

The Signaling Effect of Listed Companies' Executives' Shares Reduction

—Empirical Evidence from Securities Lending Transactions in Chinese A-Share Market

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Abstract

Stock price was affected by listed company announcements, as well as other non-systemic factors. Directors, supervisors and managers are company insiders. Will their shares reduction announcements send negative signals to the stock market? This article explores the signaling effect of shares reduction through empirical study, and found that for those companies in sales growth, sales reduction announcements from executives had a rather significant role in signaling. This article will extend the range of signaling theory in some degree, and help regulators gain a better understanding of how the investors make their investment decisions in the market.

Keywords

Shares Reduction of Executives, Signaling Effect, Short Selling

1. Introduction

On May 8th, 2007, the Shenzhen Stock Exchange and Shanghai Stock Exchange issued The Guide for the Company's Shares held by Directors, Supervisors and Senior Executives of Listed Companies of Shenzhen Stock Exchange and The Guide for the Company's Shares held by Directors, Supervisors and Senior Executives of Listed Companies of Shanghai Stock Exchange. It requires that listed companies should announce the transaction information within two working days after the company's directors, supervisors and senior executives dealing with their shares. The introduction of this policy regulates the insider trading in Chinese A-share market to a certain degree, so that ordinary investors can understand the shares transaction information of insiders in a more timely and

transparent manner.

Signaling theory was first proposed by [1], defining that market signals are individual behaviors and characteristics that can transfer information in the market and be observed by other market participants. Generally speaking, the shares increase/reduction of executives is essentially a change in the demand of individual investment. But unlike ordinary external investors, executives are insiders with first-hand information about business operations. Thus they usually have a clearer understanding of the external environment and actual situation of the company, and are capable to react to changes quickly. Therefore, in a market where information is asymmetric, shares reduction of executives is often interpreted by outside investors as a signal that the foreground of the company is not bright and overvalued.

In other words, with the information asymmetry, external investors may adjust their investment strategy by interpreting the related information hid behind the insider trading. This is the signals transferring role of insider's shares reduction. This article will use empirical methods to explore whether the shares reduction of directors, supervisors and senior executives in Chinese A-share market can effectively pass signals to external investors, especially short sellers.

The problems we mainly discussed in our research are whether the short selling transactions are significantly different during the shares reduction event period and the non-event period, and whether the signaling effect of insider's shares is significantly different in different listed companies.

The results of our study may contribute in both theories and practices. First, this article will enrich the research on signaling theory to a certain extent. While the existing signaling theory focuses on dividend distribution policy, we put the research on the internal shares holding behaviors of the company, expanding the coverage of the traditional signaling theory and laying the foundation for the follow-up study of related problems. Second, this article can effectively help supervision department to grasp reaction of stock market to the shares reduction of managers, so as to further improve the relevant rules and regulations, to achieve more efficient and standardized supervision and management. Third, this article also helps investors in Chinese stock market to better identify the information behind the management-holding behaviors of listed companies, and guide investors to make rational decisions and make rational investments. Chinese stock market started relatively late, the regulatory system is still in the process of continuous improvement. Investors often lack the professional knowledge to determine the signals of listed companies and top-level investors, ignore the scientific and objective laws in making investment decisions and lack the knowledge of high risk in stock market.

2. Literature Review

2.1. Insider Trading Research Status

Insider trading has always been a hot issue in the theory and practice circle. At

present, the research results on the insider trading mainly focus on the impact of insider trading on market efficiency, the excess returns and market timing ability of insider trading and the impact of insider trading on corporate governance.

Many scholars have found that insider trading can obtain excess returns. Reference [2] used the transaction data from 1975 to 1995 to explore whether the insider trading can get excess returns and its impact on the stock market volatility. The study found that insiders' market impact is not dramatic, but insider trading does give excess returns to insiders. Reference [3] [4] found that excess returns could be gained from insider trading. At the same time, researchers have proved that the insiders of listed companies have a good chance to seize chances of selling stocks and can choose the favorable opportunity to trade stocks [5] [6] [7] [8], and the higher the degree of market information asymmetry, the stronger the ability of insiders to profit from information superiority [9] [10].

The insiders selling or buying more shares of the company may send information to the market about the future or basic situations of the company, causing external investors to respond accordingly. Empirical research on the shares increase of listed companies from 2008 to 2010 show that the announcement of the increase of shares will have a significant and positive impact on the stock price and will last for a long time. The subdivision of the sample shows that the market impact of shares increase of large shareholders in different market environments is different. In the bull market, the market responded more strongly to the shares increase of large shareholders [11]. A study also found that the market has a clear negative reaction to the insiders' selling shares of the company [12] [13].

Prior to 2006, Chinese relevant policies did not allow the company's executives to hold the shares of the company during their employment, so during a long period, the research on the insider trading in China focused on illegal transactions. Currently, most of the researches on shares reduction of executives focus on the investors using the insider information to gain excess returns. Scholars rarely consider the reduction of insiders' selling stocks from the perspective of investors, and explore whether shares reduction of directors, supervisors and senior executives can transfer signals.

2.2. Research Status on Signaling Effect of Insiders' Behaviors

The existing researches conducted by scholars show that the senior executives' resignation and holding can lead to investor reactions and transfer signals of the company's operating conditions to external investors. A large number of scholars have shown that the departure of senior executives will pass negative signals to external investors, resulting in a drop in the company's stock price. Reference [14] found there are significant negative cumulative excess returns before and after management's departure. Reference [15] also found that replacement of management increases the risk of future business operations and transfers negative information of company, triggering a negative reaction of the market. Chi-

nese scholars' study focusing on the market reaction of executives' departure also found a similar conclusion. Reference [16] analyzes the reaction of the stock market to the change of management by event study. They found that the market generally regarded management replacements as bad news, and this phenomenon was especially notable in loss companies. The research results showed that Chinese growth enterprise market reacted strongly to the resignation of senior executives, and this phenomenon is more prominent in the events of the resignation of the senior executives who hold shares [17]. Reference [18] used the data of IPO companies in China from 2002 to 2006 to study the impact of the shares holding level of executives in non-listed companies on the IPO value of the enterprises. The empirical results showed that the shares holding level of management of the securities issuance market in China has significant signaling effect.

2.3. Research Status on Short Selling

At present, studies on short selling have focused on pricing efficiency, investor sentiment and corporate governance.

Some studies have been conducted to verify the effect of the policies on short selling from an empirical perspective. However, there is no consensus among scholars on the impact of short selling on capital markets. Reference [19] argued that when short selling is forbidden, bid-ask spread on stocks expands and liquidity declines. However, study of the Hong Kong stock market reached the opposite conclusion [20].

With the rise of behavioral finance, researchers have begun to pay attention to the impact of short selling on investor sentiment. Reference [21] found that the limitation of short selling can help to eliminate the wrong pricing of investor sentiment-dominant assets. Reference [22] also proved the impact of short selling constraints on investor sentiment. At present, the research on short selling is being extended to behavioral finance such as investor sentiment. Studies showed that the short selling is conducive to investor sentiment and aggravates the market volatility [23].

At present, another important direction of the research on short selling is how short selling constraints improve the corporate governance. Reference [24] thought the stock price under the short selling mechanism can reflect the bad news in a timelier manner, so that the management of the company can be supervised more effectively. Reference [25] found that companies with lower short selling cost experienced significantly lower earnings management degree during the pilot period. Reference [26] also found that in the face of poorer investment opportunities, the investment decision of short selling companies is more efficient.

In summary, previous literatures on shares reduction of executives focused on the investors using the insider information to gain excess returns. Then, researches on signaling effect of insiders' behaviors and short selling did not focus

on senior executives' shares reduction of the listed companies. Our research considers the reduction of insiders' selling stocks from the perspective of investors, and explore whether shares reduction of directors, supervisors and senior executives can transfer signals.

3. Research Hypotheses

As analyzed in the previous section, in the principal-agent relationship between stock market investors and listed company managers, the information asymmetry exists between the ordinary investors as principal and the management as the agent, and there is an absolute advantage among insiders. Based on two hypotheses, information asymmetry and rational agent hypothesis, the insiders of the enterprise will use their own information superiority to realize maximization of personal interests. When the market value of a company is overvalued, the executives tend to reduce their shares. When the company's market value is underestimated, the executives tend to increase their shares. For external investors, they can correct the company's assessment using the signals of shares increase/reduction of executives, increasing the valuation of companies in which executives increase shock holding and reducing the valuation of those companies in which executives reduce shock holding, so as to adjust the investment strategy and finally cause an abnormal increase in the trading volume of the stock certificates. Thus, we propose the first hypothesis.

Hypothesis 1: The transaction volume of short selling will increase abnormally as the senior executives reduce their shares of the company.

On the basis of Hypothesis 1, we further extend our study. The reduction of shares held by insiders in the company conveys a pessimistic judgment on the future prospects of the company and signals the emergence of bad news, which often occurs in the listed company in which basic situation is optimistic. At this time, the company's insiders reduce more shares, which reflect their pessimistic judgments on company's valuation more obviously. In this case, there will be more investors selling stocks and existing investors will take more efforts to sell stocks. When the basic situations of listed companies are not optimistic, the market's valuation of the company is already relatively low. At this moment, the news of the massive reduction of shares may not produce a corresponding level of market reaction.

In order to quantify the shares reduction of insiders, we collect two variables to do the research on this aspect. One is the number of shares reduction published by companies (sometimes listed companies will announce the reduction of a number of executives in the same time) and another one is the cumulative reduction proportion. Thus, we propose the second hypothesis.

Hypothesis 2: Insiders' shares reduction proportion and reduction announcement number of listed companies with good performance, *i.e.* positive business growth, will affect the signaling effect. The higher proportion of insider's shares reduction proportion, the more proclamation announcing the reduc-

tion of the same company in the same day, the greater increase in trading volume of short selling.

In the following empirical study, t test and multiple regression analysis were used to verify the above two hypotheses.

4. Empirical Study

4.1. Data Sample

The Operating Guide for the Company's Shares held by Directors, Supervisors and Senior Executives of Listed Companies of Shenzhen Stock Exchange and The Operating Guide for the Company's Shares held by Directors, Supervisors and Senior Executives of Listed Companies of Shanghai Stock Exchange was promulgated on May 9, 2005. It requires directors, supervisors and senior management of listed companies to declare to the Shenzhen Stock Exchange and the Shanghai Stock Exchange within 2 trading days of buying and selling shares and derivative products of the company through the board of directors of the listed company and make announcements on the websites designated by the Shenzhen Stock Exchange and the Shanghai Stock Exchange, including the increase or decrease volume of transactions, transaction dates, and other transaction information. The research object of this article is limited to the directors, supervisors and senior executives mentioned above. At the same time, as investors in Chinese stock market can only get relevant information about insider trading after announcements being published, this paper regards the time point of trading events as the announcement date rather than the day when the trading event occurs.

All data used in this article was from CSMAR. The CSMAR (China Stock Market & Accounting Research) research database is currently one of the largest and the most accurate economic and financial research database in China. In recent years, more than 14,000 high-quality academic papers using CSMAR database have been published in Chinese and international first-class journals. Since China's short selling started on March 31, 2010, the sample period of the events selected in this paper is from June 30, 2010 to December 31, 2016. A total of 17,982 incidents of insiders' selling stocks occurred during the sample period. We excluded stocks that carry too little or no trading volume of short selling because they may result in serious errors during the return. We also delete stocks that did not have consecutive trading data for the first quarter prior to the occurrence of shares reduction events. These may be the stocks that had just been taken into the bond market when it was sold or the stocks that had been suspended during that period of time. At the same time, taking into account that some of the insiders' shares reduction occur simultaneously with their company's share repurchase, and the market usually think of stock repurchase as good news, we also deleted the case of company repurchase events. In the final step, we consolidated the shares reductions of different executives on the same day, discarded the reduction events with a total reduction proportion of less than

0.01%, and eventually obtained a sample of 1874 shares reduction events.

Table 1 shows the descriptive statistics of the reduction proportion of all the announcements and sample announcements during the sample period. It should be noted that the negative number in the above table is actually repurchase ratio. It can also be seen from the table that the average reduction proportion of the sample is 1.19%, which is lower than the average reduction proportion of the overall reduction proportion. From the perspective of the level of variance, the volatility of the sample reduction proportion is less than the overall level.

4.2. Research Method

The first question we discussed is whether the short selling transactions are significantly different during the reduction event period and the non-event period. We used the estimation method in earlier study, assuming that the average number of shares sold short during a period of time before the shares reduction announcement is an estimate of this stock's typical trading level, which has not been affected by the announcement [27]. We define AVESS as the average of shares sold short in non-event time period. The non-event period used in this paper is 90 days before the announcement to 11 days before the announcement. So AVESS is the sum of short selling volume of a stock from 90 days before the announcement day to 11 days before the announcement day, divided by the number of working days in this period (unit: share).

Similarly, we define SS $[t_1, t_2]$ as the average of shorted shares during time period $[t_1, t_2]$. It is the sum of short selling volume of a stock from day t_1 to day t_2 , divided by $(t_1 - t_2 + 1)$. As for the event time window $[t_1, t_2]$, we will separately observe the trading volume of short selling on 3 working days, 5 working days and 10 working days before and after the announcement of shares reduction and compare it with the level of this stock's short selling during non-event period. We intend to observe the difference between trading volumes of short selling in different length of time, for the investors may need a few days to get information and there is a very small probability that the short selling related to the announcement only appear within one or two days before and after the announcement.

Figure 1 shows comparison of the average daily trading volume of short selling during different event periods and non-event period. We find that the average daily trading volume of shares sold short in a time window surrounding the event day is higher than that of the non-event period. Base on the simple observation of average numbers, we use t-test to confirm whether the level of short

Table 1. Descriptive statistics: Reduction proportion of all announcements and sample announcements (unit: %).

	Mean	Medium	Min	Q1	Q3	Max	Var	N
Sample announcements	1.19	0.12	0.01	0.03	0.45	39.81	15.23	1874
All announcements	1.97	0.21	-5.24	0.05	1.19	56.88	28.04	17,982

selling during event period is significantly different from that during non-event period to further verify our hypothesis. The results of t-test with average daily shares sold short in six different event windows from that in non-event period are shown in **Table 2**.

The null hypothesis in our t-test is that there is no difference between SS [t1, t2] in event period and AVESS [-90, -11] in non-event period. The results show that SS [t1, t2] of different time length are all significantly higher than AVESS [-90, -11] in non-event period at 1% level, which means there are abnormal short selling in a short time period surrounding the announcement of the shares reduction. This result supports the hypothesis of this article that the announcements of executives' shares reduction are accompanied by outside investors' negative bets. As we mentioned earlier in this article, the reduction of shares held by executive in listed company may send a negative signal to investors, and raise their willing to short the company's shares, so that the short selling level of this stock may increase in a relatively short period of time.

In the meantime, we also observed a significant increase in short selling in several days prior to the announcement. For this result, we think there are two possible explanations. Firstly, executive's behavior of shares reduction itself is a kind of inside information. In other words, if other insiders can predict or know a selling behavior in advance and believe the market will react negatively, then there is the profit opportunity of using this information to short the stock ahead

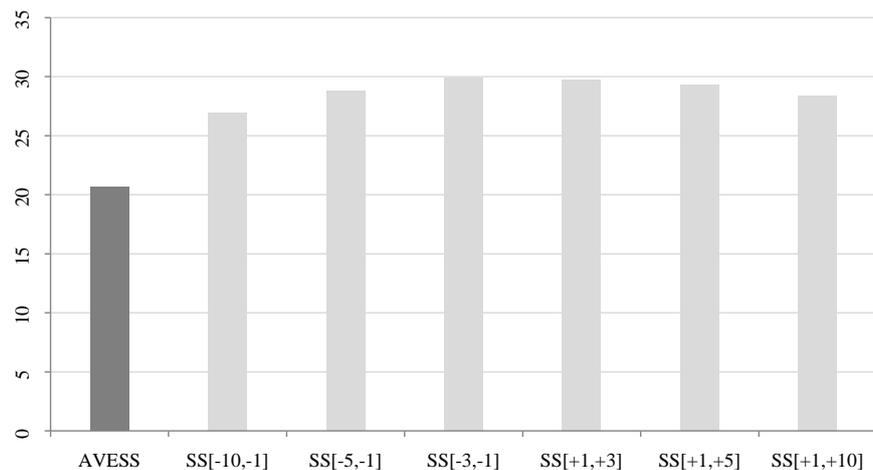


Figure 1. Column chart: The mean of average daily shares sold short during event periods and non-event period (unit: million shares).

Table 2. T-test statistics: Average daily shares sold short during event periods and non-event period.

	[-10, -1]	[-5, -1]	[-3, -1]	[+1, +3]	[+1, +5]	[+1, +10]
AVESS [-90, -11]	26.93***	28.77***	29.86***	29.78***	29.29***	28.35***
t-Statistic	-2.43	-2.93	-3.11	-3.17	-3.11	-2.97

* = statistically significant at 10%; ** = statistically significant at 5%; *** = statistically significant at 1%.

of time. Another possible explanation is that shares reduction of senior executives is likely to take place at a time when the company is about to send negative news, and other insiders grasping the negative news may carry short selling. However, the latter is unable to explain that the time period $[-3, -1]$, which is closer to the shares reduction announcement, has higher average daily shares sold short. Therefore, we tend to think that the abnormal trading volume of short selling before the announcement of shares reduction is the result of inside traders making use of the information that a senior executive is going to sell his stocks.

Based on the above analysis, we think that the first hypothesis succeeded, that is, the announcement by the board of directors, supervisors and other executives of the company is negatively interpreted by short sellers and leads to an increase in short selling.

Next, we will examine the second hypothesis by multivariate regression analysis. Our second hypothesis is whether the content of the reduction announcement has signaling effect, including the proportion of shares reduced by senior executives and the number of announcements a company issues on the same day.

First of all, we refer to the method of Christophe *et al.*, defining the level of abnormal short selling as follows:

$$ABSS[t1, t2] = \frac{SS[t1, t2]}{AVESS} - 1 \quad (1)$$

AVESS = the average of the shares sold short during non-event time period $[-90, -11]$;

SS $[t1, t2]$ = the average of shorted shares during event time period $[t1, t2]$;

ABSS $[t1, t2]$ = the level of abnormal shorted shares during time period $[t1, t2]$.

The meaning of this formula is that if the average daily shares sold short during the non-event period represents the typical short selling level of a listed company, then the abnormal increase of shares sold short during the event period is the growth ratio of the latter relative to the former. In this paper, we use the ABSS variable as the explained variable in regression analysis.

In the meantime, we take Rat, reduction ratio, and Num, the number of announcements a company issues on the same day, as the explanatory variables, referring to the method He Qing (2012) used in exploring the relationship between insider trading and stock price performance.

In addition, considering the special characteristic of short selling, we add the stock price trend before the announcement RET $[-3, -1]$, and abnormal transaction volume ABVOL $[+1, +3]$ as control variables. RET $[-3, -1]$ is the return rate of the closing price of a stock in 3 days before the shares reduction announcement. The calculation method is the closing price of a stock on day-3 minus that on day-1, divided by the closing price on day-1, relative to the announcement day. It measures the price trend of a stock in 3 days before the announcement event occurs. This variable controls the impact of stock price

movements on the investment strategy of investors/short sellers. Because there is a possibility that the stock price has risen during the period prior to the announcement and the investors in the securities lending market may think the listed company is overvalued and therefore short this stock.

$$ABVOL[t1, t2] = \frac{VOL[t1, t2]}{AVEVOL} - 1 \quad (2)$$

AVEVOL = the average volume of the shares traded during non-event time period $[-90, -11]$;

VOL $[t1, t2]$ = the average volume of the shares traded during event time period $[t1, t2]$;

ABVOL $[t1, t2]$ = the level of abnormal shares transaction volume during time period $[t1, t2]$.

ABVOL $[+1, +3]$ is calculated as in Equation (2) above. It measures the average abnormal level of the shares transaction volume in time period $[+1, +3]$. The size of a stock trading volume may have an impact on short selling volume. Because there is a possibility that stocks traded frequently in the market are more likely to be considered as overheated and therefore become short target. This variable is used to control the impact of transaction volume peak that may occur in the spot trading market.

We are also added to the regression model a series of control variable X which have possible impacts on the stock exchange, including revenue growth, asset size, leverage ratio, return on equity, equity nature, holding proportions of the large shareholders, exchanges, industry and year. The regression equation we use to test hypothesis 2 is as below.

$$ABSS[t1, t2] = \alpha_0 + \alpha_1 Rat + \alpha_2 Num + \alpha_3 RET[-3, -1] + \alpha_4 ABVOLA[t1, t2] + \alpha X + \varepsilon \quad (3)$$

5. Empirical Results

5.1. Regression Results

Firstly, we find there is no significant correlation between ABSS and explanatory variables in the full samples. It seems that there is no support for our assumptions about the content of the announcement and signal effects in the whole samples. To further verify the hypothesis 2 in this article, we divide the overall sample into two groups according to the revenue growth rate. The first group is the sample of companies whose revenue growth rate is greater than or equal to zero; the other group is the sample that the growth rate of business revenue is less than zero. The reason we grouped the samples in this way is that investors may be more surprised and disappointed when bad news from companies with better turnover shows up and be more likely to have a valuation correction for these listed companies. For those that have been underperforming, investors tend to have lower expectations of them. Or, the valuation has been corrected by the poor performance of the financial report. So the market may not feel too

much surprise and disappointment about the negative news from these companies.

In **Table 3**, “exchange” is a dummy variable that indicates the exchange in which the company is listed. Although the two exchanges have basically the same explicit rules on insider trading, there are still some specific norms that may vary. We include this variable to see if there is a significant difference in the

Table 3. Regression results: Samples grouped by revenue growth versus the whole samples.

	(1) The whole samples	(2) Sales grow < 0	(3) Sales grow ≥ 0
Rat	0.00448 (1.64)	0.0870 (1.46)	0.0692*** (2.89)
Num	-0.0132 (-0.23)	0.0163 (0.22)	-0.123 (-1.15)
RET[-3, -1]	1.443** (2.58)	0.512 (0.72)	5.427*** (5.51)
ABVOL[+1, +3]	0.000000566*** (9.92)	0.000000374*** (5.54)	0.00000145*** (8.89)
ROA	1.918*** (3.13)	-0.834 (-0.86)	3.714*** (4.05)
Grow	-0.0446** (-2.35)	-0.0396** (-2.00)	0.223 (1.59)
Lev	-0.141 (-0.73)	-0.142 (-0.52)	-0.703** (-2.31)
Conc	0.000168 (0.07)	-0.000402 (-0.11)	0.000509 (0.15)
Board	-1.019** (-2.09)	-0.237 (-0.33)	-1.332 (-1.79)
dum_nature	-0.00538 (-0.09)	-0.153 (-1.76)	0.0805 (0.82)
Exchange	-0.00973 (-0.12)	-0.199 (-1.67)	0.106 (0.91)
dum_ind(s)	Control	Control	Control
dum_year(s)	Control	Control	Control
_cons	0.746*** (2.65)	0.656 (1.41)	0.795* (1.76)
N	1874	849	1025
R-squared	0.12	0.13	0.22

* = statistically significant at 10%; ** = statistically significant at 5%; *** = statistically significant at 1%.

reduction events in different markets. ROA is the ratio of accounting profit to shareholders' equity taken from the company's previous annual report at the time of the reduction event. "Lev" is the ratio of the company's total debt to total assets. The "Conc" is the company's largest shareholder holding ratio. "Board" is the ratio of number of independent directors in the company to the total number of directors. The "Grow" is the company's main revenue growth rate in the most recent quarter when insider's shares reduction occurred.

The regression results in **Table 3** show that: 1) the shares reduction ratio is positively correlated with ABSS [+1, +3] at 1% level in the samples with positive or zero growth, while there is no significant relationship between explanatory variables and ABSS in the samples with negative growth and the full sample model. In other words, unlike companies with bad performance, the content of senior management's shares reduction announcements released by listed companies that are on the rise has a more effective signaling function. As we speculated earlier in the article, investors are more likely to regard shares reduction of senior management in "good" companies as "bad" signals. In particular, short sellers may be concerned about the proportion of shares reduced by executives. Investors tend to think that the greater the proportion of shares sold by insiders, the stronger the signal conveyed behind the executive's behavior. This result confirms the hypothesis 2 we proposed previously.

However, as for the second explanatory variable we want to observe, there is no significant relationship between the number of concurrently announced reduction events and the volume of short selling, and there is no significant relationship between the number of announcements a company issue on the same day and ABSS, no matter in the full samples or in the group samples.

2) We also found several conclusions about the control variables in the regression model. ABVOL has a significant positive impact on ABVOL in both whole samples and group samples. More actively traded stocks were short more severely when insider announced to sell these stocks.

The trend of stock price movements in three days before the announcement does have a significant impact on the abnormal growth of short selling. The faster the stock price has increased before, the stronger the company will be shorted when it announces an executive's shares reduction.

However, when the revenue growth of listed companies is not negative, this pattern does not hold. So the stock price movement may not be considered informative by short sellers when the performance of the company's main business is poor. A similar phenomenon also occurs on variable ROA. As can be seen from the regression results, there is a significant positive correlation between ROA and the proportion of abnormal short selling in samples with positive growth, while companies with negative growth do not have this feature in our regression results.

5.2. Robust Test

To test the robustness of the above results, we conducted a supplementary test.

We conduct regression analysis again with the whole samples and group samples of the first three days. The results show that although there are some differences in the significance level of some control variables, the main conclusions of this paper about Hypothesis 1 and Hypothesis 2 have no obvious changes.

6. Conclusions and Suggestions

6.1. Conclusions

The following conclusions are drawn from empirical research in this paper:

1) Announcement of insiders' shares reduction has obvious signaling effect for short sellers.

We studied 1874 events of executives' shares reduction in Chinese A-share market. In 10 trading days before and after the announcement of shares reduction of executives, the average level of short selling has increased significantly compared with typical level of short selling, indicating the signaling effect of the reduction of shares held by listed companies' executives.

2) The proportion of insider's shares reduction in listed companies with revenue growth has a significant impact on the signaling effect.

For those listed companies with non-negative growth, the higher the proportion of insiders' shares reduction, the stronger the negative signal passed to short investors, while empirical results of companies with negative growth did not show this pattern. The number of reduction announcement from the same company on the same day did not seem to have a significant influence on short sellers.

6.2. Policy Suggestions

It is common for insiders to precisely choose the opportunity of reducing shares due to their knowledge of inside information, which has been receiving the dispute. The stock market calling for improving the regulatory system of executives' shares reduction is running up. Although the executives' shares holding is an individual investment behavior, it will leave a severe damage on the market environment to reduce shares by using insider information illegally. Therefore, it's vital to monitor and regulate shares reduction behavior of executives by setting up a proper system. In fact, the reason why signaling effect exists is that investors generally believe that there may be such an infraction of law to reduce the shares and follow the signals of reduction to carry their own short selling. Based on the above analysis, we give the following suggestions.

Relevant regulatory authorities further strengthen the supervision and administration of shares reduction of insiders in listed companies. In particular, it will enhance the timeliness and accuracy of information disclosure and expand the scope of information disclosure. At present, the relevant policy documents such as Notification on How to Further Regulate Shares Trading Behaviors of Directors, Supervisors and Senior Executives of Listed Companies on GEM, The Operating Guide for the Company's Shares held by Directors, Supervisors and Se-

nior Executives of Listed Companies of Shenzhen Stock Exchange and The Operating Guide for the Company's Shares held by Directors, Supervisors and Senior Executives of Listed Companies of Shanghai Stock Exchange can't completely limit directors, supervisors and senior executives making use of private information by reducing shares. Listed companies need to disclose insider trading information in a timelier manner to prevent insiders making profits by utilizing the time difference between the transaction and the transaction announcement.

At the same time, the executives of listed companies should also be encouraged to hold long-term shares of the company. It requires that executives should consider the investment value of shares from a long-term strategic perspective rather than an irresponsible short-term speculation. Only in this way can we fundamentally change the nature and significance of the information behind the managers' shareholding behaviors. For example, relevant regulatory authorities can lead listed companies to take some measures to encourage managers' shareholding, such as binding the shareholding level with the senior executives' secret profits.

6.3. Limitations and Future Directions

In this paper, we observed the signaling effect of executives' shares reduction using event study, and found some meaningful conclusions. Yet there are still some limitations. Due to the complexity and difficulty of observing the variables that affect short selling, this study selects the trading volume, stock price trend, ROA, financial leverage, ownership concentration and the proportion of independent directors as the control variables in multiple regression. Whether such research methods are sufficient remains to be studied.

In the future research, more extensive and in-depth research can be carried out in the following aspects. In addition to the factors selected in this study, future studies can also select other variables that may affect the signaling effects, such as economic cycles and industry development. At the same time, the research methods for this problem can also be more detailed. We used empirical methods to study the impact of the reduction of senior executives on the securities market. In the future, other scholars can further analyze the influence mechanism of the signal and the conduction path by establishing the theoretical mathematical model.

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