Empirical Research on the Relationship Between the Stock Option Incentive and the Performance of Listed Companies

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Abstract

This paper chooses 30 listed companies that published and implemented stock option incentive plans in 2011 as the research objects. However on account of the hysteretic nature, we select the relevant data about the corporate performance in 2013 with the application of factor analysis to calculate the comprehensive corporate performance evaluation value. After that, we introduce a series of indexes to construct a regression model to facilitate the research on the relationship between the enterprise stock option incentive and the corporate performance. The research result proves that there's a positive correlation between the stock option incentive and the corporate performance. Finally this paper proposes a suggestion on the implementation of the stock option incentive plan.

Key words: Stock option; Listed company; Corporate performance

INTRODUCTION

With the continuous increase in the degree of opening up in China and the development of economic market, the Chinese enterprises will not only face the fierce competition from the China domestic, but also encounter the more severe competition from the world. In order to survive in the competition, all of the enterprise throng to take numerous innovation measures, especially on the innovation of distribution system. The traditional incentive mechanism (such as the annual salary system) can only reflect the historical indicator and the short-term indicator, unable to indicate the manager's future performance and the long-term performance, prone to making the manager take the short-term action to lead to an unfavorable incentive effect. However the emergence of the stock option incentive system has overcome the above defect, managing to achieve the convergence of interest to both of the operators and the owners.

Actually ever since the early of the 1990s, China had begun to introduce the stock option incentive system. However due to the fact the capital market hadn't been well established and the relevant legal system hadn't been developed at that time, the stock option incentive system didn't function well regarding the enterprise performance in China with little progress having been made in the development. On Dec 31, 2005, CSRC (China Securities Regulatory Commission) published the "Administrative Measures for Equity Incentives of Listed Companies (Trial)" to lay a legal foundation for the equity incentive of listed companies. Then both of the SASAC under the State Council and the ministry of finance published separately on January 27 and Sept 30, 2006 the "Trial measures for the implementation of equity incentive plans by state-owned listed companies (overseas)" and the "Trial measures for the implementation of equity incentive plans by state-owned listed companies (domestic)" to provide the policy guidance for the implementation of equity incentive plans by the listed companies, making the equity incentive become the focus of market at that time, when more and more listed companies began to pay attention to the equity incentive plans and developed the equity incentive solutions, most of which were about the stock option incentive methods.

1. THEORETICAL BASIS

The main reason that the equity incentive would arise is because of the principal-agent problem caused by the inconsistent objective function for the agent and the stockholder. The agency theory is mainly involved with the contractual relationship between the provider of the enterprise resources and the resource users. According to the agency theory, the owner of the economic resources is the principal, while the managers who take the responsibility for the use and control of these resources are the agents. The agency theory holds that when the managers themselves are the owners of the enterprise resources, they will possess the whole residual claim rights in the enterprise. Under such a circumstance, the managers will work for themselves and there would be no agency problem. However when the managers would absorb a new economic resource from the external by issuing the stocks, they will have such a motive to increase their company-paid consumption, relax themselves and try to reduce the workload. Also the agency theory believes that the agent has possessed more information than the principal. Then such information asymmetry will adversely affect the principal, who might monitor efficiently the agent to see if the agent has served for the benefits of the principal in a proper way. The theory also assumes that both of the principal and the agent are rational, who will maximize their own wealth in the course when the agency contract has been signed. Moreover for the sake of the profit-seeking motive, the agent might take every possible opportunity to increase their wealth. However some of their actions might damage the owner's benefits. Hence it's necessary for the principal to take corresponding measures to restrict the agent's behavior. Then the key of the principal-agent problem is on the incentive and constraint.

Of course, there're advantages and disadvantages in the stock option incentive mechanism. On one hand, the integration of the operator's rewards with the company's long-term benefits will guarantee a high level of benefit consistency between the operator and the asset owner, making the benefits of both parties connected closely and capable to lock up the risk faced by the option holders, who won't suffer any additional loss if they don't exercise their rights. The stock option, which is the right of choice conferred by the enterprise to the operator, is the anticipated revenue realized in the uncertain market. Since the enterprise doesn't make any cash payment, it will facilitate the enterprise to reduce the incentive cost. On the other hand, the risk from the stock market might make the operator take some short-term actions. In China, there're still some defects in the existing laws regarding the source of stocks during the implementation of options. It calls for the introduction of relevant policies and laws.

2. LITERATURE REVIEW AND RESEARCH HYPOTHESIS

Based on the data about 511 American enterprises in 1980, Demsetz (1985) made an empirical research on the share holding of the mangers and the enterprise performance. The research result shows that there's no obvious linear relationship between these two factors. That's to say, the share holding of the mangers doesn't make any contribution to the improvement of the corporate performance.

According to the financial data of 1049 listed companies from 1974 to 1986, Jensen and Murphy (1990) made a regression analysis on the performance salary of the senior manager and the enterprise value. The analysis result shows that the relationship between the performance salary of the senior manager and the enterprise value is extremely faint, proving that there's no significant effect on the senior manager when the salary incentive is implemented.

According to the data of 478 large-scale companies in USA from 1980 to 1990, Brian and Liebman (1997) studied the relationship between the CEO's remuneration and the market value of the shares, finding that the number of the stock options held by the managers exerted a much stronger influence on the enterprise performance than the salaries and bonus they had received. Also the research reveals that there's a positive correlation between the stock option and the enterprise performance. It means that the implementation of the stock option incentive plan will play a significant positive role in the improvement of enterprise performance.

Then Li and Zhao (2013) chose 67 listed companies who had proposed and implemented the solutions for the managerial equity incentive system from 2005 and 2010 to study the stock option incentive effect of the listed companies through the regression analysis method. They made an explanation on the ROE (return on equity) through the following explanatory variables, including operating profit ratio, total assets and asset-liability ratio etc., coming to a conclusion that the stock option incentive had been working very well. It turns out that the increase in the operating profit ratio makes a contribution to the enhancement of the company performance. However the corporate assets won't exert a great influence on the company performance. But the influence of the company's financial situation, say the asset-liability ratio on the company performance is significant.

On account of the fact that most of the scholars in the past affirmed the relationship between the stock option incentive and the enterprise benefit, then this paper makes such a hypothesis that: there's a significant positive correlation between the stock option incentive and the performance of the listed company.

3. ILLUSTRATION OF SAMPLES

This paper chooses 30 listed companies that published and implemented stock option incentive plans in 2011 as the research objects. Considering that the effect of the stock option incentive on the company performance is always hysteretic due to the reason that the period for the implementation of stock option is normally 1-2 years,

this paper selects the financial data in 2013 to make the comprehensive performance evaluation on the companies. In this paper, the original data that mainly comes from the annual report of each company and has been published on the SinaNet Finance and Economics (http://finance.sina.com.cn) and Cninfo (http://www.cninfo.com.cn), has been imported manually and has been checked carefully for many times to secure the data accuracy.

4. PERFORMANCE EVALUATION

4.1 Selection of Financial Indexes

Table 1
Statistics of Enterprise Performance Measurement Indexes

Types of indexes	Name of variables	Names of index	Index computation formula
Profitability	Earnings per share	X_1	Net profit/total shares
	Rate of return on total assets	X_2	Net profit/average total assets
	Return on equity	X_3	Net profit/average net assets
Operation capacity	Turnover of account receivable	X_4	Sales revenue/average accounts receivable
	Inventory turnover ratio	X_5	Sales revenue/average inventory
	Turnover of total capital	X_6	Sales revenue/average total assets
Debt paying ability	Asset-liability ratio	X_7	Total liabilities/ total assets
	Liquidity ratio	X_8	Current assets/current liabilities
	Quick ratio	X_9	(Current assets-inventories)/ current liabilities

Due to the reason that a single performance index used in the account book is unable to evaluate the company performance comprehensively and accurately, then in order to improve the accuracy of our empirical research, this paper chooses 9 indexes as the start of the factor analysis to make a comprehensive evaluation on the performance of the listed company from the following three aspects, including the enterprise profitability, the operation capacity and the debt paying ability.

4.2 Factor Analysis Through the SPSS Software

Test for the feasibility of factor analysis. Utilize the KMO standard and the Bartlett test of sphericity to test the sample data to see if the sample data is applicable to the factor analysis. The statistical observed value obtained in the Bartlett test of sphericity is 301.947 with the corresponding Sig value in close proximity to 0. Assume that the significance level is set to be 0.01. Then we could deny such a null hypothesis that the corresponding matrix is an identity matrix, since this Sig value is lower than the significance level. It means that there's a significant correlation between the various variables. Meanwhile since the KMO value is 0.533, which is bigger than 0.5, it indicates that the index that has been chosen is suitable for the factor analysis.

Table 2
KMO and Bartlett Tests

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.533
Bartlett test of sphericity	Chi-squared approximation	301.947
	df	36
	Sig.	.000

Principal component extraction. Extract the main factors from the original numerous indexes through the principal component analysis method, which is also a factor analysis method. Table 3 reveals that three principal component factors have been extracted to reflect the original variable information with the extent to reflect the original variable information up to 76.183%. Meanwhile it reveals that there's a high correlation between the first principal component and the earnings per share, the rate of return on total assets and the return on equity, while the second principal component is highly related to the turnover of account receivable, the inventory turnover ratio and the turnover of total capital. As to the third principal component, it has a high correlation with the asset-liability ratio, the liquidity ratio and the quick ratio. All of these prove that the result of factor extraction is quite favorable.

Table 3
Total Variance Explained

Components	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	Total	Total	Total	Variance %	Accumulated %
1	3.433	38.140	38.140	2.882	32.019	32.019
2	2.194	24.376	62.517	2.448	27.199	59.218
3	1.230	13.667	76.183	1.527	16.965	76.183
4	.892	9.915	86.098			

To be continued

Continued

Components	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	Total	Total	Total	Variance %	Accumulated %
5	.634	7.042	93.140			
6	.369	4.095	97.235			
7	.209	2.326	99.561			
8	.030	.338	99.900			
9	.009	.100	100.000			

4.3 Computation on the Comprehensive Corporate Performance Score

Table 4
Component Score Coefficient Matrix

	Components		
	1	2	3
Zscore: Earnings per share	-.039	.381	-.121
Zscore: Rate of return on total assets	.142	.395	-.021
Zscore: Return on equity	-.032	.362	-.005
Zscore: Turnover of account receivable	.007	-.078	.503
Zscore: Inventory turnover ratio	.227	-.015	.373
Zscore: Turnover of total capital	.050	-.048	.574
Zscore: Asset-liability ratio	-.285	-.035	.049
Zscore: Liquidity ratio	.327	.014	.019
Zscore: Quick ratio	.335	.013	.034

Regarding all of the specific data provided in Table 4, we might work out a function expression for the comprehensive evaluation on corporate performance:

$F_1 = -0.039X_1 + 0.142X_2 - 0.032X_3 + 0.007X_4 + 0.227X_5 + 0.050X_6 - 0.285X_7 + 0.327X_8 + 0.335X_9$

$F_2 = 0.381X_1 + 0.395X_2 + 0.362X_3 - 0.078X_4 - 0.015X_5 - 0.048X_6 - 0.035X_7 + 0.014X_8 + 0.013X_9$

$F_3 = -0.121X_1 - 0.021X_2 - 0.005X_3 + 0.503X_4 + 0.373X_5 + 0.574X_6 + 0.049X_7 + 0.019X_8 + 0.034X_9$

Sum up the linear weights of the scores for the three principal components according to the weighs, which are also the variance yields of the various principal components obtained in Table 3 to compute the comprehensive corporate performance evaluation value in 2012:

$F = (32.019\%* F_1 + 27.199\%* F_2 + 16.965\% F_3)/76.183\%$

5. REGRESSION TEST ON STOCK OPTIONS AND CORPORATE PERFORMANCE

5.1 Construction of Regression Analysis Model

This paper takes F, the comprehensive corporate performance evaluation value as the explained variable with the application of Y1, the proportion of the stock-option plan in the general capital as the test variable. Meanwhile on account of the other factors influencing the corporate performance, such as the company's capital structure, the nature of business and the enterprise growth, this paper chooses Y2, the asset-liability ratio, Y3, the nature of business and Y4, the net profit growth rate as the control variables to construct the regression model as below:

$F = A_0 + A_1 Y_1 + A_2 Y_2 + A_3 Y_3 + A_4 Y_4 + u$

Where F—is the comprehensive corporate performance evaluation value obtained after the computation based on the factor analysis;

A_0—is a constant term;

A_i—is the coefficient corresponding to the variables; (i=1,2,3,4)；

u —is the error term.

5.2 Analysis Results

Table 5
Correlation

		F	Incentive amount	Asset-liability ratio	Nature of business	Net profit growth rate
Pearson Correlation	F	1.000	.362	-.594	.209	.586
	Incentive amount	.362	1.000	-.172	.207	.024
	Asset-liability ratio	-.594	-.172	1.000	-.424	.026
	Nature of business	.209	.207	-.424	1.000	-.141
	Net profit growth rate	.586	.024	.026	-.141	1.000
Sig. (unilateral)	F	.	.025	.000	.134	.000
	Incentive amount	.025	.	.181	.136	.451
	Asset-liability ratio	.000	.181	.	.010	.446
	Nature of business	.134	.136	.010	.	.228
	Net profit growth rate	.000	.451	.446	.228	.

Table 6
Model Summary

Model	R	R^2	Adjusted R^2	F	Sig.	Durbin-Watson
1	.880[a]	.775	.739	21.562	.000[a]	2.433

Table 7
Analysis of Regression Coefficients

Model		Un-standardized coefficients		t	Sig.
		B	Standard error		
1	(Constant)	.189	.302	.627	.536
	Incentive amount	13.189	5.136	2.568	.017
	Asset-liability ratio	-1.799	.335	-5.378	.000
	Nature of business	.002	.228	.011	.991
	Net profit growth rate	.803	.130	6.196	.000

Table 5 reveals that there's a positive correlation between the amount of incentive stock option, Y1 and the corporate performance F. Meanwhile since the absolute value of the correlation coefficient between the four explanatory variables is lower than 0.6, it indicates that there's no serious collinearity problem among the variables.

Table 6 gives the coefficient of determination for the model (R^2), the corrected coefficient of determination (adjusted R^2), the F test value of the model and the Durbin-Watson test value. The result shows that the value of R^2 is 0.775, which not only indicates that 77.5% of the F variable can be explained through the other four variables, but also demonstrates a good fitting degree of the model. However the corrected R^2 is able to reflect more efficiently the fitting degree of the model. In this paper, the value of R^2 is 0.739, which also proves the favorable fitting degree of the model. The Durbin-Watson test value is 2.433 in close proximity to 2, reflecting that there's no obvious serial correlation between the various variables. Regarding the F significance test, since the significance level is lower than 0.05, it reveals that regression equation is significant, which also means that the amount of incentive stock option, the asset-liability ratio, the nature of business and the net profit growth rate have affected significantly the corporate performance.

The regression coefficient is provided in Table 7. When the significance level=0.05, the value of amount of incentive stock option, t is 2.568 and the Sig value is 0.017, which is lower than 0.05, reflecting that there's a significant positive correlation between the amount of incentive stock option and the corporate performance to further affirm our hypothesis. That's to say, there's a significant positive correlation between the stock option incentive and the performance of the listed company. Meanwhile the table also reveals that the sig value of the asset-liability ratio and the net profit growth rate is lower than 0.05, showing that there's a significant positive correlation between the asset-liability ratio and the net profit growth rate with the corporate performance. However since the Sig value of the business nature is bigger than 0.05, it reflects that there's no relationship between the nature of business and the corporate performance.

CONCLUSION AND SUGGESTION

The result of the above empirical study reveals that: first, the stock option incentive will facilitate the listed companies to improve their performance level. However due to the fact that there're not many listed companies having implemented really the stock option incentive plans in China, therefore the sample data chosen in this paper is not comprehensive to make the result of our empirical study might differ somewhat from the reality. Second, what has been reflected by the asset-liability ratio is the company's capital structure and the net profit growth rate only reflects the growth rate of the company. Although the optimization of the capital structure and the focus on the company's future development will contribute to the improvement of the corporate performance, the nature of business won't affect the corporate performance too much.

Through the empirical analysis in this paper, we're able to make some major conclusions and find the problems. However in order to increase the effectiveness of stock option incentive to make it play a positive role, finally this paper would like to propose some suggestions as below:

Clarify and standardize the relevant laws and regulations. On account of the limitations to the stock option incentive, it's necessary to develop some relevant laws and regulations to guarantee the smooth implementation of stock options. Meanwhile, the standardization and perfection of the laws and regulations will prevent the interest of the minority shareholders from being violated by the management and the major shareholders.

Optimize the company's management structure. In order to implement the incentive mechanism more effectively, a standardized board of directors and internal supervision mechanism must be established to provide the powerful impetus for the company's development.

Focus on the company's future development. Never focus on the short-term benefits. Instead, it's necessary to keep an eye on those long-term projects with promising prospect. It's only in this way that the corporate performance can be enhanced efficiently to promote the long-term development of the company.

Enrich the corporate performance evaluation mechanism. The selection of performance evaluation index is critical as it influences the development of the incentive system. Therefore with the continuous development of the market mechanism, it's necessary to make a thorough reform on the performance evaluation system that is centered by a single financial indicator so as to combine the financial indexes used in the account book

with the dynamic financial index to achieve a diversified index system.

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