The Empirical Tests of the Regulated Industry Hypothesis(RIH): The Case of Stock Option System*

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Previous studies on the relation between a managerial compensation system and the value of a firm suggest that stock option plans might not be effective in increasing the value of firms in the highly regulated industries, such as banks, insurance and utilities companies. In addition, the government regulation plays such a role that the firms under heavy regulation can behave differently from firms under milder regulation in the major financial decisions, such as risk taking in the capital budgeting and income distribution policy. This is so-called Regulated Industry Hypothesis (RIH).

Although there are many studies that deal with regulation issues in the area of financial economics, it is not easy to find the research regarding the role of regulation in the context of the stock option system and financial decision makings as Yermack (1995, 1997) points out. Therefore, in this study, we empirically analyze the influence of government regulations on the effectiveness of stock option plans for the Korean capital markets which are known as far more regulated by the government than other developed countries. From the analyses, we find that the stock option plan has a very limited and even negative effect in enhancing a firm's value for regulated firms, while the effect is significantly positive for the non-regulated firms. This implies that the stock option system should be carefully applied to the regulated firms, if the purpose of the system is to increase the wealth of the shareholders. In addition, our results show that the short-term risk and dividends have been significantly increased and decreased, respectively, for the regulated firms, while significant changes were not found for non-regulated firms. These results imply not only that stock options are not an effective compensation mechanism in enhancing firm value, but also that the introduction of stock options to the regulated firms simply increases the agency costs by inducing the increase of the risk and the decrease of the dividends. Therefore, highly regulated firms should take into account these results when they consider introducing stock option system as a way of a value management. In conclusion, this study empirically demonstrates that the regulated industry hypothesis is also valid in the compensation system of a company, such as stock option, and shareholders(owners) of the regulated firms should aware this implication to maximize their wealth when managers(agents) of the firms make crucial decisions in finance and investment

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I. Introduction

The separation of the ownership from the management in a firm generally induces the conflict between shareholders and managers, so called 'agency problem', although the separation has greatly contributed to the blooming of the modern capitalism. Since shareholders can access only to the incomplete information about the decision making by the managers and investment opportunities of a firm, agency problem, such as a moral hazard, can occur. In addition, managers can cause conflicts by using resources of a firm to maximize their utility rather than to use them for maximizing the wealth of shareholders. Therefore, voluminous studies have attempted to find out a way to ameliorate the agency problem (Fama, 1990; Haugen and Senbet, 1981; Holmstrom, 1979; Jensen and Meckling, 1976, among others).

One of the ways to mitigate the agency problem is to link managerial compensation with a firm's performance, such as stock returns, return on equity, sales, and Tobin's Q. Since the U.S. introduced it in the 1920s, the stock-option system has been widely used as a compensation package to resolve conflicts. In particular, many firms actively used stock options as a means of inspiring employees during the severe economic recession in the 1980s. That is, the stock option plan began to attract attention as a tool of making stockholders' interests compatible with the morale of managers. From the beginning of the 1990s, venture firms began to make use of the plan for recruiting and maintaining employees of higher ability. Recently, in the US about 90% of Fortune 500 companies adopted the plan as a compensation system and more than 318 firms have introduced the plan in Japan since the plan was permitted by law in 1996. In Korea, more than 261 firms have adopted the plan since the Security Exchange Act allowed special tax treatment for the plan in April 1997.

The long economic recession of 10 years in Japan, the economic crisis of Russia and foreign exchange crises in Latin America and Asia (including Korea) commonly showed that the development of a financial system is essential to economic stability and growth, implying that it is not strange to see the financial institutions in those countries actively pursuing value management, restructuring their organization, introducing advanced financial technology and recruiting professional CEOs in order to develop financial systems. Unlike those of developed countries, however, most of the governments of the countries experienced economic crises have recently heavily interrupted the operation of financial institutions. In particular, it is a well-known fact that the Korean government has highly regulated financial industries in the mana-

gement and major decision making. It is for this reason that we choose the Korean capital markets as our sample to test how regulation affects the effectiveness of stock option plans.

The major goal of this paper is to empirically test the *regulated industry hypothesis (RIH)* that the government regulations can significantly affect the financial performance and financial decision making for the highly regulated firms. For the goal, we test three specific hypotheses as follows: First, we test the differential announcement effect of the stock option plan between highly regulated companies (hereafter, we use HRC for the expository convenience), such as banks, insurance companies and utility companies and other less regulated companies (hereafter, we use LRC for the expository convenience). The rationale for this hypothesis is that regulation can induce the managers of HRCs to have limited discretion in managerial decision makings, leading to the ineffectiveness of the firm value-increasing mechanism for the HRC. Second, we analyze how the risk, measured by volatility of the stock returns, can be influenced by the introduction of the plan. As explained in the following section, there is a tendency of managers to pursue high-risk investment projects in order to maximize their future rewards from the option compensation by exploiting the asymmetric payoff structure of the option. Therefore, we will examine whether or not there is any difference between HRC and LRC in the change of the risk between before and after the announcement date of the introduction of stock option plans. Finally, we examine the association between the adoption of the plan and the subsequent change in the corporate dividend policy between HRC and LRC, because the managers of LRC can show the tendency of overly sacrificing dividends to increase firm value and their compensation.

This paper is organized as follows: Section II reviews previous literature. Section III describes the hypotheses and research methodology for the empirical testing. The results and implications are shown in section IV. Finally, we summarize the results and conclude the paper in section V.

II. Literature Review

The typical stock-option plan grants the executive or managers the option to purchase a number of shares of common stock at a predetermined exercise price that is normally equivalent to the market value of the stock on the date of grant (DeFusco et al., 1990; John and John, 1993; Yermack, 1995, 1997). These options generally have a minimum holding period required before the options can be exercised.

The most important goal of the plan is to

motivate managers to make managerial decisions in the perspective of shareholders' wealth (Agrawal and Mandelker 1987, Bizjak et al. 1993, Brickley et al. 1985). Yermack (1995) shows that some variables derived from the theories of agency and financial contracts are related with the motives of granting stock option plans. John and John (1993) argue that the plan is closely associated with a firm's capital structure policy, also suggesting that all agency problems between all the claimants of a firm (such as, bondholders, consumers, governments as well as shareholders) should be considered in the process of option design. In the following subsections, we review previous studies from the viewpoint of value, risk and dividend policy in the perspective of government regulation and the effectiveness of stock option plan.

2.1 Regulation

In most of the countries, much stronger government regulations have been imposed on the banks and public firms than other firms, such as manufacturing and private firms. Among the reasons are the preferential providing specific firms with funds, maintenance of stability in the regulated firms, the protection of depositors and the achievement of special policies. To make the lists more specific, two important motivations for the regulation exist: First, as a perspective of public interests, the necessity of the enhancement of publicity, high informational asymmetry and adverse selection problem of financial firms, externalities of financial industry, natural monopoly phenomenon of financial industry, and the role of policy tools by governments. Second, as a perspective of private interests, the internal subsidies given to specificindustries, i.e. regulation plays a role like imposing taxes on financial and public firms in order to give special subsidies to some specific firms.

As Booth et al. (2002) mention, regulation plays very important role in the banks and public utilities firms due to the reasons mentioned above. Indeed, the regulators are charged with ensuring the safety and soundness of the regulated firms and therefore directly affect the linkage between managerial decision makings and firm performance, risk-taking, and dividend payouts.

Our study includes two industries, banks and utilities, but most of the samples used in this research are banks, and hence we briefly describe the nature of regulation for banks in Korea as follows. Heritage Foundation of the USA announces the 'Financial Regulation' in the 'the Degree of Economic Freedom' section every year. According to the report, in year 2003, Korea was ranked 51st out of 161 countries in economic freedom and was cited as 'inappropriate' in the financial regulation

aspect. In addition, according to the data by Korea Financial Supervisory Services (FSS), the number of financial regulations has been increased as follows: 412 items in 1999, 588 in 2000, and 575 in 2001. These facts show that Korean financial industries are heavily regulated comparing to other industries (Kang et. al (1996). To help readers understand the bank regulations in Korea, we briefly summarized the regulations in 〈Table 1〉.

〈Table 1〉 Summary of bank regulations in Korea

Area	Sub-area	Major regulations
Exit and Entry	Minimum Capital	- Commercial banks: min. 100 billion won - Regional banks: min. 25 billion won
	Exit and Entry	- Approval by FSS is required for both entry and exit - Foreign banks' branches are the same
Ownership and Management	Ownership structure	- One person's max. holdings ≤ 10% - Non-financial entities cannot hold more than 4%
	Management structure	- Outside directors' ratio ≥ 50% - Committee of Internal Audit is required. - Executive managers shall satisfy legal qualification. - Internal Supervisor of Compliance shall be required.
Soundness Supervision	Management Direction	- BIS ratio shall be satisfied: BIS ratio ≥ 8% (BIS ratio = Capital / Risk-weighted Assets) - Liquidity ratio ≥ 100% - Maturity mismatch ratio = 0%(≤7 days), etc.
	BIS Equity Ratio	- If BIS ratio ≤ 8%, Recommendation of improvement - If BIS ratio ≤ 6%, Direction of improvement - If BIS ratio ≤ 6%, Order of improvement
	Asset Soundness	- 5 Classification: Normal, Precautionary, Substandard Doubtful, Estimated loss - Depending on the Class, correctional actions are required.
	Allowance for bad debts	- Required Ratio: ≥0.5%(Normal), ≥2%(Precautionary), ≥20%(Substandard) ≥50%(Doubtful), ≥100%(Estimated loss)
	Mandatory Management Evaluation and Investment limit in High risk-securities	- CAMELS: Capital adequacy, Asset quality, Management, Earnings, Liquidity, Sensitivity to market risk - ROCA: Risk management, Operational controls, Compliance, Asset Quality
Correction	Correctional Order	- BIS, CAMELS violations: Step-by-step corrections

* Source: Financial Supervisory Service (2005)

2.2 Effect of regulation on the relationship between stock-option plan and firm value

With more than 80 years of history in the introduction of the stock-option system, most studies in the Unites States have focused on the relation between the adoption of the plan and the firm performance.[1] Most of the empirical evidence indicates that the adoption of stock option plans are met with positive share price reactions (e.g., Brickley et al. (1985) and DeFusco et al. (1990)). In more detail, Harris and Raviv (1979) suggest that shareholders relate the compensation of executives with firm performance when shareholders do not have sufficient information about managerial decision making. This is consistent with the findings by Jensen and Murphy (1990) that the reward system connected with performance improves managerial incentives and hence significantly reduces agency costs. DeFusco et al. (1990) show that the stock option plan is very useful vehicle in ameliorating agency problems, and Brickley et al. (1985) find the empirical evidence that the introduction of a long-term compensation system, such as a stock-option plan, has a positive announcement effect in the market by motivating executives to make managerial decisions in the point of a firm value. Masson (1971) shows that the performance of the firm that adopted stock options far exceeds that of the firm without a stock-option system. These results confirm that stock-option plan is one of the most useful compensation systems that can reduce agency costs and hence enhance firm values through the efficient mechanism of managerial motivation.

Contrary to the above evidence, however, some researchers report noticeable results regarding negative aspects of the stock option plan. John and John (1993) find that most of the banks do *not* use stock-option plans, comparing to the firms belonging to other industries, since banks typically have high debt-equity ratios and low pay-to-performance sensitivity. Most of the firms highly exposed to government regulations, such as banks, insurance and utilities companies, have a tendency of not using the compensation system associated with stocks, because managers of the firms have limited discretion in decision-making due to the regulation (Demsetz and Lehn (1985), Smith and Watts (1992)). Yermack (1995) supports the argument in his empirical study. He says that "executives in highly regulated industries,

1) Among the studies for the relations are Agrawal and Mandelker (1987), Beck and Zorn (1982), Blanchard et al. (1994), Brickley et al. (1985), DeFusco et al. (1990), Harris and Raviv (1979), Haugen and Senbet (1981), Jensen and Murphy (1990), John and John (1993), Lambert et al. (1987), Lowellen et al. (1987), Masson (1971), Merman (1995), Yermack (1995, 1997).

such as, banking, insurance, and utilities, will receive lower incentives from compensation or equity ownership, since the reduced range of managerial discretion in these industries diminishes the consequences of good or bad decisions". The research proves significantly the hypothesis, strongly supporting our argument in hypothesis 1 (H1) that the stock option plan which is one of the most widely used by the firms as a equity-linked compensation system is not effective in increasing firm value for the HRCs.

In spite of the importance of the fact, it is almost impossible for us to find any research directly testing the *regulated industry hypothesis (RIH)* that the stock option plan is not effective in increasing the value of a firm involved in the regulated industries, which motivated this study and we will empirically test the hypothesis.

2.3 Effect of regulation on the relation between stock-option plan and risk-taking

Haugen and Senbet (1981) argue that stock-option plan induces managers to take higher risks, because the option itself has asymmetric payoff structure.[2] Therefore, managers receiving stock options as one of compensation plans have a tendency to invest in assets with higher expected returns, even though the assets are very risky, since they can realize great returns if they succeed in the investment opportunities and they lose only option premiums[3] if they fail in the investment. Agrawal and Mandelker (1987) show very similar results to Haugen and Senbet (1981) in that the firms having a tendency to select investment opportunities with increasing volatilities prefer the compensation systems associated with stocks or stock options. According to Jensen and Meckling (1976), the shareholders of the firms with debts can be regarded as the holders of the call options with the exercise prices and the underlying assets equal to the face values of the debts and the values of the firms, respectively. Since the values of the options are proportional to the volatilities of the returns on the underlying assets, it is rational that managers should choose the investment projects with higher risk in order to maximize their wealth. This type of risk taking by the managers holding stock options implies that shareholders maximize their profits at the expense of the bondholders, and hence rational bondholders require higher rate of returns on bonds, leading to the decrease in the bond prices in

2) For example, the maximum loss of a call option is confined by the amount of option premium, while the profit of the call option is not limited.

3) The option premium in the compensation package means the opportunity costs, such as cash or other types of bonus instead of stock options

the equilibrium (DeFusco et al. (1990)). Therefore, if the stock-option system is introduced, it can be expected that stock prices will increase while bond prices decrease.

In this study, we test not only whether the risk-taking behavior of the firms introducing the stock option plans has actually changed after adopting the plans, but also whether there is any difference in the risk taking between HRCs and LRCs. We argue that HRCs would have a more aggressive tendency in risk taking than LRCs because of the limitation in managerial discretion of HRCs. The reasons are as follows: First, many previous studies demonstrate that fixed rate deposit insurance system induces banks to take high-risk investments, so-called moral hazard problem in banks (Booth et. al (2002), Gonzalez(2002), Osborne and Lee (2001), sauders et. al (1990), and others). In other words, since the deposit insurance system in Korea is fixed-rate system rather than risk-based system, Korean banks have sufficient incentives to take high risk-taking behavior. In addition, if the moral hazard is combined with the stock option plan which has asymmetric payoff structure, it is natural that banks'managers pursue high-risk projects with high expected returns in order for maximizing their realized returns when they exercise their stock options.

2.4 Effect of regulation on the relation between the stock option plan and dividend policy

In general, stock options are *not* 'dividend protected', and thus the payment of cash dividend will decrease the expected value of a stock option to the manager. As a consequence, the manager has an incentive to reduce dividends after the stock option plan is introduced into the compensation arrangement. Lambert et al. (1989) confirm the result that actual dividends are reduced relative to expected dividends. In addition, Yermack (1995) conjectures that CEOs holding stock options could be motivatedto reduce dividend payments in order to increase the option's value.

In reality, in many countries including Korea, there exists limitation of dividend payouts for banks in order to keep sufficient funds which can be used as a buffer of the allowance when bad debts occur more than expectation. In addition, in 〈Table 1〉, the regulation of soundness requires banks to keep sound capital in BIS ratio making dividend undesirable.

By using the framework of Lambert et al. (1989), we test the hypothesis and the differential effects of the stock option plans on the dividend policy between two types of firms, HRCs and LRCs.

III. Research Methodology

3.1 Data

In analyzing the effect of government regulations on the firm value, risk taking and dividend policy, we divide data set into two groups; one is for HRCs and the other is for LRCs. Since, like banks, insurance and utilities companies are also heavily regulated by governments (Smith and Watts (1992), Yermack (1995, p.246)), we include them into the HRCs. As Appendix shows, total 19 HRCs (in detail, 13 commercial banks, 1 investment bank, 4 insurance companies, and 1 utilities company) and 56 LRCs are included in the sample. To remove any "unusual" market shock, such as a Korean economic crisis in 1997, we only choose the firms that introduced stock-option plans after 1997 as we can see in the 〈Appendix〉.

Data was gathered from the Korea Stock Exchange (KSE) for stock prices and from Korea Information Service (KIS) for dividends and financial statements. In order to obtain the exact announcement date, we use both the database in the Korea Financial Supervisory Committee (KFSC), which is the Korean equivalent to the SEC in the U.S., and disclosure data in the KSE.

In 〈Table 2〉 we present the summary statistics of a sample of 75 firms for which we are able to find financial data from several sources mentioned above. The average size of HRCs and LRCs measured in sales are $2,395 million and $2,096 million, respectively, implying that we can effectively remove the typical "size effect" which can cause severe bias in comparing "returns" between two groups. The stock returns are calculated for the previous year of the adoption of the plan. As the table shows, the stock returns are negative for banks and positive for firms, which would be one of the reasons that banks introduced more aggressively the stock option systems to increase their values. D/E is debt-equity ratio for the same year as the stock returns. Since the meaning of 'debt' in banks is different from that of non-banks, we use the ratio of debt to equity for banks, while typical D/E is used for the non-bank firms. Compared to LRCs, the D/E ratios for HRCs, about 28.56 times, are relatively high, suggesting the high risk-taking tendency of Korean HRCs.Beta is a market beta estimated from the traditional market model, $R_{i,t} = \alpha_i + \beta_i \times R_{M,t} + \varepsilon_{i,t}$, where α_i and β_i are OLS estimates, $R_{M,t}$ is market return at time t (t = trading date from Jan. 4, 1999 to Dec. 28, 1999) and $\varepsilon_{i,t}$ is error term at t for firm i. The betas are 0.9539 and 0.8085 for HRC and LRC, respectively, indicating there exists some difference in systematic risks between two groups due to their nature of businesses.

All monetary measures in the table are

〈Table 2〉 Descriptive statistics for the sample firms

The size of a firm is sales, D/E is debt-equity ratio for the previous year of the adoption of the plan, stock return is one-year return on stocks before the introduction of the plan, and beta is market beta estimated from the following market model:

$$R_{i,t} = \alpha_i + \beta_i \times R_{M,t} + \varepsilon_{i,t},$$

where α_i and β_i are OLS estimates, $R_{M,t}$ is market return at time t (t=trading date from Jan. 4, 1999 to Dec. 28, 1999), $\varepsilon_{i,t}$ is error term at t for firm i, and i indicates each firm. To calculate the size in US$ terms, we transformed Korean currency unit (won) to US$ by applying the average exchange rate in 1999, 1130.61 (won/US$), obtained from the Bank of Korea. Regarding D/E, since the meaning of 'debt' in banks is different from that of non-banks, we use the ratio of debt to equity for banks, while typical D/E for the non-bank firms. All numbers are "average" values of firms included in the samples.

	HRC[a]	LRC[b]
No. of firms in sample	19	56
Size ($Million)	2,395	2,096
D/E	28.56 times	138.40%
Stock returns (%)	-3.72	52.03
Beta (β)	0.9539	0.8085

[a] Sample firms of HRC (highly regulated company) are composed of 13 commercial banks, 1 investment bank, 4 insurance companies, and 1 utilities company.

[b] LRC (low regulated company) includes 56 firms.

transformed from Korean currency unit(won) to US$ by applying the average exchange rate in 1999, 1130.61 (won/US$), obtained from the Bank of Korea. All numbers are "average" values of firms included in the given samples.

In summary, according to 〈Table 1〉, we can infer that most of the HRCs in Korea have more actively introduced the stock option systems to increase the firm values and their stock returns than LRCs. It would be very important to test, however, whether stock options could also be an effective way to increase the firm values even for the highly regulated firms.

3.2 Hypotheses and research design

In this study, we analyze three major issues. First, we test the hypothesis that the 'announcement effect' of the adoption of stock-option plan will *not* be significant for HRCs while the effect will be significant for the LRCs. As we already explained in the previous section, most of the firms introducing stock option plans exhibit *positive* announcement effects, whereas HRCs show *negative* or *insignificant* effects mainly because of government regulations that limit the managerial decisions by a CEO and other managers. This argument can be rephrased as follows:

H1: The introduction of the stock option plan has a positive effect on the firm value of LRCs, while the effect is not significant for the HRCs or it is negative.

To test the hypothesis (H1) we use the event study that requires the time horizon to be separated into two periods, *event window* and *estimation window*. The former is necessary to consider the influences of the event and the latter is to calculate the *normal* returns when there is *no* specific shock (or event) in the market. It is natural that we should decide which date could be actual event date (i.e., t=0) for the case of stock-option plan. In general, the event date means the time point when the event is exposed to the investors in the market for the first time. For the stock option case, most of the previous studies have used the 'SEC stamp' date as the relevant event date (Lambert and Larcker (1985), Larcker (1983), Tehranian and Waegelein (1985), Brickley et al. (1985) and DeFusco et al. (1990)).[4] Therefore, we deal the 'KFSC stamp' date as our event date, but to make our results more robust we calculate cumulative abnormal returns (CARs) for the various event periods. To calculate cumulative abnormal returns, we adopt the typical procedures employed by Brown and Warner (1985), DeFusco et al. (1990) and Dodd and Warner (1983). That is, we calculate the AR (abnormal return) first using the equation (1) as follows:

$$AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i \times R_{M,t}) \quad (1)$$

where α_i and β_i are OLS estimates of the market model from the estimation window, $R_{M,t}$ is market return at time t (event window), and i indicates each firm (stock). Then, we need to calculate AAR (average abnormal return) from AR and CAR from AAR for the given time periods as follows:

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{i,t} \quad (2)$$

$$CAR_{t\sim t+k} = \sum_{k=0}^{m} AAR_{t+k} \quad (3)$$

where N is the number of sample firms, $CAR_{t\sim t+k}$ is CAR from t to (t+k), and t indicates time for the event window. In order to test the hypothesis (H1), we use the test statistic in equation (4) for the AAR and the test statistic in equation (5) for the CAR, respectively. In equation (5), t-statistic is based on the standardized residuals for each

4) The general sequence of events in the adoption of a stock option plan is board meeting, proxy, SEC stamp, and shareholder meeting dates.

stock by assuming independent cross-sectional observations (Brown and Warner, 1985).

$$t = \frac{AAR_t}{\sigma(AAR)} \quad (4)$$

$$t = \frac{CAR_{t\sim t+k}}{\sigma(AAR)/\sqrt{k+1}} \quad (5)$$

where $\sigma(AAR) = \sqrt{\frac{\sum_{t^*}[AAR_{t^*} - \mu(AAR)]^2}{n}}$,

μ(AAR) = average AAR for the firms during estimation window,

t^* = time for estimation window, and

n = number of trading days for the estimation window.

Second, we analyze the effect of the regulation on the relationship between stock option plan and the risk-taking behavior of firms. The related hypothesis can be stated as follows:

H2: The volatility of stock returns increases after the introduction of stock option plan. In particular, the change of volatility for HRCs would be greater than that of LRCs.

For testing the hypothesis (H2), we employ two different methods in order to make our results more robust. One is a non-parametric method such as Wilcoxon-test (DeFusco et al. (1990)),[5] and the other is a typical parametric test, such as a t-test.

Finally, we examine the role of regulation on the relationship between the adoption of the stock option plan and the subsequent change in the corporate dividend policy stated as follows:

H3: The dividends of the firms that adopt the stock option plan are reduced after the announcement date. In particular, the dividend reduction by HRCs would be greater than by LRCs, because HRCs try to overcome the limitations in

5) The z-statistic which is used in the Wilcoxon-test is as follows:

$$z = \frac{T - E(T)}{\sigma_T},$$

where E(T) = N(N+1)/4, σ_T^2 = N(N+1)(2N+1)/24, T = the sum of rank of signs with less frequency, and N = the number of matched pairs. To decide the change in volatility which is used to determine the rank in the statistic, we use the following equation,

$$\Delta\sigma^2 = \frac{\sigma_{t+}^2 - \sigma_{t-}^2}{\sigma_{t-}^2} \times 100,$$

where σ_{t+} and σ_{t-} are, respectively, volatilities after and before the announcement date.

managerial discretions imposed by regulations.

By applying the framework of Lambert et al. (1989), we test the hypothesis (H3). As they do, we use the following structural regression model to estimate expected dividend, and then the *estimated* dividends are compared with *actual* dividends paid out:

$$\ln(\frac{D_{t+1}}{D_t}+\frac{D_t}{P_{t-1}}) = a_0 + a_1 \ln(\frac{P_t + D_t}{P_{t-1}}) + a_2 \ln(\frac{D_t}{P_{t-1}}) + \varepsilon_{t+1}, \quad (6)$$

where D_t and P_t are dividend and stock price in period t, respectively, ε_{t+1} is the disturbance term in period (t+1), and ln refers to the natural logarithm.

Ⅳ. Results and implications

4.1 The effect of the regulation on the firm value[6]

In this section we examine not only the existence of effects of stock option introduction on firm values but also whether or not there is a significant difference in the change of the firm values around the event date between HRCs and LRCs. 〈Table 3 and 4〉 show the results for HRCs and LRCs, respectively. Most of the HRCs belong to financial industry, so we tested the effect for two benchmark indices, overall market index (KOSPI) and Financial Industry Index, in applying the market model to calculate the abnormal returns described in equation (1). Since the results are very similar both benchmarks, we only report the results for the KOSPI model in 〈Table 3〉.[7] In addition, tomake our results strong, we compared our results with those when the "market-adjusted model" is used instead of the OLS model in estimating normal returns. Since both models produced very similar results, we only report the OLS model in 〈Table 3 and 4〉. These indicate our results are very robust regarding the benchmark and model selection in the estimation of normal returns.

As we can see from 〈Table 3〉, unlike previous studies, there is no noticeable change in the values of HRCs around the introduction of the executive stock option. In addition, both the fact that 56% of AARs are negative and that almost all CARs in 〈Table 3〉 and 〈Figure 1〉 are negative in the event window

6) Firm value, generally speaking, is defined by the sum of the value of debt and of equity. In this study, however, we use the stock price as the proxy of firm value like most of the previous studies.
7) The results for the Financial Industry Index are available from the authors upon request.

〈Table 3〉 Price impact of option introduction announcement: HRC

An OLS market model is used to estimate abnormal returns (AR) during the event window. The event window consists of thirty days before plus thirty days after the event date (option introduction announcement). The OLS market model is estimated over ninety days before the event window. AAR and CAR means average abnormal return and cumulative abnormal return, respectively.

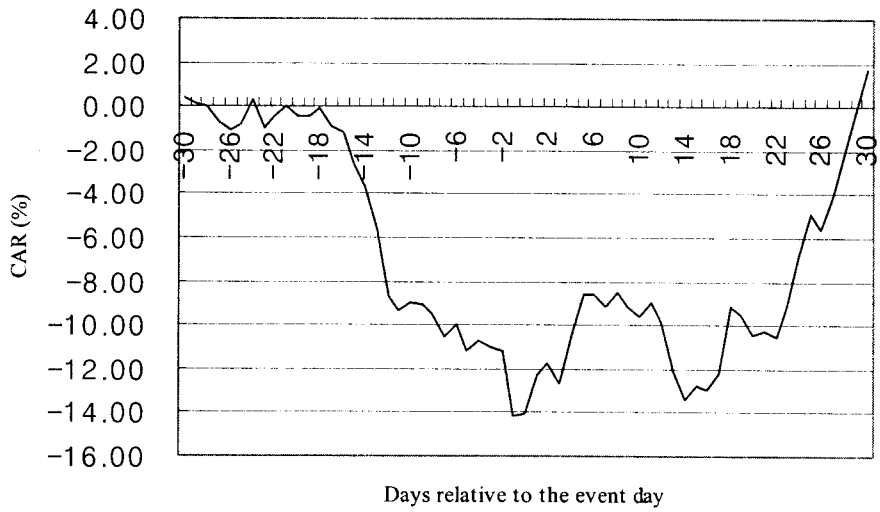
Day	AAR(%)	t-Statistic	CAR(%)	t-Statistic	% Positive[a]
-30	0.3927	0.3619	0.3927	0.0036	57.89
-29	-0.3033	-0.2795	0.0895	0.0012	52.63
-28	-0.0336	-0.0309	0.0559	0.0009	42.11
-27	-0.8185	-0.7543	-0.7626	-0.0141	42.11
-26	-0.3625	-0.3341	-1.1251	-0.0232	47.37
-25	0.3289	0.3031	-0.7962	-0.0180	52.63
-24	1.0743	0.9900	0.2780	0.0068	57.89
-23	-1.2520	-1.1537	-0.9740	-0.0254	36.84
-22	0.5685	0.5238	-0.4055	-0.0112	57.89
-21	0.4650	0.4285	0.0594	0.0017	42.11
-20	-0.4954	-0.4234	-0.4000	-0.0122	36.84
-19	-0.0055	-0.0051	-0.4055	-0.0129	42.11
-18	0.2913	0.2685	-0.1142	-0.0038	36.84
-17	-0.8320	-0.7667	-0.9462	-0.0326	31.58
-16	-0.2030	-0.1871	-1.1492	-0.0410	31.58
-15	-1.4260	-1.3141	-2.5751	-0.0949	26.32
-14	-1.0657	-0.9821	-3.6409	-0.1383	42.11
-13	-1.9827	-1.8271	-5.6235	-0.2199	36.84
-12	-3.1100	-2.8636	-8.7310	-0.3507	15.79
-11	-0.5936	-0.5471	-9.3247	-0.3843	42.11
-10	0.3414	0.3146	-8.9833	-0.3794	36.84
-9	-0.0643	-0.0592	-9.0476	-0.3911	31.58
-8	-0.4444	-0.4059	-9.4919	-0.4195	47.37
-7	-1.0387	-0.9571	-10.5306	-0.4754	42.11
-6	0.5867	0.5407	-9.9439	-0.4582	57.89
-5	-1.2344	-1.1376	-11.1783	-0.5253	31.58
-4	0.4551	0.4194	-10.7232	-0.5135	36.84
-3	-0.3065	-0.2824	-11.0297	-0.5378	31.58
-2	-0.1108	-0.1021	-11.1405	-0.5529	42.11
-1	-3.0300	-2.7906	-14.1688	-0.7152	15.79
0	0.1299	0.1197	-14.0389	-0.7203	36.84

〈Table 3〉 (Continued)

Day	AAR(%)	t-Statistic	CAR(%)	t-Statistic	% Positive[a]
+1	1.7435	1.6067	-12.2954	-0.6409	63.16
+2	0.5409	0.4985	-11.7545	-0.6223	47.37
+3	-0.8723	-0.8038	-12.6268	-0.6785	52.63
+4	2.1534	1.9844	-10.4734	-0.5710	57.89
+5	1.8564	1.7107	-8.6169	-0.4764	68.42
+6	-0.0147	-0.0136	-8.6317	-0.4838	47.37
+7	-0.5587	-0.5148	-9.1904	-0.5221	42.11
+8	0.7020	0.6469	-8.4883	-0.4885	42.11
+9	-0.6157	-0.5673	-9.1040	-0.5306	47.37
+10	-0.4651	-0.4286	-9.5691	-0.5646	42.11
+11	0.5729	0.5280	-8.9962	-0.5373	47.37
+12	-0.9199	-0.8477	-9.9161	-0.5992	47.37
+13	-2.2221	-2.0472	-12.1376	-0.7419	21.05
+14	-1.2711	-1.1713	-13.4087	-0.8289	26.32
+15	0.6245	0.5755	-12.7842	-0.7990	52.63
+16	-0.1538	-0.1417	-12.9379	-0.8174	42.11
+17	0.7261	0.6692	-12.2118	-0.7797	42.11
+18	3.0900	2.8439	-9.1257	-0.5887	63.16
+19	-0.4366	-0.4023	-9.5623	-0.6231	36.84
+20	-0.8737	-0.8052	-10.4361	-0.6868	26.32
+21	0.1948	0.1759	-10.2412	-0.6805	42.11
+22	-0.2703	-0.2491	-10.5116	-0.7052	42.11
+23	1.3378	1.2328	-9.1737	-0.6212	52.63
+24	2.3200	2.1403	-6.8512	-0.4682	78.95
+25	1.9967	1.8400	-4.8545	-0.3348	42.11
+26	-0.7922	-0.7301	-5.6467	-0.3929	42.11
+27	1.5991	1.4736	-4.0476	-0.2841	73.68
+28	1.9960	1.8393	-2.0517	-0.1452	52.63
+29	1.6884	1.5559	-0.3634	-0.0259	68.42
+30	2.0280	1.8689	1.6647	0.1198	42.11

[a] Percentage of firms with positive abnormal returns

〈Figure 1〉 Price Impact of Stock-Option Introduction: HRC



(t = -30 to +30) imply that the stock option plan does not play any role in increasing the values for regulated firms, contrary to the conventional wisdom that stock-linked executive compensation plans increase the firm values. In other words, it is a very noteworthy result that the highly regulated firms, such as banks, insurance companies and utilities, have negative CARs rather than positive by the introduction of the stock options, leading investors to have the view that the introduction of the system for the HRCs is a bad signal to them. This is because their managers who are more limited in the managerial discretion than those in LRCs due to the government regulations can pursue highly risky projects to maximize their payoffs at the expense of bondholders (DeFusco et al., 1990).

〈Table 4〉 reports the result of average abnormal returns around the event date for the non-bank firms, which is the very opposite to the case of HRCs. The fact that 62% of AARs are positive for the LRC indicates that the introduction of the stock option plan can increase the firm value, which is a consistent result to the previous studies. Unlike HRCs, LRCs show significant increases in the firm values around the introduction date. In particular, the first day after the introduction shows 2.6512% increase in the firm value that is significant at 1% level.

In addition, 〈Figure 2〉 clearly exhibits the typical pattern of CARs for the event window when there exists the impact of an event on price. Therefore, from the 〈Table 3〉 and 〈Figure 2〉, we can infer that in general there

〈Table 4〉 Price impact of option introduction announcement: LRC

An OLS market model is used to estimate abnormal returns (AR) during the event window. The event window consists of thirty days before plus thirty days after the event date (option introduction announcement). The OLS market model is estimated over ninety days before the event window. AAR and CAR means average abnormal return and cumulative abnormal return, respectively.

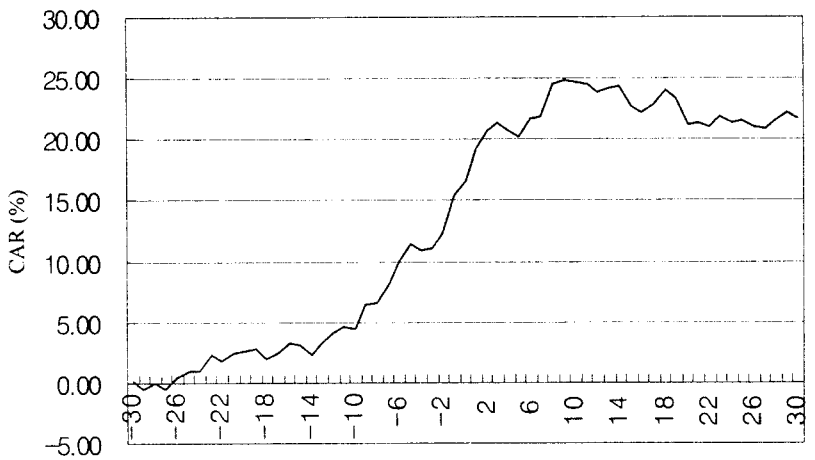
Day	AAR (%)	t-Statistic	CAR(%)	t-Statistic	% Positive[a]
-30	0.1944	0.14146	0.1944	0.2207	44.64
-29	-0.7576	-0.8601	-0.5632	-0.6394	48.21
-28	0.5520	0.6266	-0.0112	-0.0128	48.21
-27	-0.4970	-0.5642	-0.5082	-0.5770	42.86
-26	0.9624	1.0926	0.4542	0.5156	57.14
-25	0.5777	0.6559	1.0319	1.1714	41.07
-24	0.0199	0.0226	1.0517	1.1940	46.43
-23	1.1924	1.3537	2.2441	2.5477	69.64
-22	-0.3854	-0.4375	1.8588	2.1102	44.64
-21	0.5622	0.6383	2.4210	2.7485	53.57
-20	0.2350	0.2668	2.6560	3.0153	53.57
-19	0.1453	0.1649	2.8013	3.1802	57.14
-18	-0.8383	-0.9517	1.9630	2.2285	35.31
-17	0.4211	0.4780	2.3840	2.7065	50.00
-16	0.9260	1.0513	3.3101	3.7587	50.00
-15	-0.1375	-0.1561	3.1725	3.6017	44.64
-14	-0.8800	-0.9990	2.2925	2.6027	41.07
-13	0.9269	1.0523	3.2195	3.6550	51.79
-12	0.8479	0.9626	4.0673	4.6176	48.21
-11	0.5744	0.6521	4.6418	5.2697	35.71
-10	-0.2356	-0.2675	4.4062	5.0022	48.21
-9	2.0504	2.3277	6.4565	7.3300	57.14
-8	0.1455	0.1652	6.6020	7.4951	39.29
-7	1.5354	1.7431	8.1374	9.2383	60.71
-6	1.8399	2.0888	9.9774	11.3271	58.93
-5	1.3769	1.5632	11.3543	12.8903	53.57
-4	-0.3860	-0.4382	10.9683	12.4521	44.64
-3	0.0807	0.0916	11.0490	12.5437	46.43
-2	1.1262	1.2786	12.1753	13.8223	55.36

〈Table 4〉 (Continued)

Day	AAR (%)	t-Statistic	CAR(%)	t-Statistic	% Positive[a]
-1	3.2265	3.6629	15.4017	17.4852	67.86
0	1.2130	1.3771	16.6148	18.8624	41.07
+1	2.6512	3.0098	19.2659	21.8722	62.50
+2	1.4093	1.6000	20.6753	23.4721	50.00
+3	0.7737	0.8784	21.4490	24.3506	48.21
+4	-0.7029	-0.7979	20.7461	23.5526	33.93
+5	-0.4689	-0.5323	20.2773	23.0203	39.29
+6	1.4945	1.6967	21.7718	24.7170	46.43
+7	0.1402	0.1592	21.9120	24.8761	53.57
+8	2.6117	2.9650	24.5236	27.8411	66.07
+9	0.3494	0.3966	24.8730	28.2377	53.57
+10	-0.1368	-0.1553	24.7362	28.0824	42.86
+11	-0.1648	-0.1871	24.5714	27.8953	44.64
+12	-0.7832	-0.8892	23.7881	27.0061	41.07
+13	0.4258	0.4834	24.2139	27.4894	55.36
+14	0.1873	0.2126	24.4011	27.7020	42.86
+15	-1.6281	-1.8484	22.7730	25.8537	33.93
+16	-0.6219	-0.7060	22.1511	25.1476	41.07
+17	0.7705	0.8748	22.9216	26.0224	51.79
+18	1.0873	1.2344	24.0089	27.2568	42.86
+19	-0.5852	-0.6644	23.4238	26.5924	32.14
+20	-2.1810	-2.4758	21.2430	24.1167	32.14
+21	0.1485	0.1686	21.3915	24.2853	44.64
+22	-0.3796	-0.4309	21.0119	23.8543	51.79
+23	0.9334	1.0597	21.9453	24.9140	42.86
+24	-0.6504	-0.7384	21.2949	24.1756	37.50
+25	0.1917	0.2176	21.4865	24.3932	51.79
+26	-0.4140	-0.4700	21.0726	23.9232	44.64
+27	-0.1449	-0.1645	20.9277	23.7587	46.43
+28	0.5579	0.6334	21.4856	24.3921	53.57
+29	0.7134	0.8099	22.1989	25.2020	62.50
+30	-0.4862	-0.5520	21.7128	24.6500	44.64

[a] Percentage of firms with positive abnormal returns

〈Figure 2〉 Price Impact of Stock-Option Introduction: LRC



exists an announcement effect upon the introduction of the stock option plan for the LRCs. To investigate the announcement effect more closely, we constructed different event windows around announcement day as in 〈Table 5〉. Two interesting facts are observed. First, as we can see form the panel A in the table, HRCs do not show any evidence of an announcement effect, while LRCs in the panel B have a significant announcement effect. Second, whereas LRCs always have positive CARs around the event day, HRCs have negative CARs for two event windows, (-1, 0) and (-1, +1) and positive CAR for one event window, (0, +1).

These results strongly support the RIH (regulated industry hypothesis), i.e., the hypothesis (1) that the stock option plan is not effective in increasing the firm value for the highly regulated firms. In addition, the panel B of the table indicates that the announcement effect is the highest in the event window (-1, +1) among three windows and the effect in (-1, 0) is higher than in (0, +1), suggesting that investors respond more actively to the announcementnews before than after the announcement day.

4.2 The effect of the regulation on the risk-taking behavior of a firm

In this section, we investigate the change of the risk after a firm introduces the stock option plan. From 〈Table 6〉, we can observe that risk is increased for the both HRCs and LRCs after the adoption of the plan, which is consistent with the hypothesis (2). To insure the robustness of the test results, we applied

〈Table 5〉 Cumulative abnormal returns for different event windows

We calculate cumulative abnormal returns (CARs) from AAR for the given time periods as follows:

$$CAR_{t\sim t+k} = \sum_{k=0}^{m} AAR_{t+k},$$

where $CAR_{t\sim t+k}$ Is CAR from t to (t+k), and t indicates time for the event window. T-values in the table are calculated as given equation (5) where t^* = time for estimation window and n = number of trading days for the estimation window (here, n=90). We obtain the stock price data from the KSE (Korea Stock Exchange). We use both the database in the KFSC (Korea Financial Supervisory Committee), which is equivalent to the SEC in the U.S. in its role, and disclosure data by the KSE to obtain the exact announcement date

A: HRC[a]			
Event window	(-1, 0)	(-1, +1)	(0, +1)
CAR	-2.9001	-1.1566	1.8734
t-value	-1.4935	-1.1913	0.9648
B: LRC[b]			
Event window	(-1, 0)	(-1, +1)	(0, +1)
CAR	4.4395**	7.0907***	3.8642**
t-value	2.2863	7.3032	1.9900

a 'HRC' include 19 banks, insurance and utilities firms.
b 'LRC' include 56 non-bank firms.
. *, **, *** are significant at 10%, 5%, 1% level, respectively

〈Table 6〉 Change in the risk before and after the adoption of stock-option plan

We use the change in volatility (σ) to test the null hypothesis,

$$H_0: \frac{\sigma_{t-}}{\sigma_{t+}} = 1,$$

where σ_{t-} and σ_{t+} mean volatilities of a firm before and after the adoption, respectively. To test the hypothesis, we use stock return data for 2 months for each period, excluding the data in the event window, i.e., t- = -90, -89, ···, -32, -31 and t+ = +31, +32,···, +89, +90. Wilcoxon z-values are calculated using the same formula in DeFusco et al. (1990).

A: HRC				
Parametric t-test results	Mean of volatility	Before	After	t-value
		23.9333	42.5504	3.5172***
Non-parametric Wilcoxon results	Median of volatility	Before	After	z-value
		22.0790	42.2269	2.6960***
B: LRC				
Parametric t-test results	Mean of volatility	Before	After	t-value
		43.9499	56.4721	0.6265
Non-parametric Wilcoxon results	Median of Volatility	Before	After	z-value
		31.4714	37.2583	0.0120

. *, **, *** are significant at 10%, 5%, 1% level, respectively

both the parametric t-test and non-parametric Wilcoxon tests. For the HRCs in the panel A of the table, both tests show the significant change in the risk around the adoption date, while no significant result is observed for the LRCs as appeared in the panel B ofthe table. This supports the hypothesis partially and suggests that investors should be careful in interpreting the effects of the stock option introduction, in particular for the regulated firms. Along with the results in the previous section, this meansthat the tradeoff between risk and return is not guaranteed in the case of the stock option for the regulated companies. Therefore, this evidence implies that investors need to closely monitor the risk-taking behavior of regulated firms after they launch new stock-linked compensation systems.[8)]

4.3 The effect on the dividend policy of a firm

In this section, we examine whether or not a firm changes its dividend policy after it introduces the stock option plan. 〈Table 7 to 9〉

〈Table 7〉 Estimation results for Marsh-Merton Dividend Model

To estimate parameters that are used in the forecasting of future dividends, the following Marsh and Merton (1987) model described in equation (6) in the text is used:

$$\ln\left(\frac{D_{t+1}}{D_t}+\frac{D_t}{P_{t-1}}\right)=a_0+a_1\ln\left(\frac{P_t+D_t}{P_{t-1}}\right)+a_2\ln\left(\frac{D_t}{P_{t-1}}\right)+\varepsilon_{t+1}$$

The sample size for the descriptive statistics (n=15 for banks and n=32 for non-banks) is reduced because firms were eliminated from the regression estimation if they had fewer than 6 years of dividend payments during the 20-year estimation period that immediately preceded the stock option adoption year.

A: HRC						
Parameter	Mean	Median	Std. Dev.[a]	Minimum	Maximum	MM[b]
a_0	-2.9360	-2.9000	1.9378	-5.1760	0.3057	-0.1010
a_1	0.8240	0.7247	0.6212	-0.0740	1.5756	0.4370
a_2	-0.6920	-0.7640	0.5336	-1.3350	0.2038	-0.0420
adj. R^2	0.1941	0.1692	0.2629	-0.1560	0.6464	0.4700
B: LRC						
Parameter	Mean	Median	Std. Dev.[a]	Minimum	Maximum	MM[b]
a_0	-1.3880	-1.159	4.4510	-17.2300	10.2730	-0.1010
a_1	0.6631	0.3615	1.6949	-3.9780	5.3819	0.4370
a_2	-0.2720	-0.3860	1.1737	-4.0110	3.3187	-0.0420
adj. R^2	0.0823	-0.0090	0.2625	-0.3570	0.7196	0.4700

[a] Std. Dev.: standard deviation
[b] MM: Marsh-Merton estimate

8) The results in this papercould be interpreted with caution like most of the other studies. For example, there is a possibility that other factors that are not considered here can affect the risk-taking behavior of LRCs.

show the results regarding the change in the dividend policy. First, 〈Table 7〉 describes parameter estimation results using the Marsh and Merton (1987) model in equation (6). Out of 56 sample non-bank firms, we exclude 24 due to the shortage of data in either price or dividend. By applying the same criteria as Lambert et al. (1989), we eliminated firms from the analysis if they had fewer than 6 years of dividend payments or price data during 20-year time period. Similarly, 4 of 19 banks were eliminated for the same reasons. In most cases, the estimates are based on a sample size of 20 yearly observations.

As we can see from 〈Table 7〉, the parameter estimates in the equation (6) have exactly the same signs as the Marsh and Merton (1987) model, implying that the model can be applied very well to the forecasting of the future dividends for our sample firms. According to the adjusted-R^2 in the panels A and B from the table, the model for the banks has a greater explanatory power than the one for the non-banks. 〈Table 8〉 shows the dividend forecast errors calculated by subtracting the forecasted dividends using the parameters estimated in 〈Table 7〉 from the actual dividends after the adoption of the executive stock option plan. The formula for the calculation

〈Table 8〉 Dividend forecast errors for the following year after the adoption of an executive stock option plan

The parameter estimates (a_0, a_1, and a_2) from the equation (10) in the text were then used to forecast the logarithm of dividends using the following formula,

$$D_{i,t+1}^{Predicted} = D_{i,t}[e^{a_0} \times (\frac{P_{i,t}+D_{i,t}}{P_{i,t-1}})^{a_1} \times (\frac{D_{i,t}}{P_{i,t-1}})^{a_2} - \frac{D_{i,t}}{P_{i,t-1}}],$$

for bank or non-bank firm i. Then, we calculated the forecast errors ($\varepsilon_{i,t+1}$) by subtracting the above forecasted dividends from the actual dividends after the adoption of an executive stock option-plan as follows:

$$\varepsilon_{i,t+1} = \ln(D_{i,t+1})^{Actual} - \ln(D_{i,t+1}^{Predicted}).$$

A: HRC						
	Mean	Median	Std. Dev.[a]	Minimum	Maximum	N[b]
$\varepsilon_{i,t+1}$	-1.6706	0.0000	3.5063	-11.2156	0.0000	15
B: LRC						
	Mean	Median	Std. Dev.[a]	Minimum	Maximum	N[b]
$\varepsilon_{i,t+1}$	1.4210	0.0815	3.4497	-6.9677	7.1258	32

[a] Std. Dev: standard deviation.

[b] N indicates the number of samples involved when firms with fewer than 6 years of dividend payments during the 20-year estimation period were eliminated.

〈Table 9〉 Statistical tests for central tendency of dividend forecast errors

The hypothesis for the test is as follows:

$$H_0 : \bar{\varepsilon} = 0,$$

where $\bar{\varepsilon}$ means the average of the forecasting errors for all sample banks or non-bank firms. The formula for the calculation of the average forecasting errors is in the top of the 〈Table 7〉.

A: HRC				
Parametric t-test results	Average dividends	Actual	Predicted	t-value
		5.2520	11.9343	-2.3398*
Non-parametric Wilcoxon results	Wilcoxon z-value -1.6040*			
B: LRC				
Parametric t-test results	Average dividends	Actual	Predicted	t-value
		5.7982	5.3122	0.9253
Non-parametric Wilcoxon results	Wilcoxon z-value 1.3340			

* significant at 10% level.

of the error isdescribed on the top of 〈Table 8〉. Panel A and B of the table indicates that the actual dividends for the banks are less than the predicted by the model, while actual dividends for non-bank firms are rather greater than the predicted.

〈Table 9〉 provides the statistical significance of the error using the Wilcoxon Z-test, i.e., the dividend forecast error for HRC is marginally significant at 10% whereas that is not the case for LRC. These results imply that HRCs more reduced the dividends than LRCs after the introduction of the stock option in order to maximize managers' payoffs from the endowed stock options, which is direct evidence supporting the hypothesis (3).

V. Summary and Conclusions

This paper examines the influence of the government regulation on the association between the introduction of the executive stock option plans and changes in the corporate value, risk-taking behavior and dividend policy. The first hypothesis (H1) is that the introduction of the stock option plan has a positive effect on the firm value. This follows from the observation that the long-term compensation system, such as the stock option plan, has positive announcement effect in the market by motivating executives to make managerial decisions from the point-of-view

of firm value. The second hypothesis (H2) is that the volatility of stock returns increases after the introduction of the stock option plan. This hypothesis comes from the intuition that a stock option plan induces managers to take higher risks, because the option itself has asymmetric payoff structure. Therefore, managers receiving stock options have a tendency to invest in the assets with higher expected returns, even though the assets are very risky, since they can realize great returns if they succeed in the investment opportunities and lose only option premiums if they fail in the investment. The third hypothesis (H3) is that the dividends of the firms that adopt the stock option plan are reduced after the announcement date. The rationale of the hypothesis is that stock options, in general, are not dividend protected and thus the payment of cash dividend will decrease the expected value of a stock option to the manager. As a consequence, the manager has an incentive to reduce dividends after the stock option plan is introduced into the compensation arrangement.

The empirical tests show very interesting results. Specifically, we find that the most of the values of LRCs increases significantly after the adoption of the stock option plan, which is consistent with the results by Mason (1971), Brickley et al. (1985), DeFusco et al. (1990), while values for HRCs decrease similar to Demsetz and Lehn (1985), Smith and Watts (1992), John and John (1993), and Yermack (1995). These results suggest that investors and shareholders should be very careful in interpreting the effects of the introduction of the stock option plan on the firm value for the regulated firms. This fact implies that the regulated firms whose managers do not have much ownership can face severe agency problems at the expense of shareholders and hence close monitoring by shareholders, for the managerial decision would be necessary for those firms. In addition, as predicted, we observe that the risk for HRCs increases significantly after the adoption of the stock option plan, which is consistent with the results of Haugen and Senbet (1981), Agrawal and Mandelker (1987) and DeFusco et al. (1990), whereas there is no significant change in the risk for LRCs. Finally, we obtain similar results as Lambert et al. (1989) and Yermack (1995) in the change of dividend policy for HRCs, even though we do not find significant results for LRCs.

Our findings in this study make it clear the major contribution of this paper: the role of government regulation in the functioning of executive compensation. Unlike almost all previous studies, our analyses consistently focus on the differences between regulated and non-regulated firms in the operating mechanism of compensation system. Using three operating channels, such as value, risk and dividend policy, we find that government

regulations play key role in the effectiveness of the stock option system. It would be extremely dangerous to draw implications from the results obtained without properly considering regulations like previous studies. To extend the study to other countries for generalization has yet to be done.

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〈Appendix〉 The sample firms and their stock-option adoption dates

HRC		LRC			
Name[a]	Adoption	Name	Adoption	Name	Adoption
Kyung-nam (B)	2-29	Kyoung-In	02-1	Iljin Electric	3-7
Kwang-ju (B)	2-12	Ko-hap	3-3	Cheil	2-29
Kook-min (B)	2-29	Kwang-dong	3-2	Cheil Mojik	3-2
Tae-koo (B)	2-11	Kia Motors	2-24	Jindo	3-28
Boo-san (B)	3-3	Nix Telecom	2-29	Cambridge	2-29
Shin-han (B)	3-3	Dong-suh Industry	2-29	KedCom	3-10
Foreign Exchange (B)	3-9	Dong-won	3-7	KC Tech	3-2
Chon-book (B)	2-29	Doosan	3-8	Korea Circuit	3-8
Cho-heung (B)	3-10	Doosan Construction	3-6	Kolon	2-16
Korea Housing (B)	2-10	DI	3-13	Kolon Construct.	2-24
Hana (B)	3-18	Medicine	3-17	Kolon Sangsa	2-25
Han-mi (B)	3-10	Mirae Industry	3-7	Kolon Petr.	2-16
Hanvit (B)	3-8	Tri-Gem Computer	2-29	PanTech	3-3
Dongyang (IB)	5-23	Samsung Mool-san	3-3	Hankook Comp.	2-29
Ssangyong (I)	5-29	Samsung Engineering	2-24	Hanbyul Telecom	2-29
Samsung (I)	5-12	Samsung Electric	2-29	Hansol Electronics	3-7
Daehan (I)	5-11b	Samsung Electronics	2-29	Hansol CSN	2-29
Cheil (I)	3-31b	Samsung Precision	2-28	Hanol	2-21
SK Gas (U)	3-18	Samsung Heavy Ind.	3-2	Hyundai Elevator	2-21
		Samhwa Crown	3-7	Hyundai Motors	2-18
		Shinsung ENG	2-24	Hyundai Electro.	3-3
		Shinwon	3-9	Huyndai Precision	3-4
		Ennex	3-6	Hotel Shila	2-28
		Eswon	2-28	Heung-chang	2-28
		Elex	3-23	SK	3-17
		Youngwon Trade	3-8	SK Chemical	2-29
		Young-chang	2-21	SK Telecom	2-29
		Iljin	3-7	SKC	2-29

a) B, IB, I and U indicate bank, investment bank, insurance, and utility firm, respectively.
b) Adoption dates are year 1999 and others are 2000.

규제산업가설의 실증 연구: 스톡옵션제도의 경우

원 재 환*

요 약

임직원보상제도와 기업의 가치와의 관계에 대한 많은 선행연구에 따르면 은행, 보험회사, 그리고 전기나 가스와 같은 공공서비스회사와 같이 정부의 규제를 많이 받는 회사들의 경우, 전통적인 이론과는 달리 스톡옵션의 도입이 이들 기업들의 가치향상에 기여하지 못하는 것으로 나타나고 있다. 또한 정부의 규제가 규제를 많이 받는 기업들로 하여금 자본예산수립 시 위험감수나 배당정책과 같은 주요 재무의사결정에서 규제가 적은 기업들과는 다른 경향을 갖게 한다는 연구결과들도 있다. 이러한 이론을 소위 "규제가설(RIH)이라 부른다.

재무경제학분야에서 규제와 관련된 연구는 많이 있으나, Yermack(1995, 1997)이 지적하는 바와 같이 스톡옵션과 기업재무의사결정 사이에서의 규제의 역할을 직접 검증한 논문을 찾아보기는 쉽지 않다. 특히 우리의 견해로는 한국시장을 대상으로 한 연구는 본 연구가 최초일 것이다. 따라서 본 연구에서 우리는 여타 선진국에 비해 자본시장에서 아직 많은 규제를 가지고 있는 한국자본시장을 중심으로 규제가 스톡옵션의 성과에 미치는 영향을 검증하고자 한다.

실증자료를 이용한 분석을 통해 스톡옵션의 도입은 규제기업들의 가치향상에 유의적으로 기여하지 못하며 심지어는 부정적인 영향을 끼친다는 사실을 발견하였으며, 반면 동일한 기간에 대해 비규제 기업들을 검증한 결과 기존의 연구결과와 일치하는 결과를 얻었다. 이러한 결과는 요즘 가치경영의 일환으로 기업들이 유행처럼 도입하고 있는 스톡옵션을 은행과 같이 규제가 많은 기업에 적용할 때는 매우 조심스럽게 접근해야 함을 시사한다. 또한, 규제기업들의 경우 스톡옵션 도입 후 주식으로 평가한 기업가치의 위험은 유의적으로 증가한 반면, 배당은 유의적으로 감소한다는 사실을 발견하였는데, 이는 규제기업들의 경우 스톡옵션이 기업의 가치를 제고하는 데 효과적인 방법이 아닐 뿐만 아니라, 기업의 위험을 증대시키고 배당은 줄인다는 측면에서 기업의 대리인비용만 오히려 증가시킨다는 중요한 시사점을 보여주고 있다. 따라서, 이런 결과들은 은행, 보험회사, 공공서비스 기업 등 규제가 많은 기업들의 경우 스톡옵션도입을 지양해야 함을 강력히 시사하고 있다.

결론적으로 규제산업가설(RIH)이 스톡옵션과 같은 임직원 보상제도에도 타당함을 실증적으로 보여주고 있으며, 대리인인 기업의 경영진이 회사의 투자와 재무관련 주요 의사결정을 내릴 때 기업의 소유주인 주주들은 자신의 부를 극대화하기 위해서는 이러한 결과들이 보여주는 시사점에 유의할 필요가 있다는 것을 본 연구는 잘 보여주고 있다.

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