stock returns (SR) are -12.06, 4.91 and -10.55 for each week, and the first and third weeks of stock returns (SR) is significantly lower than that in the second weeks, indicating the stock has low returns on investment in the two week, the change of stock price (STPEI) is similar to stock returns (SR).

4.2 The Empirical Results of Model (I)

In the model (I), the research takes network media attention (MEDATT) as independent variables in the week, next three weeks of stock returns as the dependent variable, and assets (ASS), asset-liability ratio (ASLIRA), ownership concentration (TOP 1) as control variables. Upon this design, we make regression for each week separately, the results showed in Table 2.

From the data in Table 2, it shows that influence of network media attention (MEDATT) on stock returns (SR) in different weeks. On the first week, the network media attention (MEDATT) has positive impacts on stock returns (SR) , but not significant. And on the second week, the influence is negative significantly. Although the influence on the third week is also negative, not significant. The results show that the higher the MEDATT is, the lower the stock return (SR) of the second week is, which imply that the media has a negative effect on the stock returns (SR) after reported on the network media. Therefore, we supply additional evidence to support the result that the media effect exists in the stock market of China. Fig. 2 is an intuitive expression of this relationship.

It is worth noting that although the results of first week and third week did not pass the T test, the change process of the relationship between MEDATT and stock returns (SR) occurs. As shown in Fig. 2, the media attention coefficient of the first week is 0.299, and the second and third weeks are negative, which are -0.290 and -0.148, respectively. The overall trend of the coefficient decrease to the minimum on the second week, which states that the media effect appeared in this week, gradually weakened, and then rise on the third week.

Table 2. The regression analysis of network media attention and stock returns

Variable	Stock Return (SR)		
	First Week	**Second Week**	**Third Week**
MEDATT	0.299 (1.016)	-0.290** (-2.088)	-0.148 (-1.106)
ASS	1.878*** (2.689)	-0.816* (-1.898)	1.446*** (3.493)
ASLIRA	-0.025 (-0.800)	0.002 (0.112)	-0.004 (-0.226)
TOP 1	-0.007 (-0.207)	0.011 (0.622)	-0.023 (-1.063)
C	-51.351*** (-3.515)	22.286** (2.477)**	-40.231*** (-4.645)
Adj-R^2	0.026	0.028	0.042
F	2.463**	2.730**	4.105***

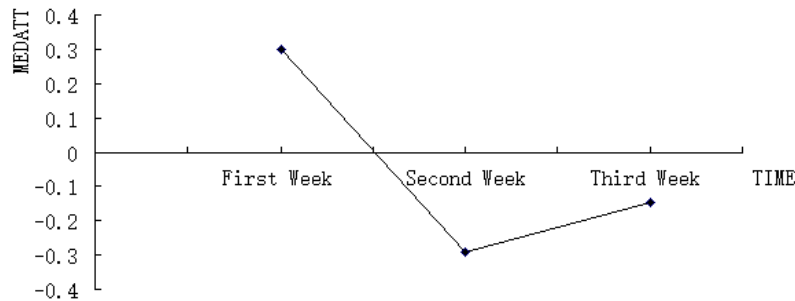*Note: *, * * and * * * represent the significant level of 10%, 5%, and 1%, respectively*

Fig. 2. The change process of network media attention coefficient

As mentioned before, the study of existed literature only focused on the relationship between the number of stock reports and stock returns, and there is no specific exploration of the timing of media effects. Different from literature, we find that the negative correlation between internet media attention (MEDATT) and stock returns (SR) appears in second week, and it is most obvious in Fig. 2. The reason for the results is that the information issued on network has attracted the attention of investors and affect their investment behavior.

In practice, investors always pay attention to the stocks with more information sources, leading to centralised to buy or sell them. Owing to the influence comes later than the media reports issued on network platform, the influence process exists time delay (the information transmission the first, investors decision-made the second, and the stock transaction and stock price changing the last), which implying the behavior of investors would have an impact on the listed companies stock returns. As a result, with the value of information decline, the stock returns decrease gradually. These conclusions indicate that the higher the MEDATT is, the lower the stock return (SR) of the second week listed companies is. In other words, the media effect begins at the second week, and the hypothesis 1 has been proved.

4.3 The Empirical Results of Model (II)

The theory of over-attention under performance hypothesis holds that the suddenly increase of reports will cause investors to pay too much attention to stocks, which will lead to the buying pressure and the subsequent returns reversal of the concerned stocks. To test this theory, the research takes the network media attention (MEDATT) this week as independent variables, the stock volume (VOL) three weeks later as the

dependent variable, with company assets (ASS), asset-liability ratio (ASLIRA), ownership concentration (TOP 1) as control variables, and make an regression analysis separately for each week of network media attention degree (MEDATT) and volume (VOL). The results are shown in Table 3.

The data in Table 3 shows that the media attention coefficients are 0.038, 0.034 and 0.026 in the three weeks respectively, and the impacts in the first and second are significant, while it is not significant in the third week. This regression states that there is a positive correlation between MEDATT and VOL. In other words, the higher the MEDATT is, the larger the VOL is. Owing to the value of information declined with the time passed, the influence of MEDATT and VOL is not significant in the third week. Therefore, the information issuing on the network will attract investors' attention and lead to the transaction volume (VOL) increased, which support the hypothesis 2.

4.4 The Empirical Results of Model (III)

Upon the analysis above, we want to analyse the relationship between stock volume (VOL) and stock price (STPRI) more accurately. So, we introduce the abnormal volume (AVOL) to measure the volume changes this week relative to the last week, and then use the regression model (III) to analysis the relationship between abnormal volume (AVOL) and stock price (STPRI) separately for each week. In the model, we take the weekly stock abnormal volume (AVOL) as independent variables, the corresponding stock price (STPRI) as the dependent variable, and take the assets (ASS), asset-liability ratio (ASLIRA) and ownership concentration (TOP 1) as control variables. Table 4 is the results.

Table 3. The regression analysis of media attention and stock volume

	Stock Volume (VOL)		
Variable	First Week	Second Week	Third Week
MEDATT	0.038** （1.976)	0.034* （1.655)	0.026 （1.300)
ASS	0.597*** （9.997)	0.590*** （9.379)	0.645*** （10.228)
ASLIRA	-0.001 （-0.455)	-0.003 （-0.945)	-0.002 （-0.801)
TOP 1	-0.013*** （-4.257)	-0.013*** （-3.967)	-0.013*** （-3.980)
C	4.890*** （3.917)	5.074*** （3.854)	3.735*** （2.833)
Adj-R^2	0.295	0.267	0.295
F	40.729***	34.298***	39.415***

*Note: *, * * and * * * represent the significant level of 10%, 5%, and 1%, respectively*

Table 4. The regression analysis of abnormal volume and stock price

	Stock Price (STPRI)		
Variable	First Week	Second Week	Third Week
AVOL	2.653*** （3.597)	-1.941*** （-2.624)	1.260** （2.443)
ASS	-5.670*** （-3.450)	-6.035*** （-3.608)	-5.896*** （-3.681)
ASLIRA	-0.212*** （-2.873)	-0.235*** （-3.125)	-0.203*** （-2.840)
TOP 1	-0.145* （1.701)	0.155* （1.790)	0.155* （1.869)
C	149.973*** （4.349)	159.920*** （4.557)	154.993*** （4.603)
Adj-R^2	0.125	0.114	0.108
F	13.444***	12.097***	11.344***

*Note: *, * * and * * * represent the significant level of 10%, 5%, and 1%, respectively*

Table 4 is the regression result of the abnormal stock volume (AVOL) and the stock price (STPRI) each week. In the first week, the coefficient of stock volume is 2.653, and t value is 3.597 passing through 1% significant test. Similarly, in the second week, the coefficient of stock volume is -1.941, and t value is -2.624 passing through 1% significant test. Combining these results together, it indicts the abnormal stock volume (AVOL) and stock price (STPRI) have a positive relationship in the first week and they have a negative relationship in the second week, and the hypothesis 3 is approved.

The theory of over-attention under performance hypothesis holds that investors' overreaction to stock will lead to the reversal of later returns, and frequent trading will reduce stock returns. This theory is verified in the second week regression model in Table 4. In addition, the data in Table 4 also shows that, before the media effect appears, abnormal stock volume (AVOL) is positively related to stock price (STPRI) in the first week, but in the second week, the relationship between abnormal stock volume (AVOL) and stock price (STPRI) immediately turns to negative after the media effect appears, indicating that behavior of investors overreact to the stock media reported would cause the stock price (STPRI) decreased. Based on the relationship between abnormal stock volume (AVOL) and stock price (STPRI), we suppose that in the first week, when investors receiving the message, they will increase the shares of listed companies, and the volume of buying share is more than selling share, which lead to the stock price rising. In the second week, the number of selling share is more than buying share, and the stock price falls. Therefore, we have the results for the first and send week. Furthermore, in the third week, the abnormal stock volume (AVOL) has significant positive impacts on the stock price (STPRI). The

perhaps reason is the selling share volume in the second is too much than the buying share, so the investors tend to buying share than to selling share, leading to the stock price rising. From the view of the change of the coefficient in the first, second and third week, it reduced from 2.653, 1.941 to 1.260, implying the influence of information issued on network media is decreased with the time passed.

4.5 The Path Analysis of the Influence of the Network Media Attention on the Stock Returns

Based on the above analysis, we can understand the causes of the media effect and the complete transmission path. As shown in Figure 3, when the rise of network media attention (MEDATT) attracting investors' interesting in the first week, the stock volume (VOL) will increase, and the corresponding stock abnormal volume (AVOL) will increase, so that the stock price (STPRI) will eventually decline in the second week, and the stock returns of listed companies (AR) will reduce. The media effect appears in the second week after the information release on network media or Internet platform. The cause and the transmission path are basically in line with the theory of over-attention under performance hypothesis. The relationships are summarised in the Fig. 3.

As mentioned before, the study of media effects of the internal mechanism in the existing literature mainly analysis the influence of the media attention on investor behavior, and predict the impact of investors' behavior on the stock price, but there is no empirical test on this link, and the path analysis in this paper have important significance to deeply understand the media effect.
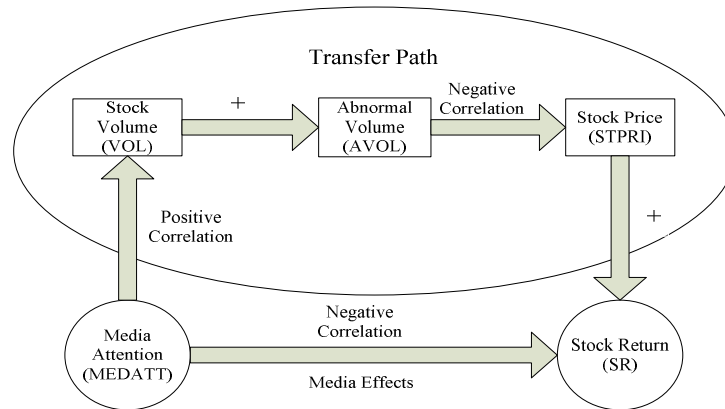
Fig. 3. The transmission path of media effect

5. CONCLUSION

In the Internet environment, the impacts of network media is expanding, and as the consequence, the information issued in network media is likely to influence the stock price and its returns. In literature, scholars analyses the impact of the media on stock returns, however, the influence path of network media has not attracted attention.

In order to fill the gap in literature, in this paper, we take listed companies on the Shenzhen Stock Exchange as samples, and use the number of reports released on network of Baidu as the media attention within weeks to study the impact path of network media attention on stock returns. The analysis shows that there is a significant negative correlation between the network media attention and stock returns. This relationship appears in the second week after report issued, indicating that there is media effect in China's stock market. About the path of media's impact on stock returns, the empirical analysis results shows that the network media attention this week is significantly positively correlated with the stock volume in the second week, and a significant negative correlation between the abnormal volume and stock price in the second week.

The study in the paper have contributions both in theoretical and practice. In theory, it researches the influence path of network media on investment returns of stock, which would help us to understand the impacts of network media further. In addition, the results in the paper shows that the stock which has more network media attention will be easier to attract the interesting of investors, implying the network media based on Internet play an important roles to issuing information and monitor listed company. In practice, in order to achieve more invest returns, the results suggests that it is better for investors to buy more shares in the first week and sell more shares in the second week. Therefore, the paper suggest that it is necessary to understand the importance of network media in financial market, and the network media is likely to be an efficient mechanism for corporate governance in the Internet environment. In the paper, we use the data of Baidu network as the source of network media, so it is likely to be valuable to study the network media on the path of the same or other issues with different source of network medias.

NOTE

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Qian M. On the development of internet media and the impacts on traditional media [J]. Press Circles. 2009;3:93-94. (In Chinese)
2. Guo Y, Liu C Y, Yu Z H, Zhang J, Dai Y. Research on the impact evaluation of Web information sources of public opinion [J].

Journal of Chinese Information Processing. 2011;5(3):64-71. (In Chinese)

3. You JX, Wu J. The silent spiral: Media sentiment and mispricing of assets [J]. Economic Research Journal. 2012;7:141-152. (In Chinese)

4. Wang CF, Li JY, Fang ZM. Relationship between media attention and stock return based on Big Data [J]. Journal of Tianjin University. 2016;18(2):103-108. (In Chinese)

5. Sun K, G Li. Open source information, underwriters' behavior and IPO under pricing [J]. Journal of Chongqing Institute of Technology. 2014;28(5):120-126. (In Chinese)

6. Li LJ. Stock returns and the Internet media attention -- An empirical study of limited attention effect [J]. Journal of Guangxi University. 2013;35(6):33-38. (In Chinese)

7. Ying QW, Zhou KG, Chen SS. Media attention and return on stock investment in China's capital market - risk premium hypothesis or attention driven?[J]. Securities Market Herald. 2015;5:33-42. (In Chinese)

8. Rao YL, Peng DF, Cheng DC. Does media attention cause abnormal return? – Evidence from China's stock market[J]. Systems Engineering-Theory & Practice. 2010;30(2):287-297. (In Chinese)

9. Fang L, Peress J. Media coverage and the cross – section of Stock Returns [J]. Journal of Finance. 2009;64(5):2023-2052.

10. Wang Y, Yang QY. The impact of China's network attention on stock returns - An empirical study based on the harmony of attention[J]. Review of Investment Studies. 2014;2:143-149. (In Chinese)

11. Liu F, Ye Q, Y J Li. Impacts of interactions between news attention and investor attention on stock returns: Empirical investigation on financial shares in China [J]. Journal of Management Sciences in China. 2014;17(1):72-85. (In Chinese)

12. Zhao LK, Lu ZC, Wang ZY. In search of stocks -- An empirical research on the relationship between the stock returns and the amount of Baidu search[J]. Journal of Financial Research. 2013;4:183-195. (In Chinese)

13. Jiang Y, Yan XB. An empirical study of the impact of the news media coverage on the stock returns of the listed companies based on the agenda setting[J]. Financial Theory and Practice. 2016;6:78-84. (In Chinese)

14. Ritter JR. The long – Run performance of Initial Public Offerings[J]. Journal of Finance. 1991;46(1):3-27.

15. Rao YL, Wang P. The impact of media attention to the performance of new shares---evidence from China's stock market [J]. Accounting & Finance. 2010;3: 1-7. (In Chinese)

16. Zhang YH, Wan DF, Fu LM. The media effect of stock returns: Risk premium hypothesis or over-attention under performance hypothesis [J]. Journal of Financial Research. 2011;8:143-156. (In Chinese)

17. Barber, Brad M, Terrance O. All that glitters: The effect of attention and News on the buying behavior of individual and institutional investors [J]. Review of Financial Studies. 2008;21(2):785-818.

18. Yu QJ, Zhang B. The limited concern of investor and stock returns - An empirical study which takes the Baidu index as the attention [J]. Review of Financial Studies. 2012;8:152-165. (In Chinese)

19. Liu Y, Wang SS, Ji JC. The cause of the media effect: Is the investor overly concerned [J]. Journal of Dalian Maritime University. 2012;11(3):19-23. (In Chinese)

20. Mitchell ML, Mulherin JH. The impact of public information on the stock market [J]. Journal of Finance. 1994;49(3):923-950.

21. Berry TD, Howe KM. Public information arrival [J]. Journal of Finance. 1994;49(4): 1331-1346.

22. Dyck A, Zingales L. The governance role of the media. In Islam, R. (Ed.), The right to tell: the role of mass media in economic development [M]. The World Bank, Washington. 2002;40-107.

23. Dyck A, Volchkova N, Zingales L. The corporate governance role of the media: evidence from Russia [J]. Journal of Finance. 2008;63:1093–1135.

24. Miller GS. The press as a watchdog for accounting fraud [J]. Journal of Accounting Research. 2006;44:1001-1033.

25. Dyck A, Morse A, Zingales L. Who blows the whistle on corporate fraud? [J]. Journal of Finance. 2010;65:2213-2253.

26. Joe J, Louis H, Robinson D. Managers' and investors' responses to media exposure of board ineffectiveness [J]. Journal of Financial and Quantitative Analysis. 2009;44:579-605.

27. Liu B, McConnell JJ. The role of the media in corporate governance: do the media influence managers' capital allocation decisions [J]. Journal of Financial Economics. 2013;110:1-17.

28. Kuhnen CM, Niessen A. Public opinion and executive compensation [J]. Management Science. 2012;58:1249-1272.

29. Dai L, Parwada JT, Zhang B. The governance effect of the media's news dissemination role: Evidence from insider trading [J]. Journal of Accounting Research. 2015;53:331-366.

30. Rogers JL, Skinner DJ, Zechman SL. The role of the media in disseminating insider-trading news [J]. Review of Accounting Studies. 2016;21:711-739.

31. Vishal P. Baloria, Jonas Heese J. The effects of media slant on firm behavior [J]; Journal of Financial Economics. 2018; 129:184–202.

32. Peress J. The media and the diffusion of information in financial markets: evidence from newspaper strikes [J]. Journal of Finance. 2014;69:2007–2043.

33. Wang JX, Rao YL, Peng DF. What drives the stock market "media coverage effect": Expected media attention or unexpected media attention? [J]. Systems Engineering —Theory & Practice. 2015;35(1):37-48. (In Chinese)

34. Luo DL, Li XX, Peng W. Media attention, political connections and stock returns -- empirical evidence based on Chinese GEM listed companies [J]. Quarterly Journal of Finance. 2016;10(2):1-18. (In Chinese)

35. Li PG, Shen YF. The corporate governance of the media: Empirical evidence in China [J]. Review of Financial Studies. 2010;4:17-24. (In Chinese)

36. Li PG, Xu SM. The corporate governance of the media -- consensus and disagreements [J]. Review of Financial Studies. 2013;4:196-206. (In Chinese)

37. Cu WH, Li PG. Empirical study on media as watchdog in corporate governance [J]. Nankai Business Review. 2012;1:33-42. (In Chinese)

38. Zhang YJ, Zhang W, Jin X, Xiong X. Does the Internet know more?——Open source information and asset pricing [J]. Systems Engineering —Theory & Practice. 2011;31(4):577-586. (In Chinese)

39. Zhou KG, Ying QW, Chen XX. Media attention, analysts' attention and returns forecast accuracy [J]. Review of Financial Studies. 2014;2:139-152. (In Chinese)

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sciencedomain.org/review-history/27530