An Empirical Study of Short-Term Performance of Listed Companies' stock incentive Plan

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Abstract: This paper takes the mixed-ownership state-owned enterprises that issued the stock incentive plan from 2014 to 2017 as a sample, and used the event research method to test the changes of the average abnormal return rate and the cumulative abnormal return rate before and after the announcement of the stock incentive plan. After the plan is disclosed, the securities market has a significant positive reflection, indicating that the event can improve the short-term business performance of the enterprise; This paper further compare the sample companies with the three dimensions of stock incentive type, state-owned enterprise type and different plan implementation frequency, and analyze the plan, analyzing the impact on the short-term performance of different types of sample companies.

1. Introduction

The principal-agent problem causes the economic behavior of business operators to seriously affect the company's performance. At the present stage, the stock incentive system, by giving some shareholders' rights and interests, makes the operators and the company constitute an interest community and improves the possibility to maximize the interests of shareholders.

Stock incentive system originated in the United States, prevailed in the west in the 1970s and 1980s, and developed rapidly in the 1990s. By the end of 2000, more than half of the listed companies in the United States had adopted stock incentive plan. However, China's stock incentive system started relatively late. The launch of the share split reform in 2005 and "Administrative Measures for Equity Incentives of Listed Companies (Trial)" provided a basis for listed companies to implement stock incentive. However, in the case of imperfect internal and external governance mechanism of listed companies in China, it is very meaningful to study whether stock incentive plan should be implemented and what kind of impact it will bring to the short-term and long-term performance of the company. This paper will use the event study method to study the short-term cumulative abnormal return after the introduction of the company's stock incentive plan, so as to understand the short-term reaction of the market to the company's plan.

2. Literature and hypothesis

From the perspective of relevant foreign studies, Larcker (1986) compared the excess returns of research samples and paired samples of 25 companies that implemented long-term stock incentive plans from 1971 to 1978, and found that the stock market had a significant positive reaction when implementing long-term incentive plans. Aboody & Kaszinkls (2000) took 1264 companies implementing stock option plans from 1992 to 1996 as research samples, and the results showed that there was a significant difference between the cumulative abnormal return (CAR) of 30 days

before the announcement of the stock option plan and that of 30 days after. Morgan & Poulsen (2001) analyzed the S&P500's 1992-1995 equity incentive plan through the event research method and found that the average cumulative excess return rate of the company was significantly positive during the three-day event window period, indicating that the equity incentive plan can indeed enhance the value of shareholders, and when these programs are motivated by executives, shareholder value increases significantly. However, the time of stock incentive research in China is not long. Chen Hua (2011), a domestic scholar, took listed companies that published stock incentive plans from 2008 to 2010 as samples and found that the cumulative abnormal returns of companies after the announcement of stock incentive plan were significantly positive. Fang Ming (2016) takes a sample of A-share listed companies that have announced the equity incentive plan since the promulgation of the "Administrative Measures for Equity Incentives of Listed Companies (Trial)" on January 1, 2006 to April 26, 2016. After the release of the incentive plan, the excess returns were studied, and it was concluded that there was a significant equity incentive effect in China's stock market. Based on this, the following research hypothesis is proposed:

Hypothesis 1: There are significant changes in cumulative abnormal return before and after the release of the stock incentive plan of the listed company, which is well reflected by the market. It can produce positive effects on the short-term performance of the company.

Stock incentive mode mainly includes stock option, restricted stock, performance stock and stock appreciation right. Among them, stock options and restricted shares are the two most commonly used ways in the post-share split-placement era in China (Xu Ning, 2011). When applying stock options, the incentive object can choose to exercise or abandon the right to purchase the company's stock according to the market value of the company's stock at the end of the exercise period, while the restricted stock needs the incentive object to pay off the stock purchase fund once after obtaining the incentive (Zhao Xiang Gong, Yu Wei, 2011). Based on this difference, we can regard the company's choice of restricted stock as the game result between the board of directors and the management. In other words, the management needs to be full of confidence in the company's future before accepting the current cash to invest in the company's future value expectation. So companies choose restricted stock are sending a more positive signal to the market. Based on this, the following research hypothesis is proposed:

Hypothesis 2: The listed companies that implement the restricted stock incentive plan have better market response than the listed companies that implement the stock option incentive plan.

According to the existing research results, Central enterprises and local state-owned enterprises have different differences in debt ratio and interest burden due to their different state-owned assets management authority, which may lead to different market reactions after the implementation of the equity incentive plan. Lu Jiang Yuan (2018) uses the annual financial data of state-owned enterprises from 2007 to 2015 and points out that the interest burden of local state-owned enterprises is heavier than that of central enterprises and shows regional differentiation. Dai You You (2018) analyzed the difference of leverage ratio within state-owned enterprise based on the financial data of state-owned enterprises, and pointed out that central state-owned enterprise and local state-owned enterprise have different debt mechanisms, and the potential debt risk of local state-owned enterprise is generally higher than that of central enterprises. Based on this, the following research hypothesis is proposed:

Hypothesis 3: The central enterprises implement the stock incentive plan have better market response than local enterprises.

3. Research design

3.1 research methods

We use the event study method to investigate the impact of stock incentive on the company's short-term performance. The event research method refers to the fact that before and after a specific economic event, the company's stock price will fluctuate with certain fluctuations, and will therefore produce "abnormal returns", also known as the "cumulative abnormal return method".

The event research method first determines the target event, then judges the estimated window period and event window period associated with it, and finally determines the yield coefficient by analyzing the estimated window period data, and the yield coefficient is used to calculate event window period accumulated cumulative abnormal return and the average abnormal returns, using the two indicators of the calculation results to verify the influence of a particular event.

3.2 sample and data

Since the Third Plenary Session of the Eighteenth Central Committee, enterprises in various countries have carried out mixed ownership reform. This paper selects all 70 state-owned enterprises as samples from the mixed-ownership main board listed companies that implement the equity incentive plan in 2014-2017.There are 10 companies implement stock incentive plan for many times, each company implemented the equity incentive plan as an independent sample, and finally got 80 samples.

The data sources are as follows: Financial data such as stock daily closing price and market yield are from CSMAR database; The company's equity incentive plan is derived from the Shanghai Stock Exchange disclosure document. Data processing is carried out according to specific steps of event research method, which are as follows:

3.2.1 Determine event date, window period and estimation period

Event date refers to the date of announcement of event related information in the market. This paper defines event date as the announcement date of stock incentive plan of listed companies. After the date of the event is determined, the window period of the event needs to be defined, that is, several trading days before and after the date of the event. The length of the period is generally set according to the content of the event studied. This paper studies the stock price movements within 10 days before and after the date of the event, so [-10, 10] is selected as the window period of the event. The estimated window period is used to estimate the expected rate of return of a company when it is not affected by events. When selecting the estimated window period, we generally select a certain period before the announcement of the stock incentive event, and the estimated window period in this paper is [-130, -10]. Thus, we can get the timeline of stock incentive events, as shown in figure 3-1 below:
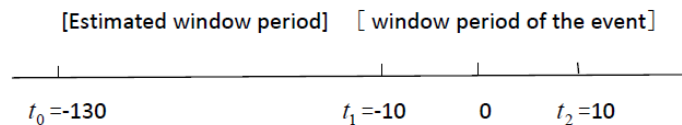
[Estimated window period]　　[window period of the event]

$t_0 = -130$ 　　　　 $t_1 = -10$ 　 0 　 $t_2 = 10$

Fig. 1. Event window and estimation window diagram of equity incentive event research

3.2.2 Determine the expected return model

This paper uses market model to calculate the expected rate of return. The specific model is as follows:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} . \tag{1}$$

R_{it} refers to the actual rate of return of stock i on day t of the event estimation period $R_{it} = (P_{it} - P_{i(t-1)})/P_{i(t-1)}$, among them, P_{it}、$P_{i(t-1)}$ are the closing price of the stock on day t and day t-1。 R_{mt} is the market rate of return on day t。 β_i is the regression coefficient between the real return rate of stock i and the market return rate, and represents the influence of the market return rate on the real return rate of stock i， α_i is parameter. ε_{it} is the error term of stock i at t days。

3.2.3 Calculate abnormal rate of return and average abnormal rate of return

Abnormal rate of return is the difference between the actual rate of return and the expected rate of return in the window period, namely:

$$AR_{it} = R_{it} - E(R_{it}) . \tag{2}$$

$$E(R_{it}) = \alpha_i + \beta_i R_{mt} . \tag{3}$$

In the above formula, AR_{it} is the abnormal rate of return of stock i on the day t of the event window, R_{it} refers to the actual rate of return of stock i on the day t of the event window, and $E(R_{it})$ is the expected rate of return of stock i on the day t of the event window.

Thus, the average abnormal rate of return of all sample companies on day t is obtained:

$$AAR_t = \sum_{i=1}^{n} AR_{it} / n .$$

(4)

Where *n* is the number of sample companies

Meanwhile, the cumulative abnormal rate of return of sample companies on day t in this window period is:

$$CAR_t = \sum_{t=-10}^{t} AAR_t (t = -10, -9 \ldots\ldots 9, 10) .$$

(5)

According to the collected data, the average abnormal return (AAR) and the cumulative abnormal return (CAR) of the whole sample for 21 days in (-10,10) were calculated by using Excel software. The results are shown in table 3-2.

Table 1. All samples in the event window daily AAR_t and CAR_t

time	AAR_t	CAR_t	time	AAR_t	CAR_t
-10	-0.000474532	-0.009173402	1	0.008445935	0.020510369
-9	-0.002395995	-0.011842074	2	-0.00114413	0.022816207
-8	-0.002199458	-0.013067342	3	0.003289911	0.021557586
-7	-0.00355521	-0.013643575	4	-0.001624805	0.018348692
-6	0.0000157607	-0.014867662	5	-0.000890915	0.018433993
-5	0.0000853011	-0.015758577	6	-0.001224087	0.018449753
-4	-0.003208894	-0.017383382	7	-0.000576233	0.014894543
-3	-0.001258622	-0.014093471	8	-0.001225267	0.012695085
-2	0.002305838	-0.0152376	9	-0.002668673	0.01029909
-1	0.013588743	-0.006791665	10	-0.009173402	0.009824558
0	0.013713291	0.006921626			

4. Analysis of empirical results

4.1 the total sample

We analyze the changes of the average abnormal return (AAR) and cumulative abnormal return (CAR) of the total samples during the event window, as shown in figure 4-1. We can see that AAR and CAR increased significantly from the two days before the event, and AAR reached its highest point on the event day, followed by a downward trend, indicating that the company may have inside information that led to the disclosure of information about the stock incentive plan. CAR shows a continuous upward trend from the two days before the announcement to the two days after the

announcement, with the event date changing from positive to negative and reaching the peak at t=2, indicating that the implementation of stock incentive plan can promote corporate performance. Three to ten days after the announcement, CAR has shown a downward trend, but remains positive. Through the above analysis we can see that after the implementation of stock incentive plan, the CAR is always positive and significantly promoted. It shows that the majority of investors are generally optimistic about the future performance of listed state-owned enterprises that implement the stock incentive plan, and are willing to purchase the stocks of these companies. The implementation of stock incentives can increase shareholder wealth, have a positive market reaction, and improve the company's short-term performance.
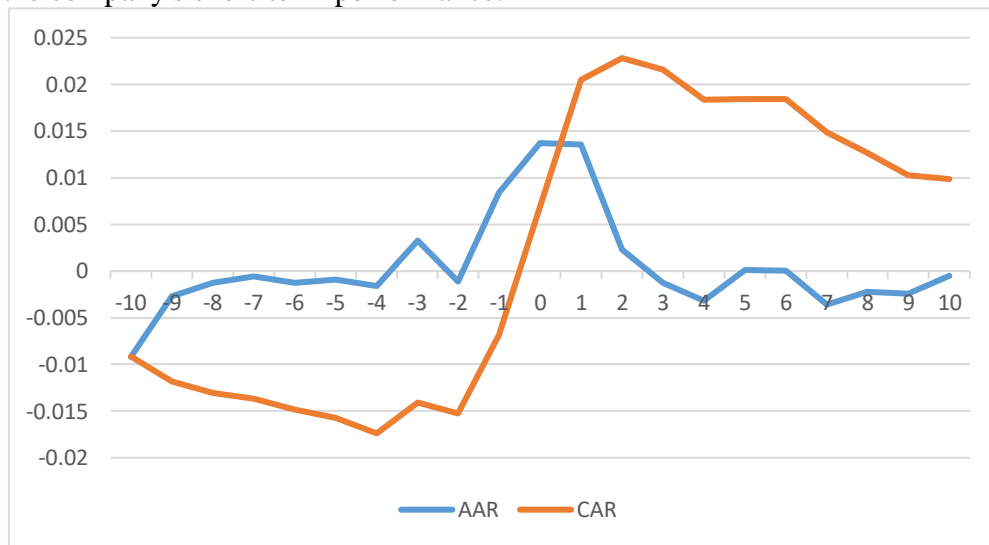

Fig. 2. Changes of AAR and CAR within the event window of the total sample

This paper further analyze the $CAR_{i(-10,-1)}$ and $CAR_{i(+1,+10)}$, using T test, test data after announcement has the existence of significant differences, test results are shown in figure 2, It can be seen that there are significant differences in CAR before and after the implementation of the equity incentive plan, indicating that the market reflects this incident well, and the implementation of the plan can improve the company's short-term business performance. The research hypothesis was verified.

Table 2. $CAR_{i(-10,-1)}$ and $CAR_{i(+1,+10)}$ mean difference significance test

	Test value = -.0132（$CAR_{i(-10,-1)}$ mean）					
	t	df	Sig.(2-tailed)	Average difference	95% confidence interval of the difference	
					lower	upper
VAR00001	20.540	9	.000	.02998	.0267	.0333

4.2 Subsamples of different excitation types

For the type of stock incentives, the Securities and Futures Commission and the State-owned Assets Supervision and Administration Commission promulgated the listed company's stock incentive management methods, indicating that equity incentives include stock options, restricted stocks, and other methods permitted by laws and administrative regulations. Stock options refer to the right of a listed company to give corporate executives and core technicians a certain amount of stock at a predetermined price for a certain period of time. Restricted stock refers to the number of shares of the company that the listed company grants to the incentive target in accordance with predetermined

conditions. Domestic and foreign views on the effects caused by these two forms of stock incentive differ. Through analyzing the stock incentive methods of 70 listed companies selected in this paper, it is found that most of the incentive forms are concentrated in stock options and restricted stocks. Below we study and analyze the differences in enterprise performance caused by these two main forms of stock incentive.
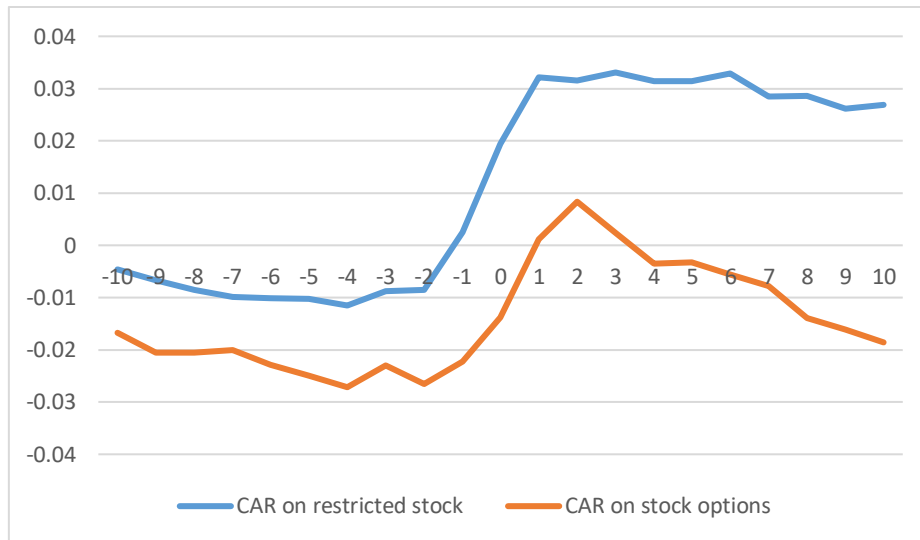

Fig. 3. CAR diagram of different types of stock incentive

As can be seen from the figure above, CAR caused by restricted stock and CAR caused by stock option show roughly the same growth trend, but CAR caused by restricted stock is significantly higher than that caused by stock option. CAR of restricted stocks changed from negative to positive before the event, with the largest increase one day before the announcement. After the announcement, CAR continued to be positive, and finally leveled off with no obvious downward trend, the company may exist inside information leads to the stock incentive plan information leaked in advance, and the companies implementing this equity incentive plan were affected by the event, and the company market responded well and the shareholder value increased. Observed in the form of stock options, CAR curve can be found that ten days prior to the implementation of stock incentive plan announcement on the same day, the CAR is always negative, announcement day growth is positive in the future, and a peak in the second day, but then falling for negative, t = 1 and t = 10 difference value of the CAR, the stock option incentive plan of type information of although company business performance has positive influence, but the effect is limited. According to the conclusion drawn from the overall sample analysis, the stock incentive plan can promote the short-term performance of enterprises and increase the shareholder value, but the incentive plan in the form of restricted stock plays a major role in promoting the performance. Hypothesis 2 is verified.

4.3 Subsamples of different enterprise types

According to the division of state-owned assets management authority, state-owned enterprises are divided into central enterprises and local enterprises for analysis. The Excel software is used to calculate the CAR of two sample companies, and the results are shown in figure 4-3.
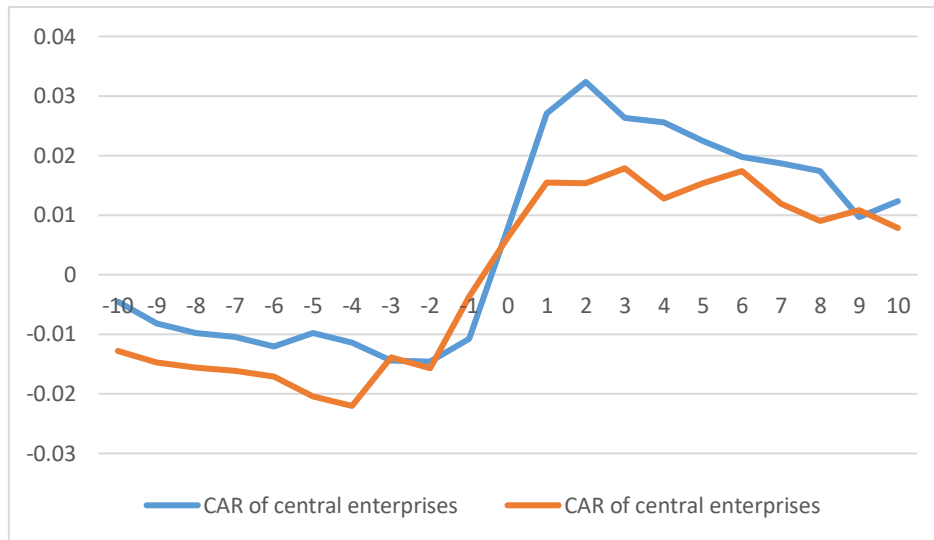
Fig. 4. CAR diagrams for different enterprise types

As can be seen from the above figure, the CAR of the central enterprises and the CAR of the local enterprises are generally on the rise and the change process is roughly the same. During the window period, the CAR is turned from negative to positive, and the growth rate is the fastest on the event day. Continue to be positive. It shows that the central and local enterprises implementing the equity incentive plan have responded well to the market affected by the event, and the shareholder value has increased. CAR of central enterprises reaches its peak at t=2 and then shows a downward trend, but it is still larger than local enterprises on the whole, which further indicates that central enterprises have better market response than local enterprises. Hypothesis 3 is verified.

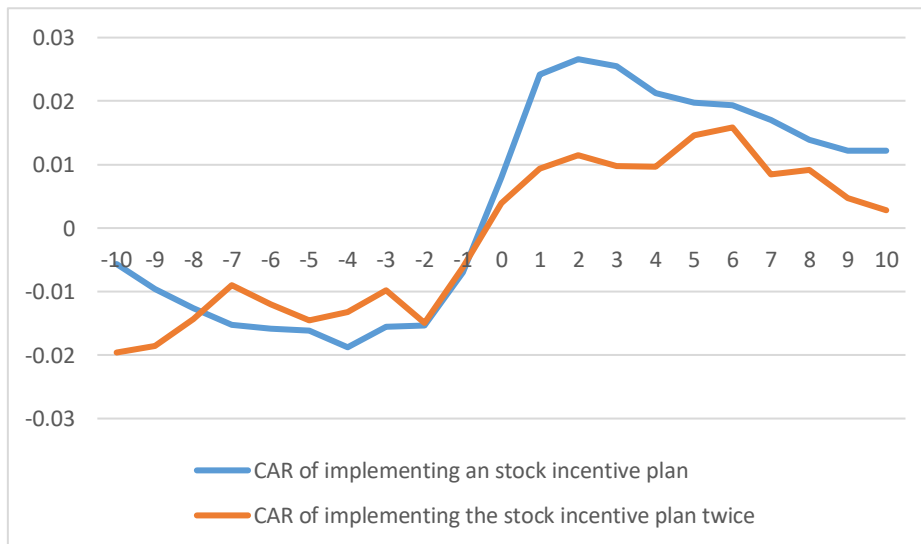## 4.4 Subsamples with different plan implementation frequencies

Fig. 5. CAR diagrams with different implementation frequencies

As can be seen from the above figure, the CAR value of the company implementing the stock incentive plan and the implementation of the two stock incentive plan is generally on the rise, and both turn from negative to positive on the day of the event, and continue to grow until the event 2 days later, and then fluctuating decline, in [0, 10] CAR window period is positive all the time, but the implementation of a CAR value of the stock incentive plan is higher than the implementation of stock incentive plan two CAR, illustrating the implementation of an stock incentive plan reaction to market better than the implementation of stock incentive plan. Based on the above analysis, we speculated that the company implemented the stock incentive plan twice because the market response of the company to implement the first stock incentive plan was good and the short-term

performance was improved. In order to further improve the performance and increase the wealth of shareholders, the company implemented the second stock incentive plan. Based on the above analysis, it can be concluded that although the company implements the stock incentive plan twice, there is still some positive market reaction, but the overall effect is lower than that of the company implementing the stock incentive plan once.

5. The research conclusion

According to the basic theory of stock incentive an empirical analysis of the market reaction of 70 state-owned enterprises that implemented the equity incentive plan from 2014 to 2017,conclusions are as follows: one is that capital market announcement events give positive response to the stock incentive plan, in the company of stock incentive announcement event window has significant cumulative abnormal return, the market responds well to the event, and the event can improve company's short-term business performance, increase shareholder value. The second is the horizontal comparison of stock incentive form and equity structure. It is found that the influence of different types of stock incentive forms on business performance is significantly different. Restricted stock options can promote the short-term performance of company, while stock options cannot produce a good market response. Finally, the state-owned enterprises are divided into central enterprises and local enterprises for horizontal comparison. The research results show that for different types of state-owned enterprises, the implementation of stock incentive plan should have a significant impact on the business performance of enterprises, but the central enterprises have a better market response.

Stock incentive can motivate the enthusiasm and creativity of company executives by granting them some stock, and closely link the interests of the company with personal interests, so as to bring higher returns to shareholders and maximize the value of shareholders. This incentive mode is conducive to the improvement of corporate governance structure and corporate restraint mechanism. However, while affirming the advantages of the stock incentive plan, it is also necessary to realize that the management can obtain incentives through fraud due to the imperfect regulatory system, which will not only damage the company's business development, but also seriously affect the interests of shareholders. Therefore, we should improve the regulatory system and let the stock incentive play its due effect.

Although the research results of this paper show that the stock incentive plan of listed companies has a positive impact on the company's short-term operating performance and the market responds well, there are still many shortcomings. In the research process, factors such as the proportion of stock incentive stock in the share capital, the company's growth, and industry differences are not considered. At the same time, the trend and reasons of the influence of stock incentive on enterprise performance need to be further studied, and the follow-up needs to be supplemented and improved.

Acknowledgement

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