Attention Difference, Violation Announcement and Abnormal Return —An Empirical Study based on Baidu Index

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Abstract

We use violations announcements of listed firms reported by China Securities Regulatory Commission (CSRC) during 2011-2016 as negative events, and apply Baidu index to investigate the influential mechanism of attention difference on abnormal returns. The empirical results show that a higher degree of attention difference has a significant negative effect on abnormal returns. Specifically, for firms with a higher degree of attention difference on time and regional dimension, the cumulated abnormal returns of listed companies during the violation period will have decreases that are more significant.

Keywords: attention difference, corporate violation, abnormal return

1. Introduction

As different people have different attention regarding different information, the difference of attention can affect the capital and time devotion of investors, thus, determines the investment in the entire decision-making process. Existing literature shows that when investors focus on the stock information, they are easily driven by the information and trigger trading behavior, which bring changes to stock price (Zhang Jide, 2014). Besides, when investors are over-feed by the information of specific stock, they tend to be overconfidence and make irrational reactions (Daniel et al., 1998). Scholars have employ different proxies to measure investor attention includes abnormal returns, trading volume (Peng and Xiong, 2007), media coverage (Fang and Peress, 2009), investor turnover, advertisement expenses (Lou, 2010) and so on. However, these variables are not direct measurements. Da,Engelberg and Gao(2011) apply weekly data of Google search to measure investor attention, which provides a new method for research. Song Shuangjie et al. (2011) use Google's search engine to provide trend data and systematic study on Chinese IPO market. Yang Xiaolan (2010) appliedstocks' attention data to measure the extent of investor attention and usethe random effects panel data to examine the effects of attention on the stock market. Yu Qingjin and Zhang Bing (2012) use daily Baidu index to measure the investors'attention and find that the investor attention can bring abnormal return in the future and the stock price reversed in a short period. Zhao Longkai et al. (2013) apply the Baidu search data to study the relationship between attention and abnormal return, and find that the average return of high attention group is significantly higher than the low attention group. Therefore, we propose the following hypothesis:

H1: Others are as equal, the degree of attention difference on time dimension has negative effect on the abnormal return of listed firms. The investors of the Chinese stock market are mostly from first-tier cities; these investors possess higher income and are willing to devote in venture capital. Although there are many investors from three or four other tier cities, first-tier citizens are at a greater convenience of attaining information resources. The higher level of attention difference on regional dimension indicates a higher degree of information asymmetry. The release of explosive information that is highly sensitive to the stock market variation would bring high attention to them. For a short period, the public would make investment decisions based on their high degree of concern on such information. Therefore, we propose the following hypothesis:

H2: Others are as equal; the attention difference on regional dimension has a significant negative effect on the abnormal return of listed firms.

2. Method

2.1 Data and Sample selection

In order to investigate the difference of attention on time and regional dimension could cause difference effect on the abnormal return, we sample the violations announcements reported by China Securities Regulatory Commission (CSRC) of listed firms during 2011-2016 as negative events. For the measurement of attention effect, previous literatures applied the number of news coverage, the number of related passages on Oriental Fortune Stock Forum, as well as the stock market open index as alternative measurements of attention. Compared to these external data, the number of search queries directly from the investors serves as a better reflection on the true orientation of public attention. Baidu search engine has achieved the leading position in the market of mainland China, so the application of Baidu search volume index is more persuasive as a measurement for the attention difference. The Baiduindex starts from 2011, and our selected sample contains 2656 violation listed firms' sample, which are from January 1, 2011 to December 7, 2016. We excluded the observations with missing data,the finally sample includes 169 violation cases. The specific data collection process is as follows: After entering Baidu Index website, we inputthe stock abbreviation as a search criteria andthe selection period, thenwe collect the Baidu Index data duringviolations announcements of listed firms reported by China Securities Regulatory Commission (CSRC), whereas other research data are from CSMAR database.

2.2 Model and variables

We examine the impact of attention difference on the abnormal returns of listed firms. We use violations announcements of listed firms reported by China Securities Regulatory Commission (CSRC) during 2011-2016 as negative events to investigate the attention difference of violated firms within 20 days of violations announcements of listed firms reported by China Securities Regulatory Commission (CSRC).Here, we use the model of Chen et al. (2005) and Fan et al. (2008) and control the firm characteristic variables, including the firm size, PB ratio, the proportion of fixed assets and the ratio of state own stocks. Meanwhile, we add the industrial fixed effect. The model is as follows:

$$CAR = \alpha_0 + \alpha_1 \ln(bdIndex) + \alpha_2 ROA_{pre} + \alpha_3 Size_{pre} + \alpha_4 MB_{pre}$$
$$+ \alpha_5 Tangibility_{pre} + \alpha_6 SOE_{pre} + \sum_{i=1}^{n} \alpha_{7t} IND_i + \varepsilon_t \quad (1)$$

Dependent variable

We employ CAR (cumulative abnormal return) to measure the abnormal returnof violated firms within 20 days of violations announcements reported by China Securities Regulatory Commission (CSRC) for regression.

Independent variable

Based on the above analysis, we use Index to measure the public attention. And we use Break to measure the attention difference on time dimension and regional dimension:

$$Index = \log(NumberIndex_{i,t}) \quad i = 1,2\dots,N; t = 1,2\dots,T \quad (1)$$
$$Break = sd(Index_{i,t}) \quad i = 1,2\dots,N; t = 1,2\dots,T \quad (2)$$

(1) bdIndexis the overall Baiduindex measured by the search volume of keyword after analysis and calculate the total weighted search queries. Based on differentsources of the search, the search index includes personal computer index (pcIndex) and cell phone index (phoneIndex).

(2) mediaIndex is the media attention index based on the news exposure of major Internet mass media. The number of Baidu news calculation is based on the corresponding keywords included in the headline.*Control variable*

The control variable include ROA、Size、MB、Tangibility、SOE.ROA is the average return of total assets of firms during three years prior to the violation. Size isthe natural logarithm of the total assets of firms during three years prior to the violation. MB isthe ratio of market value to book value of firms during three years prior to the violation. Tangibility is the ratio of fixed assets to total assets of firms during the first three years prior to the violation. SOE isthe proportion of state owned shares of firms during the first three years prior to the violation.

Table 1 is the definition and measurement of all variables.

Variable	Definition
Independent variable	
bdIndex	The overall attention index of firms during violation period
mediaIndex	The media attention index of firms during violation period.
pcIndex	The computer attention index of firms during violation period.
phoneIndex	The phone attention index of firms during violation period.
Dependent variable	
CAR	The cumulated abnormal return of firms during violation period
Control variable	
ROA_{pre}	The average return of total assets during three years prior to the violation
$Size_{pre}$	The natural logarithm of the total assets during three years prior to the violation
MB_{pre}	The ratio of market value to book value during three years prior to the violation
$Tangibility_{pre}$	The ratio of fixed assets to total assets during three years prior to the violation
SOE_{pre}	The proportion of state owned shares during three years prior to the violation

2.3 Descriptive statistics

We can see from Figure 1, The pcIndex and phoneIndexhave a higher fluctuation. Specifically, the bdIndex and the phone Indexreach the maximum on the third day prior to the violation (bdIndexis 3503.3,phoneIndex is 2044.9) and on the second day after the violation (bdIndex is 3513.8, phoneIndex is 2070.4). On the day of the announcement, the index is not significant (bdIndexis 3286.9; phone Index is 1839.0). This also suggests that the violation information of listed firms has been released on the third day prior to the violation. The public attention index increases from -6 day (bdIndex is 3126.6; cell phone index is 1703.4) to -3 day (bdIndex is 3503.3; cellphone index is 2044.9) and brings a corresponding fluctuation on cumulative abnormal return of violated firms. (Reach the maximum -0.00532 on -3 day). Additionally, within three days after the announcement, the attention of investors continues to accumulate and the degree of attention reaches the peak during +2 day to +3day (CAR during the period is -0.01027).
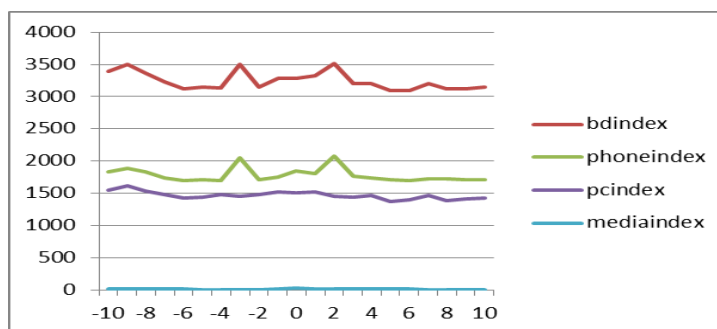

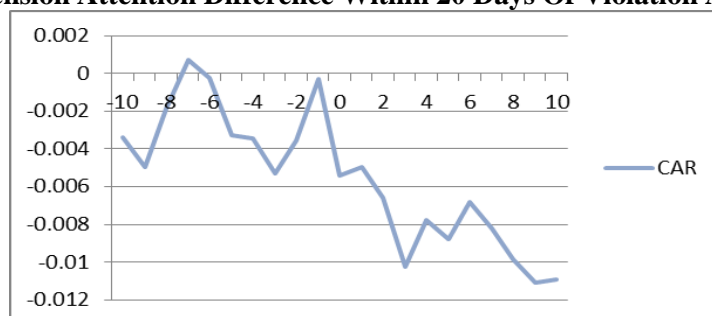**Figure 1 Time-Dimension Attention Difference Within 20 Days Of Violation Announcement**

Figure 2 the distribution of average abnormal return within 20 days of violation announcement

For geographical distribution, the proportion of Baiduindex on Guangdong Province (bdIndex is 876.9 in the event period, pcIndex is 328.1 and cell phone index is 548.7) was significantly higher than that of other provinces, Beijing (average bdIndex is 436.6, pcIndex is 226.0 and cell phone index is 210.5) and Shanghai (average bdIndex is 454.8, pcIndex is 299.1 and cell phone index is 165.2), which rank second and third respectively, while Zhejiang ranks fourth (average bdIndex is 416.8, pcIndex is 157.5, and cell phone index is 259.2). Asthe ratio of pcIndex relative to the overall index could represent the institutional investor's distribution of the provinces, we could know that the proportion of institutional investors in Shanghai is the highest (pcIndex accounted for 65.7%), with Beijing ranking second (pcIndex accounted for 51.7%). Guangdong Province, despite the highest degree of attention on violation firms, has less institutional investors than other provinces (pcIndex is 37.4%). Compared to other inland cities in China, the coastal cities, especially the Yangtze River Delta provinces have relatively high attention on violation firms, which reflect that new media application of the coastal city is higher. In addition, the users in Hong Kong and Taiwan prefer YAHOO and Google to Baidu, so the Baidu index of the two regions does not represent the actual attention of these areas.
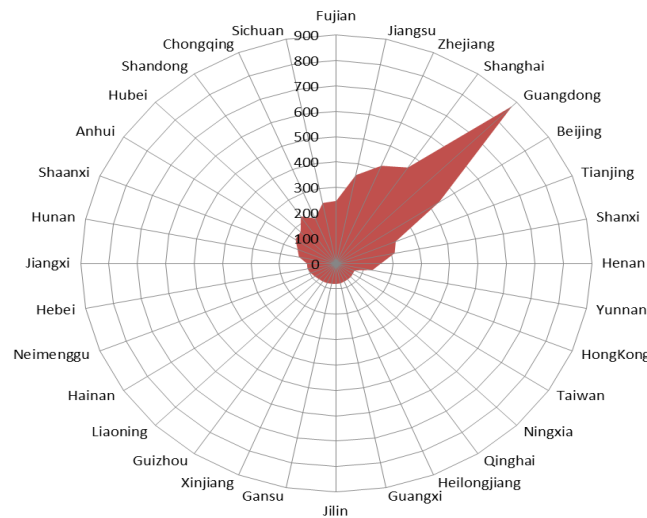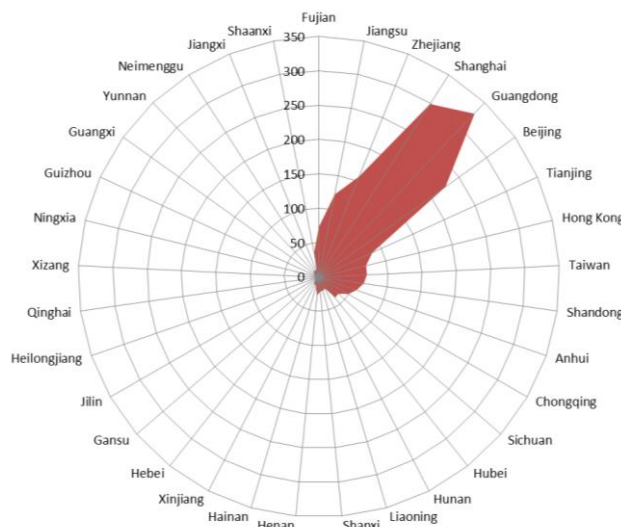

Figure 3 regional distribution of bdIndex

Figure 4regional distribution of pcIndex

Figure 5 regional distribution of phoneIndex

3. Result

We employ different attention indexes for cumulated abnormal return during the announcement period of violated firms, after which attention index is used to measure the attention difference on time and regional level.

（1）**The effect of time-dimension attention difference on abnormal returns**

We use the standard deviation of attention index during (-10, 10) to measure the attention difference on time dimension and divide the sample by attention difference into two groups to study the impact of attention difference on time dimension on CAR (-10, 10). We first divide the sample into two groups by standard deviation in (-10, 10) and discover that for the group with the higher degree of attention difference, the attention difference has a more significant influence on CAR (-10,10) (the coefficient is -0.034, at 5% significance level). For the group with the lower degree of attention difference, the attention difference is insignificant towards CAR (-10, 10). We find that the higher degree of opinion difference on time dimension could bring about a greater effect on CAR (-10, 10). This is because the higher degree of attention difference means the information transfer in the market is not sufficient, whereby negative information could result in a severe herding effect, and the subsequent fall of stock price.

Table 1 Panel A the effect of time-dimension attention difference on abnormal returns

	（1）	（2）
bdIndex	-0.029	-0.034
	（-1.26）	（-2.27）**
roa_pre	0.003	-0.055
	（0.04）	（-0.92）
size_pre	-0.000	0.000
	（-0.20）	（1.03）
mb_pre	0.003	-0.001
	（1.02）	（-0.49）
tangibility_pre	-0.004	-0.002
	（-0.20）	（-0.08）
soe_pre	0.023	-0.016
	（0.90）	（-0.43）
Industry Dummy	Included	Included
Constant	0.165	0.194
	（1.08）	（0.82）
Observations	85	84
R-squared	0.272	0.083
Robust t-statistics in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Consequently, we divide the group by the attention difference extent using the standard deviation of pcIndex on (-10, 10). For the group with the lower attention difference on time dimension, the coefficient is -0.040(at 5% significance level).For the group with the higher level of opinion difference, the coefficient of pcIndex is -0.071(at 1% significance level). Results also show that the higher the extent of attention difference on time dimension, the greater the impact that pcIndex could have on CAR (-10, 10).

Table 1 Panel B the effect of time-dimension attention difference on abnormal returns

	（1）	（2）
pcIndex	-0.040	-0.071
	（-2.41）**	（-2.99）***
roa_pre	3.302	-0.016
	（0.87）	（-0.84）
size_pre	0.000	0.000
	（0.51）	（0.35）
mb_pre	0.001	-0.001
	（0.76）	（-0.14）
tangibility_pre	-0.012	-0.014
	（-0.62）	（-0.47）
soe_pre	0.018	-0.017
	（0.62）	（-0.56）
Industry Dummy	Included	Included
Constant	0.226	0.403
	（2.39）**	（2.15）**
Observations	85	84
R-squared	0.192	0.207
Robust t-statistics in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

（2）The effect of regional attention difference on abnormal returns

Different cities react differently to violations announcements of listed firms reported by China Securities Regulatory Commission (CSRC). Therefore, we use the standard deviation during (-10, 10) among 30 provinces and cities of each stock to measure the regional attention difference and divided the sample into two group. We found that for the group with higher regional attention difference, the regional attention have more significant effect on cumulated abnormal return within 20 days of violation. (The coefficient is -0.054, at 5% significance level).

Table 2 Panel A the effect of regional attention difference on abnormal returns

	（1）	（2）
bdIndex	0.013	-0.054
	（0.61）	（-2.06）**
roa_pre	-0.937	-0.012
	（-0.24）	（-0.86）
size_pre	-0.001	0.001
	（-1.38）	（1.78）*
mb_pre	0.004	-0.001
	（1.52）	（-0.31）
tangibility_pre	0.013	-0.003
	（0.60）	（-0.10）
soe_pre	0.022	-0.018
	（0.57）	（-0.75）
Industry Dummy	Included	Included
Constant	0.023	0.190
	（0.13）	（0.85）
Observations	85	84
R-squared	0.122	0.235
Robust t-statistics in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

In addition, we also test the influence of regional attention directly from the location province of listed firms on the cumulated abnormal return. We use the bdIndex, phoneindex and pcIndex for regression and find that the attention of investors from the location of listed firms has a significant negative effect on CAR (-10, 10). The coefficient of bdIndex is -0.038 (significant at 5% level) andthe coefficient of phoneindex is -0.041 (significant at 5% level); however, the influence of attention index is not as significant as that of the first-tier cities. Meanwhile, the pc Index of the listed firm is not significant on CAR (-10, 10); the coefficient is -0.040(significant at 1% level). Based on the previous analysis, we it is evident that the attention group has more sufficient information and more mature on the violation of enterprises. The attention group from the location of listed firms has limited influence on CAR (-10, 10).

Table 2 Panel B the effect of attention difference from location province on abnormal returns

	（1）	（2）	（3）
bdIndex	-0.038		
	（-2.44）**		
phoneindex		-0.041	
		（-2.30）**	
pcIndex			-0.035
			（-1.63）
roa_pre	-0.010	-0.008	-0.008
	（-1.43）	（-0.88）	（-0.83）
size_pre	-0.000	0.000	-0.000
	（-0.12）	（0.00）	（-0.49）
mb_pre	0.001	0.001	0.001
	（0.89）	（0.55）	（0.71）

tangibility_pre	0.004	0.008	0.008
	（0.27）	（0.48）	（0.51）
soe_pre	0.014	0.012	0.018
	（0.71）	（0.61）	（0.89）
Industry Dummy	Included	Included	Included
Constant	0.152	0.145	0.096
	（1.39）	（1.24）	（0.74）
Observations	169	168	169
R-squared	0.106	0.106	0.102
Robust t-statistics in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

5. Discussion

The empirical results show that a higher degree of attention difference has a significant negative effect on abnormal returns. Specifically, for firms with a higher degree of attention difference on time-series and regional dimension, the cumulated abnormal returns of listed companies during the violation period will have decreases that are more significant. Individual investors dominate the Chinese capital market, and we find that corporate violation has a very significant impact on the cumulative abnormal return of stocks within twenty days during the announcement period. These factors not only reflect the irrational behaviour of individual investors, but also the economic disparities of the Chinese economy. The attention difference could be more severe in the future. The attention difference reflects the distance of regional economic development, which is very representative among developing countries.

Acknowledgements

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