

INTELLECTUAL CAPITAL AND THE VALUE OF EXECUTIVE STOCK OPTIONS

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ABSTRACT

This paper examines the information content of executive stock options when intellectual capital is taken into consideration. Three stock option valuation models based on stock price are adopted. We also examine the determinants of stock options value and the effect of intellectual capital. Our results show that stock options value is positively related to executives' abilities of risk bearing, the firm's growth opportunities, and executives' stockholdings ratios, but negatively related to executives' tenure and institutional investors' stockholding ratios. We also document that there is a positive relation between stock options value and the firm's future growth value, especially, when intellectual capital is considered.

INTRODUCTUON

The separation between ownership and control has caused the problem of agency. Effective performance evaluation methods and rewarding systems could alleviate the problem of agency. The stock option compensation plan is one of the methods that companies use to solve agency problems. Frye (2004) pointed out that the more equity-based rewarding systems are introduced; the better will be the performances of the firm. Simon and Dugan (2001) indicated that the number of employees who held stock options increased from only one million employees in 1991 to ten million employees in 2001. In particular, in the newly founded intellectual Hi-Tech firms, granting stock options has already become the key condition to attract talented personnel. Because the options can be exercised after a period of time, time value recognition is still disputable, and thus it is difficult to evaluate stock options value. Prior literatures mostly used stock prices to evaluate the value of stock options. As to the initial intentions of adopting stock option rewarding systems, performance incentives are offered to coordinate the interests of both shareholders and managers so that managers will be motivated to maximize firm's profits and improve the firm's growth. If a stock option is valued by the current stock price, then the short-term and noisy information contained in the stock price would affect stock options value. Moreover, if managers recognize that the intellectual capitals owned by the firm are not recorded, and then managers could make good use of their private information, i.e., the intellectual capital would make a great impact on earnings, to influence the incentive effects of the executives' stock options. This issue induces the research motivation of this paper.

Traditional financial performance measures subjected to generally acceptable accounting principles are not taken into account intellectual capital. Those measures could not describe the firm's operating outcome properly. Besides, most of the previous research uses the value of the whole firm to examine the value creating factors. We are aroused to investigate the relationship between stock options and firm's future growth value. After the bankruptcies of Enron, WorldCom, and a series of corporation's

fraudulences in U.S., corporate governance has become a popular issue worldwide. Institutional investors take on a more and more important role in internal governance of a firm Romano (2001) states that if institutional investors regarded firm's performances as the goal, they paid more attention to corporate governance activities. Institutional investors are more concerned in the firm's operation after those fraudulent events and more financial economists are interested in studying the effects of institutional investors on firms performances. Hence, the relationships among institutional investors, firms performances and stock options also triggered the research motivations of this paper.

The purposes of this research can be summed up as follows. First, the stock price is estimated based on Ohlson's (1995) linear valuation model with intellectual capital included and then the value of stock options is measured. We analyze the difference between this estimated value of stock options and the calculated value of stock options based on actual stock price. The main purpose of stock option compensation system is to alleviate the agency problem due to the separation of ownership and control. However, the success of stock option rewards system depends on the CEO incentive intensity, so another purpose of this paper is to examine the factors that affect stock options value. Third, as institutional investors play an important role in corporate governance, we examine the effects of institutional investors' shareholding ratios and the firms performances on the value of stock options. Finally, we further examine the relationship between the value of stock options and the firm's future growth opportunities when intellectual capital is taken into account.

RESEARCH HYPOTHESIS

- H1: By using the three types of stock prices respectively, i.e., actual stock price, stock price estimated by using book value and earnings, and stock price estimated by using book value, earnings and intellectual capital, in the modified Black-Scholes valuation model to obtain three different stock option values, there is significant difference among those values.
- H2: Stock option value is negatively related to the CEO's tenure, the CEO's age and institutional investors' shareholding ratio, but is positively related to the CEO's risk-taking ability, firm's growth opportunities and the CEO's shareholding ratio.
- H3: The value of future growth of the firm is positively related to stock option value with intellectual capital imbedded.

RESEARCH DESIGN

We collected data from Compustat and Execucomp databases. Our sample firms included listing Hi-Tech. industries in the U.S. i.e., information technology and telecommunication Services. The sample period extended from 1992 to 2004. We obtained a final sample of 747 firms. We first input (1) actual stock price, (2) stock price estimated by including book value and earnings (3) stock price estimated by including book value, earnings and intellectual capital, respectively, into Black-Scholes valuation model to estimate stock option value. We adopted "One-Way ANOVA" method. The dummy variables were used to distinguish the above three stock option values. The One-Way ANOVA is $C_{DC,i} = \mathbf{m} + \mathbf{a}_{DC} + \mathbf{e}_{DC,i}$, where DC=1 if stock option value is calculated from modified Black-Scholes valuation model by using actual per stock price; DC=2 if stock option value is calculated from modified Black-Scholes valuation model and the stock price is estimated by using book value and earnings, DC=3 if stock option value is calculated from modified Black-Scholes valuation model and the stock price is estimated by using book value, earnings and intellectual capital. $C_{DC,i}$ is the observed reaction value of firm i in the DC individual group, $C_{1,i}$ is the stock option value calculated by using actual per share price;

$C_{2,i}$ represents the stock option value calculated by using the stock price estimated from book value and earnings. Next, we examine H2. The empirical model is

$$C_{i,t} = \mathbf{b}_0 + \mathbf{b}_1 Tenure_{i,t} + \mathbf{b}_2 Age_{i,t} + \mathbf{b}_3 IF_{i,t} + \mathbf{b}_4 RT_{i,t} + \mathbf{b}_5 Growth_{i,t} + \mathbf{b}_6 Share_{i,t} + \mathbf{b}_7 Size_{i,t} + \mathbf{e}_{i,t} \quad (1)$$

where $C_{i,t}$ is CEO stock option value, $C_{i,t} = C_{1,t}$ is the stock option value calculated by actual per share price, $C_{i,t} = C_{2,t}$ is the stock option value calculated by stock price estimated from book value, earnings and intellectual capital, $Tenure_{i,t}$ is tenure of CEO, $Age_{i,t}$ is age of CEO, $IF_{i,t}$ is shareholding ratio of institutional investors, $RT_{i,t}$ is the risk-taking ability of CEO, $Growth_{i,t}$ is growth opportunity, $Share_{i,t}$ is shareholding ratio of CEO, $Size_{i,t}$ is firm size. Finally, we tested H3. The empirical model is

$$FGV_{i,t} = \mathbf{a}_0 + \mathbf{a}_1 C_{i,t} + \mathbf{a}_2 CH_{i,t} + \mathbf{a}_3 RDS_{i,t} + \mathbf{a}_4 ROS_{i,t} + \mathbf{a}_5 PE_{i,t} + \mathbf{a}_6 MB_{i,t} + \mathbf{a}_7 CF_{i,t} + \mathbf{e}_{i,t} \quad (2)$$

where $FGV_{i,t}$ is future growth value, $CH_{i,t}$ is cashholding, $RDS_{i,t}$ is R&D intensity, $ROS_{i,t}$ is return on sales, $PE_{i,t}$ is price earning ratio, $MB_{i,t}$ is market to book ratio, $CF_{i,t}$ is cash flow. According to Ohlson's (1995) valuation model, we regarded dividend and information variable of modified future profitability as the intercept and formed the equity valuation model that contains book value and earnings: $P_{i,t} = a_0 + a_1 y_{i,t} + a_2 x_{i,t} + e_{1,t}$ equity valuation model with book value and earnings. This paper uses the sample obtained from 1992 to 1999 to estimate coefficients that were stationary during both the estimation period (1992 to 1999) and observation period (2000 to 2004), to further estimate per share price from 2000 to 2004. Next, we develop an equity valuation model with intellectual capital to measure the relationships of stock price, book value, earnings and intellectual capital. The model is

$$P_{i,t} = b_0 + b_1 y_{i,t} + b_2 x_{i,t} + b_3 IC_{i,t} + e_{2,t} \quad (3)$$

Where $IC_{i,t}$ is intellectual capital.

CONCLUSIONS

This research adopts modified Black-Scholes valuation model to compare three stock options values calculated respectively by using actual stock price, the stock price estimated by considering equity and earnings, and the stock price estimated by considering equity, earnings and intellectual capital. Empirical results are summed up as follows. First, there are significant differences between the three estimated stock options values that mean executive stock options value is to be influenced when intellectual capital is taken into consideration. Second, executive stock options value is significantly and negatively related to executive's tenure and institutional investors' shareholding ratios. On the other hand, it is significantly and positively related to executives' risk-taking abilities, firm's growth opportunity, and executives' shareholding ratios. This shows that when the executive's shareholding ratio is higher, he/she has more power to decide the contents and components of compensation, and thus stock options value is higher. However, executive's stock options value is not related to executive's age. Third, the firm's future growth value is positively related to stock options value, and this positive relationship is more prominent when stock options value is calculated based on the stock price which estimated by considering book value, earnings and intellectual capital. Our results imply that when valuating stock options, intellectual capital should be taken into consideration to avoid distortion of executive's stock options value.