# The Relationship between Stock Option Grants and Firm Value based on Agency Costs

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**Abstract**

This paper studies the impact of stock option on Korean IT companies' financial performance and agency costs between shareholders and executives before and after the announcement of stock option grants. Specifically, the paper compared the change growth and performance of the companies adopting executive stock option (ESO) with those of the companies not adopting ESO on surrounding the announcement. Also, the paper analyzed the difference of growth and performance of the companies in the former group before and after the announcement of stock option grants. Moreover, this paper examined whether stock option can have significant impact on agency costs. From the results, it can be concluded that companies with ESO does not show significantly different firm-value growth than those without ESO. And financial performance of companies with ESO before and after the announcement of ESO grants does not become significantly changed. Lastly, agency costs can be reduced by adoption of ESO, but not through affecting the shareholders' funds.

**Keywords:** Stock option, Executive, Executive stock option, ESO, incentive, compensation, agency costs, principal-agency theory, financial performance

# Table of contents

# 1. Introduction

Compensating executives is a crucial aspect to take into account in modern management control system. It is well recognized that incentive for executive is necessary for corporations to achieve in aligning the interests of shareholders and executives (Gopalan, Milbourn, Song, & Thakor, 2014). Therefore, issues related to how incentive for executive has to be structured have been center in governance discussions since Jensen and Murphy (1990) argued that how you pay matters in CEO incentive payment, not how much you pay. Understanding the behavior of executives with compensation is important as their behaviors affect corporation's performance, both in financial and non-financial perspective.

Compensation can take various forms. The most common form of compensation is cash bonus that is tied up with profit or other profitability measurement such as ROI. However, this type of compensation cannot avoid criticism because it motivates managers to make short-term oriented decisions to maximize profit at the expense of shareholders' long-term interest. This phenomenon refers as 'myopia' where managers are obsessed with short-term performance. The use of such compensations brings about problems, for example managers will be more likely to take actions in order to maximize the current profit, rather than to focus on the long-term interests of shareholders. Also, managers may turn down useful long-term investment since accepting risky investment will only hurt current profitability. More seriously, myopia will trigger managers to engage in data manipulation to make their performance look better than it is (Anthony & Govindarajan, 2014).

Due to these problems, there has been tremendous change toward the emphasis on long-term compensation systems. The premise of long-term compensation is that growth in the value of the company's common stock reflects the company's long-term performance. Stock option is one of the most common long-term compensation plans these days, which takes the largest component of CEO compensation in large publicly traded corporations in the US (Hall & Liebman, 1998). Also, the most direct solution to agency problem is considered to align the incentives of executives with the interest of shareholders by granting stock options to executives (Hall & Liebman, 1998).

According to Anthony et al. (2014), adopting stock option for compensation will not only bring the increase of the wealth of stockholder, but also bring positive abnormal earnings. Hence, this paper will examine whether stock option grants will bring positive abnormal earnings using

method of OLS and event study. Furthermore, it is well recognized that the most important function of stock option grants is that it decreases the agency cost (Hartzell & Starks, 2003). This paper will analyze the influence of stock option grants on the relationship between stock price and agency cost, and also the influence is different with different types of agency cost. Among companies gone public in Stock Market Exchange, this study will select the final sample that has the financial sheets and notes which disclosed the related contents and that the registered executives who are with the incentive of stock options.

## 2. Research Problem & Motivation

Stock option is a contract to provide executives with the right to purchase stock of the firm up to certain amount at a prescribed price before predetermined date. The logic of stock-based compensation such as stock option is representatively based on agency theory. Before management is separated from ownership, manager who owns the firm could maximize his own wealth and effectiveness by maximizing firm value. However, separation of management from ownership which led to modern capitalism built various principal-agent relationship, which raised substantial costs. That is, a manager, not owner of firms, are doing their best in order to achieve their interest rather than to maximize firm value using their expertise and resources of firm (Jensen & Meckling, 1976). For this issue, many compensations aligning the interest of manager with that of owner are concerned to lower agency costs. The effective way to lower agency costs is to relate manager's incentive to the performance of the firm (Harris & Raviv, 1979). Additionally, stock-based compensation rather than cash compensation can significantly motivate managers to increase firm value. This is due to the fact that since stock is the source of the wealth of shareholders, managers can be more compensated by increase of stock price, which can solve the conflict of interests (Jensen & Murphy, 1990).

However, stock does not reflect exact contribution of manager but is possible to be affected by market movements, therefore, it can give too much risk to managers and fail to manage optimization of risk. On the other hand, since managers want compensation system with low risk, they prefer cash bonus to stock-based compensation. However, if firm pays cash to managers for incentive, managers will avoid aggressive investment to minimize risk of their compensation, which may end up with decreased firm value. This is where stock option comes in to lower risk burden for managers as well as to motivate them to work for firm. Stock option

is awarded to executives and/or employees instead of stock itself so that they can exercise their right to purchase share of the firm they work. Hence, it enables executives and/or employees to restrict the risk of loss due to the nature of option, and as they can benefit by exercising option to own stock when option is in the value, its effect for motivation is substantial.

Stock option compensation has been adopted since 1920s in the U.S and its grants are designed to range from employees to executives at first, however, it is awarded to only executives or employees who contribute a lot to the firm, which takes 5% to 10% of firm (Yermack, 1995). As one of methods to solve agency problem, stock option is introduced to address moral hazard of managers raised by asymmetric information between manager and stockholders. That is, executives including CEO will do their best to increase stock price of the firm so that they can benefit from exercising high-priced stock option granted. Hence, granting stock option will align the interest of executives with that of stockholders, which potential moral hazard problem will disappear, therefore long-term firm value will improve.

As mentioned above, it is known that corporations which hire professional managers such as CEOs try to align the interest between stockholders and managers via granting stock options (Jensen & Murphy, 1990). However, there is also negative argument that firms focus on short-term profits through stock option grants, then the wealth can be transferred to bondholders. Additionally, it was reported that firm performance could be worse after granting stock option to executives (DeFusco, Johnson, & Zorn, 1990). Likewise, in the case of stock option granting that can affect firm value, it also has an influence on managers, shareholders, and bondholders.

## 3. Research Objectives

This goes with agency problem that focused on shareholders, so that it shows that there are complicated agency problems between stakeholders. Therefore, the research will be conducted considering agency costs between shareholders and managers. And how the announcement of executive stock option (ESO) is related to agency costs will also be analyzed.

This research is expected to provide deeper understanding on the relationship between stock option and agency costs. This research can also be used as a reference on future study on related topic. This paper is expected to add value toward society since analyzing further about stock option will help to find a way to deal with the agency problems and goal congruence.

On the other hand, it may be possible to think further effect of stock option grant. Adoption of stock option compensation may have an influence in firm value through mitigating agency problem between shareholders and executives. Hence, how the firm value will be affected after adopting stock option compensation also should be investigated with relation to agency costs.

These lead to main research question of the paper, which is,

***"What are the effects of stock option grants on firm value and agency costs?"***

The use of stock option for compensation has diverse influence. It may have an influence on the wealth of stakeholders related. In order to investigate the effect on firm value, whether the implementation of stock option will transfer the wealth of stockholders will be analyzed. In addition, since stock option compensation is designed to sort out agency problem, what is the relationship between them also needs to be investigated. To help answering the main research question, the research will develop sub-questions as follow:

1. How does executive stock option compensation have an influence in firm value?

2. How does executive stock option compensation relate to agency costs?

3. Can executive stock option play a significant role as an incentive plan to resolve principal-agency problem?


**4. Research Relevance**

Among many topics from management accounting control system, it is found interesting to study incentive section. This is because the incentive is closely related to motivation for people to work. Whether stock option compensation has a positive impact on the organizations as it is purposefully designed should be answered by this paper. Besides that, ESOs as incentive will help to understand both management control system and finance comprehensively.

By answering the central and sub-questions, the paper aims to provide deeper understanding on the use of ESO and its influence on agency cost and firm value. Other aspect such as different types of incentive system including non-financial incentive are exempted as it falls out of the research scope. This study will answer whether ESO as compensation plan generally leads managers to behave in a way that is in alignment with shareholders' interests or not.

## 5. Main Concepts Defined

Throughout the paper, some important concepts and theories in both accounting and finance will be applied to address the problem, and further to answer the research question of the paper. Those are as following:

### 1) Principal-Agency Theory and Goal Congruence

The Principal-Agency theory, known as agency problem, is the issue occurred between the agent and the principal within organization. This agency problem exists when the agent makes decisions on behalf of the principal in the circumstances where the interest of the agent is not aligned to that of the principal (Jensen & Meckling, 1976). The agent in the agency theory is assumed to be driven by self-interest. When both parties have different goals, the agent is likely to behave for its own interest rather than acting on behalf of the best interest of the principal.

The agent normally has more information than the principal, then asymmetric information problem arises. Hence, it is difficult for the principal to control and monitor decisions made by the agent. The agency problem is defined in two different types such as adverse selection and moral hazard. Adverse selection concerns when the agent has more information than principal and moral hazard concerns when the agent acts differently as not fully exposed to the risks and not subject to responsibility to the consequences. Opportunistic behavior of the agent can stimulate adverse selection of accounting contracts so that the agent can benefit earnings that is in the interest of the agent. Hence, the principal adopts certain systems to minimize such opportunistic behavior of the agent. Jensen and Meckling (1976) implied that managerial compensation plans should be built to minimize the conflict between executives (agent) and shareholders (principal) and thus to improve firm value. In this sense, stock option compensation can be a solution to solve such agency problems (Haugen & Senbet, 1981).

In contrast, this compensation plan can also bring about earnings management for short-term oriented profit since it is associated to only accounting figures and stock price (2012). Therefore, behavior by the principal to minimize the agency costs will incur other types of agency costs. With comprehensive understanding of this theory, the relationship between shareholders and managers is one of examples which is in my concern throughout the paper.

With the effort to solve agency problem, this paper can elaborate on the idea of goal congruence as the objective for management control, and how it relates to motivation and managerial decision making (Anthony & Govindarajan, 2014). The interests of each member within the organization is required to align with the interest of the organization. Since goal congruence is one of important objectives in the organization, the behavior of the agent should be in line with that of the principal, and further the organization in terms of management control system. Therefore, incentive plans will be introduced in order to tackle principal-agency theory and accomplish goal congruence.

## 2) Incentive System

Organizations apply incentive plans in order to motivate agents or managers. Incentive system is defined by Kemmerer & Thiagarajan (1989) something that influences people to act in certain ways, that is used by organizations to motivate their employees. An earlier study by Clark & Wilson (1961) has also suggest that incentive system may be regarded as a principal variable affecting organizational behavior. Therefore, such system may be viewed as an organization's way to bring about realization of the organization's objective.

Anthony et al. (2014) named the following, among others, as the functions of compensation functions: to achieve the obligation to pay employees, to attract new employees, to motivate employees to be more productive. Incentive system plays a crucial role in aligning the goals of different individual and department, that is, it helps achieving goal congruence.

## 3) Stock Option

An option is one of contracts that provide option holder with the right to purchase or sell an asset at a prescribed price on a predetermined date. A predetermined price, which is called 'strike price', is set to the market price of an asset when an option is exercised. When the holder decides to exercise the option, in turn, the seller has the obligation to sell or purchase. The option with the right to purchase at a predetermined price is called as a call option, which is general type of stock option. This call option will generally be exercised when the strike price is lower than the market price of the asset so that the holder will realize the profit from the difference between the market price and the strike price (McDonald, 2013).

With the definition of an option, stock options have two purposes of 1) a hedging instrument to decrease financial risk of asset holders, 2) a speculative instrument by bearing more risk by others for potential financial reward. ESOs are commonly call options which are not publicly traded. Executives should hold options for particular period of time before expiration, so-called vesting period. Stock options are generally granted to executives with the strike price set equal to the stock price on the grant day with 10 years of expiration period (Murphy, 1999). The executives will be benefited by any increase of stock price unless the option is expired. The rationale for ESO as a compensating system is that the corporation provides executives with the right to purchase the share of its stocks at strike price after granting, as a result, executives can realize the payoff when the stock price increases from positive operating profit or being listed on the stock exchange.

## 6. Literature Review & Hypothesis Development

This section will present the methods and results of previous research as well as the thought on those in order to develop reasonable hypotheses, in turn, to answer the sub-questions and research question. Previous research regarding the similar topic is present and analyzed so that the purpose can be justified.

The importance of incentive in the managerial compensation has been stressed by not just many economists but also management controllers (Anthony & Govindarajan, 2014). Alternative long-term compensation schemes are considered to improve the alignment of management and shareholders' interests and to dedicate to reduce agency costs (Smith Jr & Watts, 1982). Also, such schemes are supposed to offer positive tax effects, hence this benefits must be considered in the design of compensation schemes (Miller & Scholes, 2002). Both incentive and positive tax effects often become the key factors in the time that boards of directors discuss changes in compensation schemes for managers (Hite & Long, 1982). It is also quite important to notice the effect of such schemes on shareholder wealth. Hence, both Larcker (1983) and Bhagat, Brickley and Lease (1985) had empirical evidence that suggests that adoption of long-term managerial compensation schemes can have a positive impact on shareholder wealth.

Larcker (1983) states that various contractual compensation schemes are used by many corporations for executives. He clarifies two different types of compensation schemes. Many corporations adopt so-called 'bonus' plan where annual remuneration is based on yearly

performance which is short-term compensation. Besides, many corporations also adopt long-term compensation schemes, which differs from bonus plan in several dimensions. One aspect is that the performance is measured for longer than one year and change in stock price is generally regarded as the performance measure. While there are six long-term compensation schemes[1], only stock option is within the scope of this paper.

According to Larcker (1983), the other aspect of long-term compensation schemes is based upon performance plans[2]. He also compares performance plans with the short- and long-term compensation schemes. Relevant to the first aspect of long-term compensation, performance plans evaluate accounting performance a longer time period which offer bonus based on yearly performance. Also, compensation related to the performance plans is deferred to the future and is forfeited when executives leave the corporation before the expiration of the award. The target for performance is explicitly set in the relation of growth in accounting-based measures over long-term. Lastly, performance plans show the characteristics that is like stock options in the manner that loses nothing from below and unlimitedly increases when the performance reaches over the specific target.

Larcker (1983) examined how the adoption of performance plan contracts are related to managerial investment decisions and financial performance of corporation. He built two research hypotheses to investigate whether this performance plans have significant effect. The first hypothesis is that the adoption of performance plans is associated with an increase in corporate investment. And the second hypothesis is that the adoption of performance plans is associated with a favorable security market reaction. Two hypotheses are intended to check whether corporate investment level can be expected to change with the adoption of the performance plan into executives' compensation plan. The results suggest that corporations adopted performance plans showed a statistically significant rise in capital investment right after scheme adoption, and a positive security market reaction when it was disclosed to the

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[1] (i) Stock Option (qualified, non-qualified, and incentive stock options), (ii) Stock Appreciation Rights, (iii) Phantom Stock, (iv) Dividend Units (v) Restricted Stock, and (vi) Performance Plans (performance units or performance shares) (Larcker, 1983)

[2] Book units is additional type of long-term compensation plan which operates in the manner similar to performance plans. Performance units and performance shares are included in the type of performance plans. While performance units set the amount of compensation per unit at the time of designing plan or set a unit value that is unrelated to stock price (e.g., book value per share at the award), performance share plan provides the compensation per share depending on the market price per share at the end of award period.

market. The result can be interpreted that the deferral accounting characteristics of performance plans enable to give managerial incentives to invest more capital to increase shareholder wealth. These are explained by incentives related to introduction of performance plan.

In addition to Larcker, there already exists much research as to the effect of ESO compensation on financial performance. Brickely et al. (1985) support Larcker's research by investigating market price reaction to the announcement of stock option grants. The reaction of the stock price around the announcement of changes in long-term managerial compensation was examined. With analysis of 175 samples related to five types of long-term compensation plans including stock option, significant positive result of cumulative average residual (CAR) was showed. The results support the notion that positive market reactions on average, for example, shareholder wealth increases by such compensation schemes. Yermack (1997) also showed similar research result with Brickely et al. (1985). With a sample of 620 stock option awards to CEOs of Fortune 500 corporations between 1992 and 1994, the stock market reaction from 20 days before to 120 days after stock options were granted to CEO was tested. In his paper, Yermack found that the award timing is closely related to changes in stock prices. The result showed that abnormal positive CAR was notified 15 days to 120 days after options were granted. An average CAR of over 2 percent in the 50 trading days after options were granted was shown, even before option grants were not disclosed to the public.

ESOs reduce principal-agency problem, thereby, ineffective managerial decisions can be prevented, which leads to increase of the wealth of shareholders (Haugen & Senbet, 1981). Frey (2004) examined the potential growth for corporations which compensate executives with equity-based compensations between 1992 and 1999. Calculated by Tobin's Q, he found that equity-based compensations for executive have significant positive relationship with corporate future growth. However, he also warned that excessive use of equity-based compensation can result in low quality of financial statements. Sesil et al. (2000) also reported that there is significantly positive relationship between stock option, productivity, growth of sales, and Tobin's Q. Mehran (1995) analyzed 153 sample of manufacturing companies and insisted that corporate performance has a positive association with ownership of shares of firm stock by managers. Then, firm has more value when the importance of ESOs become higher in compensation schemes for management.

Moreover, Sanders and Hambrick (2007) support above-mentioned result. They stated that executives holding high proportions of payment from stock option only become more risk-

lover, thereby facing with bigger losses. The ratio of losses to gains is higher than the ratio for executives holding low proportions of payment from stock option. This can be interpreted that expected financial performance after announcement of stock option grant cannot be reached.

Even though there are previous research showing positive returns from adopting stock option, it cannot hastily be concluded that the effect of stock option on corporate performance is significant. It may not stock option that leads such result or such results were shown due to existence of other factors affecting financial performance. Hence, corporations adopting ESO should firstly be compared with those without ESO in order to analyze the impact of stock option. This leads to the first hypothesis:

**H1: Corporations adopting stock option are different from those without stock option in firm-value growth after granting stock option to executives.**

On the other hand, in the analysis of the relationship between executive compensation system and growth of corporate stock price in manufacturing firms between 1964 and 1981, it was reported that executive compensation plays an important role in the returns of shareholders as well as growth of corporate sales. However, the relationship between compensation and shareholders' returns does not strictly show positive results (Murphy, 1985). Furthermore, DeFusco et al. (1990) supports this result. DeFusco et al. analyzed long-term performance of 359 sample of corporations listed in New York Exchange in between 1978 and 1982. Return on Assets (ROA) was adopted for long-term performance on surrounding 5 years of stock option grants. In this research, corporate long-term performance became worse after stock options were granted, which was contrast to its expected result. Nevertheless, the market reaction to stock option grant in the short period of time shows positive relation.

The long-term performance of corporations adopting ESO also needs to be tested. This is because as previously mentioned stock option is designed to motivate executive to dedicate to their firm for long-term. There are two different cases of companies listed in stock market exchange granting stock option to executive. Corporations can grant stock options to executive before or after its being listed in the stock market exchange. Corporations' going public is necessary for stock option to be exercised, so the corporate growth between firms with/without stock option will become different at surrounding the date of being listed (Brickley, Bhagat, & Lease, 1985). And significant difference in corporate growth few years after the adoption of stock option can be found when it plays a positive role in corporations' long-term performance.

Hence, financial performance of corporations with stock option may be able to outperform their corresponding peers without stock option compensation. Thinking of option's purpose to improve long-term performance rather than stick to myopia, how well stock option performs its role should be tested based on relatively long-term after options were granted. Therefore, this leads to the second hypothesis:

**H2: Long-term firm-value growth of Corporations with ESO is different between before and after the announcement of stock option grant.**

On the other hand, whether the impact on financial performance works well enough as an incentive plan to reduce agency costs needs to be discussed. There was research done in Singapore to for this purpose. The research investigates the short-term market reaction to option awards announcements and the long-term stock and performance of sample firms after the adoption of stock option. In the time period between 1986 and 1993, Yeo et al (1999) analyzed 61 Singapore corporations granting ESO to test the impact of grant on the wealth of shareholder and corporate performance. The result shows that stock option compensations in Singapore do not play significant role in motivating executives and giving incentive, which suggest that other factors may have an influence on incentive effect of ESO, then on corporate performance. Only weak evidence for positive market reaction on around the announcement could be found. Therefore, there may not exist significant difference between the returns of corporations with stock option and those of the market in the following year of the announcement. This comes with the fact that corporations with stock option could not improve their operating performance.

Furthermore, some previous research that relates stock option grants to agency costs do not show consistent result. Grossman and Hart (1980) and Shleifer and Vishny (1986) insisted that as the ownership of share is distributed to many small shareholders, agency costs begin to increase due to emergence of free-rider problem. In other words, stock option compensation gives some share of ownership to executives, which bring some effect in increasing agency costs. Hence, it is expected that stock option in corporate remuneration scheme will not bring about positive effect in the shareholders' wealth, which is not in line with the objective of ESO. Yermack (1995) also reported that there is no effect for stock option grant in decreasing agency costs by examining 792 sample of American corporations. He tested whether nine leading

compensation theories[3] can be supported or not, and the result showed that most of them could not be supported by his study and even one of them is directly contradicted (1995).

Relatively recently, Sanders and Hambrick (2007) demonstrated that stock option rewards lead CEO to be more risk-taker, then they are inevitably prone to more big losses than big gains. In the perspective of shareholders, this can be interpreted that CEOs taking more risk are not acting in the best interest of shareholders. In their study for the impact of CEO stock options on investment outlays, it was found that the more that CEOs are paid in stock options, the more they are willing to invest in risky spending[4]. Therefore, it may be hastily concluded that option-awarded executives bring about high performance by taking risky investments. However, their result showed that CEOs holding high proportions of their payment from stock option compensation ended up with generating more big losses than big gains. Their ratio of big losses to big gains was greater than corresponding ratio for CEOs holding low proportions of their payment from stock option compensation. Greater levels of option compensation motivate CEOs to be risk-takers and to improve corporate performance, which can be explained in the respect of agency theory (Jensen & Meckling, 1976). Nonetheless, the fact that option-loaded CEOs paradoxically make more big losses is against the notion of agency theory. Hence, this result may not be in the best interest of shareholders, which induces agency problems between CEOs and shareholders.

In contrast to above-mentioned results, Lee et al. (2012) analyzes how stock option affects the wealth of shareholders and bondholders from the perspective of the agency cost. The change in the wealth of bondholders is estimated by the methodology being applied in the area of risk management. Empirical findings show that the wealth of both stakeholders significantly decreased (increased) for companies whose debt ratio greatly increased (decreased) before stock options were granted (Lee, Kim, & Jung, 2012). When the leverage ratio rises significantly, it is highly likely that executives who received stock options pursue risky investments, making the wealth transfer from bondholders to shareholders, therefore bondholders are likely to react in negative manner. Thus, increase in agency costs will lead the

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[3] Nine leading compensation theories include (1) Alignment of CEO wealth and stockholder returns (2) Horizon problem of CEOs nearing retirement (3) Nature of firms' assets (4) Noisiness of accounting data (5) Agency costs of debt (6) Incentives in regulated industries (7) Liquidity constraints (8) Tax reduction (9) Earnings management.

[4] Research & Development, capital spending, and acquisitions, etc. are referred to as risky spending.

wealth of shareholders to decrease. On the contrary, it also can be interpreted when the leverage dropped, executive are prone to raise firm-value, which increases the wealth for both shareholders and bondholders. The result of analysis implies that granting stock option leads executive to seek after risky investment, but depending on the fluctuation in the debt ratio before granting, it may affect the wealth of shareholders and bondholders.

Furthermore, DeFusco et al. (1991) discussed about the impact of ESO on managerial decisions such as tax effects, incentive effects and risk-taking effects. With the sample of 987 different firms listed in New York Stock Exchange for five-year periods, they examined the changes that occurred in risk-taking, investment, and capital structure by financial ratios. When focusing on real section, the result showed that firms adapting changes in managerial compensation experienced a significant decrease of other operating expenses. Such other operating expenses can be a proxy for agency costs as it will be used a proxy in this paper. Therefore, the result shows that compensating executive with stock-based incentive may have a positive effect in solving the agency problem.

Even though there were some studies showing the negative effect of executive stock option on shareholders, it is not clear why and how ESOs will affect the wealth of shareholders, then whether principal-agent problem can be sorted out. Although direct relationship between stock option and the wealth of shareholders cannot be recognized due to other factors that may have an impact on shareholders, there may be some significant effect. By comprehending above incompatible arguments, how ESOs are associated with agency costs must be tested. Hence, the third hypothesis is developed as:

> **H3: The use of executive stock option has a significant impact on agency costs through affecting the wealth of shareholders.**

## 7. DATA and Sample

In this study, numerous historical financial data are required, therefore, financial data, such as financial statement and profit/loss statement, to analyze performance (e.g., profitability) and agency costs are collected from Orbis database. And it is necessary to look into annual or semi-annual report of corporations to know when stock option grant had been announced in public. This should be manually done by looking into one by one, which takes quite time.

Since most of previous research regarding this topic has been done in the U.S and not many studies on this subject in Korea have been conducted, IT companies listed in KOSDAQ are selected for sample. There are three different stock market in Korea such as KOSPI[5] (Korea Composite Stock Price Index), KOSDAQ[6] (Korea Securities Dealers Automated Quotation), and KONEX[7] (Korea New Exchange). The reason why KOSDAQ among them is chosen in this study is composed several reasons. The first is that KOSPI market focuses on relatively big and global corporations in many diverse sectors. The characteristic of stock option suggests that new startups or venture businesses adopt ESO compensation to cultivate and retain a younger, skilled workforce even under lack of enough capital (Avci, Schipani, & Seyhun, 2016). Hence, corporations listed on KOSPI market are not considered to be appropriate sample. The second is that KONEX market is composed of corporations that are relatively small-sized and are having financial constraints, therefore this also are not regarded appropriate for sample stock market. The most important reason is that the KOSDAQ market is established for companies in IT, BT and CT sectors and is composed of startup companies needing funds. So, this market was chosen under the assumption that companies listed in KOSDAQ will adopt ESO to hire competent and young executives under financial constraint.

**Figure 1: The state of stock option grants in recent 2 years,** (KOSDAQ)

|  | 2015 | 2016 |
|---|---|---|
| No. of companies grated stock option | 102 | 116 |
| No. of grants in general stockholders' meeting | 75 | 81 |
| No. of grants by the board of directors | 43 | 60 |
| Total no. of grants | 118 | 141 |
| Total no. of executives granted | 2,319 | 2,337 |
| No. of executives Per company | 22.7 | 20.15 |

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[5] The KOSPI (Korea Composite Stock Price Index) is the major benchmark stock exchange market of Korea, and has listed global corporations such as Samsung Electronics, Hyundai Motor, POSCO, and LG Electronics since its opening in 1956. Its market capitalization currently amounts to KRW 115 billion with solid growth in major corporations (Korea Exchange, 2018). Additionally, the KOSPI market was recognized to be proper for investment by the stock markets of major developed countries. This indicates that corporations listed on the KOSPI market would have an advantage in funding foreign markets.

[6] The KOSDAQ market was launched in July 1996 for the purpose of providing funds for startup companies as well as SMEs in such Information Technology, Bio Technology and Culture Technology (KOSDAQ, 2018). The KOSDAQ market has grown remarkably since its establishment and is regarded as young market with a high quality, by the leading sectors of the times such as tech stocks related to IT and BT as well as entertainment, software and game, etc.

[7] The KONEX (Korea New Exchange) is a new market established in 2013 for small- and medium-sized enterprises to form the basis of creative economy by reinforcing support through the capital market for SMEs at the early stage (KONEX, 2018).

Figure 1 shows current state of adoption of ESOs among corporations listed on the KOSDAQ market. According to the investigation by KOSDAQ in 2017, the number of corporations are steadily increasing year-to-year since its introduction in the stock exchange market. Not just the number of corporations granting stock option, but also the number of executives granted are reported to increase. The reason seems to be that many Korean companies recognize the importance of compensation plans.

The period of data covered in the study is 2009-2017 since orbis which is the main database employs the data regarding Korean stock exchange market only up to 2009. Moreover, the sample is limited to the companies which was incorporated and/or listed before 2015 and declared disclosure about stock option grant to DART (Data Analysis, Retrieval and Transfer system in Korea). Only companies that have access to financial statement for [-2,2] years at the point of the awarding announcement are chosen to analyze the growth of corporation and the effect of stock option. Therefore, corporations not having complete financial statement and/or compensation data over the period are excluded out of the sample. Financial statement of these companies can be found in DART and this data can be used to analyze disclosed financial information of companies. Additional criteria for selection of sample is below:

(1) Companies which settle sales accounts at the end of every year

(2) Companies which did not do stock split and/or M&A during sample period

(3) Companies which were unlisted from exchange market during sample period

The reasons why additional criteria are adopted are that if the month of settlement of sales accounts differ within sample companies, the accounting period becomes shorter than twelve months, which may pervert the research result; if company was involved in stock split, M&A, and being unlisted from stock exchange during sample period, it means that management control systems were changed, therefore sampling companies without such events improves coherence of sample companies. Companies that have a financial-related subsidiary company are also excluded because executives in such industry have different motivations (Burgstahler & Eames, 2006). The process for data selection is as following below:

**Figure 2: Data selection for Final sample**

| | |
|---|---:|
| Starting sample in IT industry | 50,638 |
| Deleted from unlisted/formerly listed companies | |
| - Unlisted companies | 50,408 |
| - Formerly listed companies | 12 |
| | **218** |
| Deleted from different stock markets | |
| - KOSPI | 24 |
| - KONEX | 26 |
| IT companies listed in KOSDAQ | **167** |
| | |
| Deleted from other types of directors/managers | |
| - Directors/managers who are not shareholders | 54 |
| | **113** |
| Deleted due to | |
| - Non-adoption of stock option | 24 |
| - Cancellation of stock option during the period | 29 |
| - Grant to only employees | 3 |
| - Merger & Acquisition | 1 |
| Sample companies adopting ESOs | **56** |


**Figure 3: Total sample classification**

| | |
|---|---:|
| **Total sample** | **113** |
| Sample with ESOs | **57** |
| Sample without ESOs | **56** |


**Figure 4: Industrial distribution based on classification**

| Industry Sector | No. of companies | Proportion |
|---|---:|---:|
| Digital Contents | 7 | 6.19% |
| Semi-conductor | 22 | 19.47% |
| Software | 26 | 23.01% |
| Internet | 3 | 2.65% |
| Information Technology | 8 | 7.08% |
| Computer Service | 9 | 7.96% |
| Telecommunication | 16 | 14.16% |
| IT Hardware | 22 | 19.47% |

Total starting sample of IT industry are selected based on the criteria of NAICS 2017. Among 50,638 of companies in IT industry, both 50,408 of unlisted and 12 of formerly listed companies are exempted. Subtract 50 companies listed on other market than KOSDAQ. Out of 167, only companies whose directors and/or managers are shareholders are considered. Companies which cancelled option, granted only to employees, and merged are exempted. As stock option data from annual reports should be collected manually by looking into one by one, the sample is limited quite small number of companies that do fit the criteria.

## 8. Research Methodology

8.1 Methodology for Literature Review

The fundamental books including management & financial accounting, and finance are used for the framework while many journals about stock option are used to study empirical cases. To secure the credibility, top journals from the eminent journal list such as ERIM list of journals are selected and from the secondary list if needed. ERIM list of journals is evaluated based on the research performance of academic staff. The list contains the top journals in the management field and accounting and finance field. Scientific journals with good quality are selected through the database of the university library and Science Direct, etc. The journals are chosen based on the number of citations, the impact factor and the relevance.

Also, some Korean journals are adopted to develop more diverse and clear description as well as to search for related empirical case studies. Due to the fact that stock market exchange in specific country, which is South Korea, is chosen, some Korean journals listed in the National Assembly Library of Republic of Korea, National Assembly Research Service, Koreanstudies Information Service System, and Research Information Sharing Service. etc. are selected to help understating of exclusive characteristics and regulations of Korea Stock Market Exchange. Journals and articles listed in above-mentioned institutes are all considered to secure the quality.

8.2 Definition of Variables

In this part, the different variables and the measurements are explained. It begins with the dependent variable which is compound annual growth rate followed by the independent variables, the dummy.

8.2.1 Compound Annual Growth Rate (Dependent Variable)

Compound Annual Growth Rate (CAGR) is employed in order to calculate corporate growth between particular period of years. CAGR is the mean annual growth rate of an investment over a particular period of time longer than one year. Using CAGR, the growth of corporate value and sales, etc. over specific period can be calculated. In this study, CAGR is adopted to estimate corporate growth based on sales growth as a dependent variable. To calculate CAGR, divide the value of sales at the end of the period by the value at the beginning of the period, raise the result to the power of one divided by the period length, and subtract one from the subsequent result. CAGR is written as follows:

$$\text{CAGR} = \left[ \frac{Ending\ Value\ of\ sales}{Beginning\ Value\ of\ sales} \right]^{\left[ \frac{1}{No.of\ years} \right]} - 1$$

8.2.2 Return of Assets

Return on Assets (ROA[8]) is one of profitability ratios, that is, an indicator of corporate profitability relative to total assets. Total asset includes liabilities and financial assets, which are unrelated to net operating activities. Hence, total asset seems not to represent profitability of operating activities as measuring variable. However, previous studies such as DeFusco et al. (1990), Yeo et al. (1999), and etc. employed ROA in order to analyze performance after adoption of stock option. That's because ROA can provide executives, shareholders, and analysts with information of how efficient organizational management takes advantage of its assets to generate profits. ROA can be written as a percentage as follows:

$$\text{ROA} = \left[ \frac{Net\ Income}{Total\ Assets} \right]$$

8.2.3 Return of Equity

Return on equity (ROE) shows how much profit shareholder obtain by investing, that is, net income of equity displayed as percentage. Return on equity measures a company's profitability

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[8] Return on Assets is sometimes referred to as return on investment.

by showing how much profit a company generates with the investment of shareholders. ROE can be calculated by dividing net income with the average of equity in the year. There is a previous study using ROE as measuring variable for performance. ROE is calculated as a percentage as follows:

$$\text{ROE} = \left[\frac{Net\ Income}{Shareholder's\ Equity}\right]$$

8.2.4 Proxy for Agency Costs

In this paper, the relationship between adoption of stock option and agency costs needs to be tested. However, there does not exist the entity for agency costs in neither financial statement nor income statement. Hence, as a variable, agency costs between executives and shareholders are defined as manager's private expenses. The proportion of other operating expenses is taken as a proxy for agency costs which is assumed to be the extent of manager's private expense. Other operating expenses distinguish selling expenses and general administrative expenses. The proportion of selling & general administrative expenses is assumed to increase when executives misbehave to bring about wasteful costs in using corporate resources the result for abusing corporate resources (Singh & Davidson, 2003). This leads to increase agency costs.

$$\text{Proxy for Agency costs} = \text{last 2 years average of}\ \left[\frac{Other\ operating\ expenses}{Sales}\right]$$

8.2.5 Dummy

The dummy employed in this paper is whether a company adopts ESO compensation or not during the experiment period. To see the impact of stock option on the growth of financial performance, sample companies are separated into two groups, that is, one with ESO and the other without it. With this dummy, whether there exists significant difference between them is examined on the basis of the time period before and after the announcement of stock option.

8.3 Research Methods

The paper obtains relevant data first from Stock Market Exchange for specific period to develop adequate empirical test. Data for changes in stock price, sales, net income, total asset, and other operating expenses, etc. are obtained from Orbis for hypotheses. However, finance-related corporations such as bank, investment bank and insurance companies are exempted because those have exclusively different financial statement from that of manufacturer. E-Views and Matlab are used to analyze data obtained. Finally, this paper implements event study for the impact of stock option grant on CAGR during specific period.

Standard event study is employed to investigate the announcement effect with compound annual growth rate. Since this paper classifies samples into two categories (Corporations with/without ESOs), event study procedures are done to each category respectively, then they are compared together.

For the hypotheses, to test whether there exists significant difference from adoption of stock option, companies adopting ESO and those without such compensation are comapared on the year of announcement of stock option grant to the public. More specifically, comparisons based on the event date[9] are conducted with variables to test whether there is significant difference between two different categories. Similarly, long-term growth of firm value after the announcement can be examined by comparing 2 years of firm value growth.

It is important to consider the average growth of industry. Since the scope of industry is limited to IT, it is not required to do more classification. But the average yearly growth of IT industry needs to be subtracted from the growth of sample companies to compare only abnormal growth of the firm. In order to compare the long-term growths between corporations with/without ESO, CAGR, ROA, and ROE for each year are subtracted from industry average, then get the average. The average of indicators obtained in each year are used for t-Test. For the last hypothesis, proxy for agency cost is employed as last two years average of ratio of other operating expense to sales. Since the event occurred, how this proxy would change must be examined.

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[9] The date of announcement of ESOs grant to public

8.3.1 Statistical Test

The statistical test employed is the Ordinary Least Squares regression. The OLS regression is adopted to analyze which of the independent variables significantly affect the growth of financial performance. The single regression is performed under the assumption that CAGR is positively affected by Total assets, ROE, ROA and negatively affected by other operating expenses. The dummy is included at first to see the difference between two groups, then it is excluded for the second hypothesis. The regressions to be tested in this paper are shown below:

Regression 1:
$$CAGR = \alpha + \beta_1*Total\ Assets + \beta_2*ROE + \beta_3*ROA + \beta_4*Other\ Operating\ Expenses + \beta_5*Dummy + \epsilon$$

Regression 2:
$$CAGR = \alpha + \beta_1*Total\ Assets + \beta_2*ROE + \beta_3*ROA + \beta_4*Other\ Operating\ Expenses + \epsilon$$

Regression 3:
$$Agency\ costs = \alpha + \beta_1*ROE + \beta_2*ROA + \beta_3*CAGR + \beta_4*Shareholders\ Funds + \beta_5*Stock\ option + \epsilon$$

The major focus of the test is the weights of the independent variables and their significance. Also, to ensure autocorrelation-free, homoscedasticity, reliable results and reliable results, Breusch-Godfrey Serial Correlation LM test and Breusch-Pagan-Godfrey test are performed. For both tests, the critical value for F-statistic is over 4 to reject null hypothesis. From figure 5 below, none of F-statistic is over 4, therefore the results imply that none of regressions performed do not have autocorrelation nor heteroscedasticity at 95 percent of significance level. Therefore, all regressions do not violate the assumptions of OLS regression. Therefore, all regressions do not violate the assumptions of OLS regression.

**Figure 5: Test for assumptions of OLS**

| F-statistic | Autocorrelation | Homoscedasticity |
|---|---|---|
| Regression 1 | 0.671680 | 3.455368 |
| Regression 2 t-2 | 1.220654 | 0.414288 |
| Regression 2 t+2 | 0.911636 | 2.827078 |
| Regression 3 t+2 | 2.472387 | 3.844025 |

To find out whether there exists the significant difference between before and after the announcement of ESO grants, the *Chow break test* is performed with the sample of companies only with ESO. When there may be a break point in the sample and it needs to be tested whether the parameters have changed at that point, the *chow break test* is appropriate to adopt (Heij, Boer, Franses, Kloek, & Van Dijk, 2004). With n observations being split in two parts, the first part consists of $n_1$ observations and the second part consists of the remaining $n_2 = n - n_1$ observations. To test the hypothesis of constant coefficients for two parts of data, the model should be formulated as

$$y_1 = X_1 \beta_1 + \epsilon_1$$
$$y_2 = X_2 \beta_2 + \epsilon_2,$$

and this can also be written as

$$\begin{pmatrix} y_1 \\ y_2 \end{pmatrix} = \begin{pmatrix} X_1 & 0 \\ 0 & X_2 \end{pmatrix} \begin{pmatrix} \beta_1 \\ \beta_2 \end{pmatrix} + \begin{pmatrix} \epsilon_1 \\ \epsilon_2 \end{pmatrix}$$

This model assumed that all the $(n_1 + n_2)$ error terms are independent and have equal variance. Hence, the null hypothesis of constant coefficients is as followed:

$$H_0: \beta_1 = \beta_2$$

This can be tested against the alternative hypothesis that $\beta_1 \neq \beta_2$ by the F-test. Least squares in the unrestricted model gives an error sum of squares that is the sum of the error sum of squares of the two separate regressions of $y_1$ and $y_2$. Therefore, the F-test is shown as:

$$F = \frac{(S_0 - S_1 - S_2)/k}{(S_1 + S_2)/(n_1 + n_2 - 2k)}$$

$S_0$ is the error sum of squares under the null hypothesis and $S_1$ and $S_2$ are obtained by two subset regressions of $y_1$ and $y_2$. The Chow break test under the null hypothesis of constant parameters follows the *F(k, n₁ + n₂ - 2k)* distribution. If the F-value is over 4 or under -4, the null hypothesis is rejected, whereas F-value between -4 and 4 cannot reject the null hypothesis. The Chow break test in this paper has to be performed with the result of regression 1 to find whether there exists break point or not with the only companies with stock option compensation.

## 9. Result

### 9.1 Descriptive Statistics

The data used for analysis are described in this section. The sample consists of 113 observations when outliers are excluded. The main statistics of all the variables are independently described. Mean, standard deviation, minimum, median and maximum of each variable are given below:

**Figure 6: Descriptive statistics**

| Variable | Year | N | Mean | Std. Dev | Minimum | Median | Maximum |
|---|---|---|---|---|---|---|---|
| **CAGR** | Whole period | 80 | 0.05 | 0.14 | -0.24 | 0.04 | 0.50 |
| | [-2, 0] | 80 | 0.03 | 0.28 | -0.37 | -0.01 | 1.19 |
| | [0, 2] | 95 | 0.14 | 0.23 | -0.29 | 0.11 | 1.11 |
| **Total Assets** | Whole period | 80 | 0.55 | 1.06 | -0.68 | 0.20 | 5.98 |
| | [-2, 0] | 80 | 0.13 | 0.64 | -0.57 | -0.03 | 3.43 |
| | [0, 2] | 96 | 0.47 | 0.96 | -0.46 | 0.24 | 7.79 |
| **ROE** | Whole period | 79 | -0.73 | 3.50 | -25.92 | -0.48 | 6.95 |
| | [-2, 0] | 80 | 1.87 | 20.73 | -19.93 | -0.56 | 181.94 |
| | [0, 2] | 95 | -0.70 | 8.73 | -41.09 | -0.24 | 29.34 |
| **ROA** | Whole period | 78 | -0.62 | 2.85 | -17.52 | -0.44 | 7.07 |
| | [-2, 0] | 79 | 0.39 | 8.17 | -18.61 | -0.43 | 65.24 |
| | [0, 2] | 95 | -0.75 | 9.99 | -70.13 | -0.33 | 30.05 |
| **Other Operating Expenses** | Whole period | 80 | 0.49 | 1.28 | -0.55 | 0.18 | 9.69 |
| | [-2, 0] | 80 | 0.06 | 0.68 | -0.66 | -0.04 | 3.50 |
| | [0, 2] | 96 | 0.54 | 0.83 | -0.52 | 0.27 | 4.37 |
| **Agency Cost** | Whole period | 80 | 0.15 | 0.66 | -0.88 | 0.01 | 2.95 |
| | [-2, 0] | 80 | 0.16 | 0.57 | -0.79 | 0.08 | 2.98 |
| | [0, 2] | 95 | -0.01 | 0.51 | -0.68 | -0.02 | 3.32 |

### 9.2 Descriptive Variables

For descriptive analysis, data are divided into threefold, before/after announcement stock option grants and whole period. Since each company granted ESO at different fiscal year, it would be better to use relative year rather than using absolute fiscal year. Therefore, the year

had to be sorted at relative year with the reference point[10]. However, as mentioned before, the sample period is limited to between 2009 and 2017.

From figure 5 the statistics for variables can be found. During the whole period, CAGR which implies the growth of sales is 5 percent at average, which means that IT companies listed in KOSDAQ grew average 5 percent for 5 years. Before the announcement of option grants, it shows only 3 percent of growth whereas it skyrocketed to 14 percent after the announcement. This implies that companies are firmly growing fast, especially once executives were to be compensated.

Total assets of the companies grew quite fast at average 47 percent once they decided to grant ESO, which is much higher than last 2 years before that decision at 13 percent of growth. While total assets are long-term oriented entity in the financial statement, ROE and ROA are rather short-term profitability indicator of the company. For 2 years before the announcement, the growth of ROE was shown at 1.87 percent while it turned to decrease to -0.7 percent. Likewise, the growth of ROA also dropped to -0.75 percent from 0.39 percent of growth. This is in line with the result for the growth of ROE. These two indicators are shown to be decreased which is opposed to what was expected.

On the other hand, while other operating expenses for 2 years before the announcement grew at only 6 percent, it grew quite fast after the event at 54 percent. It may be natural that other operating expenses become increasing year by year, however, significant growth after the announcement is quite notable.

Lastly, the growth of agency costs, which is calculated by other operating expenses dividing by sales, is showing its increase during whole sample period. It increased by 16 percent before the announcement. However, after the announcement it turned to decrease up to 1 percent and this is in the right direction as expected.

9.3 Test Results and Discussion

In this part, the test results of the different regression analyses as well as what these results imply for research question are presented. Starting with the normal regression, the regression

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[10]  The reference point [0] in this part implies the year when companies announced ESOs grants to public.

with dummy and the regression for agency costs will be described. In the description of the outcomes, these will be explained by linking to hypotheses, then research question. As mentioned in methodology section, the tests were performed using E-views and Matlab.

For general interpretation of independent variables from figure 7, total assets show significantly positive coefficient for all four regressions at 1% significance level. It means the variable 'total assets' significantly contributes to the growth of sales growth, that is, firm value in this paper. This result is in line with what was expected in the methodology section. Likewise, there is significant coefficient of other operating expense at all four regressions at 1% level. It also implies that the variable other operating expense positively affect the sales growth. However, this variable was expected to negatively affect the sales growth, but it turned out to be opposite.

For the first and second hypothesis, the regression 1 and 2 were adopted to test whether there exists significant difference in firm value growth between companies with/without ESO. Four different kinds of regressions were performed as ordinary least squared regression.

When it comes to first hypothesis 'Corporations adopting stock option are different from those without stock option in firm-value growth after granting stock option to executives', the regression 1 is used and the dummy 'Stock option' explains the result from figure 7 below. For a dependent variable of CAGR, the dummy 'stock option' shows whether two different groups of companies have significant difference in sales growth. From the figure 7, the result shows that there is no significant different sales growth between companies with/without ESO before the announcement of ESO grants as showing a coefficient of 0.006013. Also, the test result of the regression for 2 years after the announcement show a coefficient of 0.043126.

When compared with the previous regression, coefficient becomes higher quite a lot, however, both figures are not significant at any significance level below 10%. Hence, although giving stock option has a positive influence on CAGR especially after stock option grant were announced, as it does not show significant results it could be concluded that stock option grant does not have a significant effect on firm value growth. Therefore, the first hypothesis can be reject meaning that corporations adopting ESO are not significantly different from those without ESO in firm-value growth after granting stock option to executives.

Regarding second hypothesis 'Long-term firm-value growth of Corporations with ESO is different between before and after the announcement of stock option grant', the regression 2 without dummy was employed. The R-squared that can be seen at the bottom of figure 7 shows

how much the independent variables explain the dependent variable. However, since the R-squared may not explain the number of the independent variables, the adjusted R-squared explains better. Among the regressions without dummy, the regression 2 years after the announcement has 31.63% of explanatory value. It means that 31.63% of the variance of the dependent variable can be explained by the independent variables. On the other hand, the regression 2 years before the announcement shows higher explanatory value at 38.34%. Hence, both regressions can be tested for the *chow break test* with high enough explanatory power.

To find whether there exists significant difference between before and after the announcement of ESO grants, the *chow break test* was also used with the residual came from the result of regression 2. The test was performed with the sample of only companies adopting ESO after the announcement of option grants. 55 companies out of total sample were adjusted and selected for the *chow break test*. The *chow break test* was performed using Matlab and the result of F-values obtained by the test can be found in figure 7. From figure 7, no significant company could be found. The F-values of all companies fall between [-4,4], apart from one company, 54 out of 55 companies show insignificant result. This means that there is no break point in the period. Hence, it can be concluded that the financial performance before and after the announcement of stock option grant does not significantly differ. Therefore, the second hypothesis can be rejected.

The results from the two regressions may imply that there are possibilities of factors that are not considered in the regression or that ESO itself does not work better than other types as an incentive plan to make explicit difference. When it comes to the factors, for instance the debt ratio may have a specific influence on the firm value. Since the total assets are composed of assets and liabilities of the company, high total assets with high debt may somehow have an influence on the result of the test. How the company is financed can be a factor to consider in developing the regression. Or simply the other type of compensation adopted by companies without ESO could work better to encourage executives to work harder. Although this research is based on the assumption that stock option will induce the most effort from executive, other types of compensation such as incentive based on non-financial measures or stock itself can be more effective for such purpose.

Therefore, the result for the two hypotheses may answer the first sub-question which is 'how does executive stock option compensation have an influence in firm value?'. The test results show that the firm value growth of companies with ESO does not differ from that of companies

without ESO and that after-effect of companies with ESO is not significantly different from before-effect. That is, although there were some studies showing that ESO has a significant positive impact on the financial performance and the growth in firm value, this paper implies that ESO does not contribute to the growth of the firm value.

| Regression analysis Dependent variable | Regression with dummy | | Regression without dummy | |
|---|---|---|---|---|
| CAGR | 2 years before event | 2 years after event | 2 years before event | 2 years after event |
| Total Assets | 0.174181*** | 0.057943*** | 0.148214*** | 0.064692*** |
| ROE | -0.008296* | 0.007930 | -0.008132* | 0.006887 |
| ROA | 0.023674* | -0.002648 | 0.023280* | -0.002030 |
| Other operating expense | 0.165185*** | 0.151059*** | 0.165690*** | 0.165123*** |
| **Stock option** | 0.006013 | 0.043126 | | |
| | | | | |
| R-squared | 0.407428 | 0.350959 | 0.407200 | 0.338371 |
| Adjusted R-squared | 0.375397 | 0.321788 | 0.383488 | 0.316317 |
| Number of observation | 79 | 94 | 79 | 94 |

**Figure 7: Regression results for hypothesis 1 and 2.** As stated in methodology, regressions with and without dummy, that is, whether company adopts ESO or not, were performed. All Ordinary Least Squared regressions. The significance is indicated with the indicator of *. *: 10% significant, **: 5% significant, ***: 1% significant

**Figure 8: Distribution of F-value result obtained by the *chow break test***

| | F-value < -4 | -4 < F-value < 4 | 4 < F-value | Inf |
|---|---|---|---|---|
| Number of Company | 0 | 54 | 0 | 1 |
| Significance | Significant | Insignificant | Significant | X |

For the third hypothesis 'The use of executive stock option may have a significant impact on agency costs through affecting the wealth of shareholders.', the regressions with the dependent variable of agency costs were tested. This regression was formed with the independent variables including ROE, ROA, CAGR, and Shareholder Funds with dummy. ROE and ROA do not have any significant coefficient while CAGR shows a positive impact on agency costs at 1% significance level before and after the announcement. This result is not what was expected from the design of regression. On the other hand, the variable 'shareholder funds' has significantly positive coefficient of 0.110607 regarding agency costs at 5% significant level. Also, the dummy stock option has negative coefficient of -0.274257 at 1% significant level, which means that the companies adopting ESO involves less agency costs after its

announcement. With three significant independent variables, it can be concluded that agency costs decrease by adopting stock option, however, positive coefficients of CAGR and shareholder funds are not compatible to what was expected. From figure 9 of appendix, there does not seem to exist significant relationship between shareholder funds and whether stock option is adopted or not. Hence, agency costs may be affected by adoption of stock option but not through affecting the shareholder funds. Hence, the third hypothesis can be rejected.

This test result can help to answer the second sub-question of the paper which is 'How does executive stock option compensation relate to agency costs?'. Even though it was expected that ESO would play a crucial role in reducing agency costs between shareholders and executives by increasing shareholders' wealth, the result turns out to be opposed. Granting ESO can definitely reduce agency costs but this cannot be achieved via increased shareholders' funds. There may be other disturbing variables to distort the relationship. Furthermore, from the additional test for regression between shareholders' funds and stock option, it does show insignificantly negative coefficient. Therefore, to explain more sophisticated reason for the relationship between agency costs and stock option, more variables need to be clearly defined.

| Regression analysis | Regression with dummy | |
| --- | --- | --- |
| Dependent variable | | |
| Agency costs | 2 years before event | 2 years after event |
| ROE | -0.005929 | -0.003539 |
| ROA | -0.006714 | 0.002963 |
| CAGR | 1.497370*** | 0.899280*** |
| Shareholder Funds | -0.045203 | 0.110607** |
| Stock option | 0.111663 | -0.274257*** |
| | | |
| R-squared | 0.455044 | 0.304444 |
| Adjusted R-squared | 0.414677 | 0.268774 |
| Number of observation | 59 | 83 |

**Figure 9: Regression results for hypothesis 3.**

The significance is indicated with the indicator of *.

*: 10% significant, **: 5% significant, ***: 1% significant

From overall results, the last sub-question needs to be answered. Whether ESO can play a significant role as an executive incentive plan to resolve principal-agency problem can be discussed. It may be summed into that ESO did not make something different for financial-related factors such as profitability. There are various external and internal factors affecting

corporate financial performance, therefore, the assumption that it can be affected by only few variables must be too naïve. On the other hand, ESO itself can help to partly sort out agency problem but this does not occur through financial methods. Whether it can occur via extrinsic motivation or intrinsic motivation also should be tested in the future research. To sum, it can be concluded that ESO cannot be a crucial tool to resolve agency problem based on the results.

## 10. Conclusion and Limitation

10.1 Conclusion

Compensation for executives is a crucial aspect to take into consideration in modern management control system. It is necessary for organizations to fulfil align the interests of the shareholders (principal) and executives (agent) (Gopalan, Milbourn, Song, & Thakor, 2014). In the sense, how executives be compensated has been an issue in management control system since Jensen and Murphy (1990) argued the importance of how managers should be paid.

Organizations want to pursue long-term performance to achieve growth in the value of company rather than short-term oriented performance that decreases overall corporate performance (Anthony & Govindarajan, 2014). Cash bonus is a common short-term compensation only emphasizing the short-term corporate performance at the expense of long-term growth, which does not fulfil goal-congruence between the principal and the agent. Therefore, among various types of compensation, stock option that can reflect the effort of executives into long-term performance becomes one possible alternative to cash. Furthermore, stock option can reduce the agency costs by aligning the interests of shareholders and managers.

The goal of this paper was to find what influence executive compensation has on firm value and agency costs. Specifically, how ESO has an influence in firm value and relates to agency cost are main research question of this paper, and additionally whether ESO can play a significant role as a compensation plan to resolve principal-agency problem is discussed. Most previous literature based its sample on U.S and U.K in this topic and not many studies were tested in Korea market. Therefore, the sample companies listed on KOSDAQ were chosen in the period between 2009 and 2017. This market was selected under the assumption that companies listed in KOSDAQ adopts ESO to hire and retain competent and young executives in their employment.

Using ordinary least squared regression and the chow break test, the three hypotheses were tested and the results are as follows:

First hypothesis of whether corporations adopting stock option are different from those without stock option in firm-value growth after granting stock option to executives was tested by OLS regression. The result showed that there is no significant different firm value growth between companies with/without ESO before the announcement of ESO grants. Although the event seems to affect CAGR after the announcement, the result is not significant. Therefore, the hypothesis is rejected, which concluded that after the announcement of ESO, companies with ESO does not show significantly different firm-value growth than companies without ESO.

Second hypothesis of whether long-term firm-value growth of corporations with ESO is different between before and after the announcement of stock option grant was examined by the *chow break test*. Any significant F-value was not found from the result, which means that there seems no break point during the sample period. Therefore, the second hypothesis is also rejected, which implies that financial performance before/after the announcement does not become significantly changed. This was opposed to what was expected in the design process of the hypothesis since companies adopting ESO would experience great firm value growth after its adoption or announcement of grants.

Third hypothesis of whether the use of executive stock option has a significant impact on agency costs through affecting the wealth of shareholders was tested by different OLS regression from the regression taken for hypothesis 1 and 2. From the result of the test, CAGR positively contributes to increasing agency costs. This result, though, is unexpected from the design of regression by stating that the sales growth may help to increase agency costs. It seems that there is no explanans for such result or there must be more explaining variable for the result. Also, shareholder funds also positive impact on agency costs, which means that increasing shareholder funds may induce agency costs. This does not seem to have possible explanans, neither. On the other hand, the regression between giving stock option and agency costs shows significantly negative relationship. Therefore, agency costs may be reduced by adoption of stock option, however, not via affecting the shareholder funds. Then the hypothesis is rejected.

As results of the tests, adoption of ESO may not bring about positive influence in the growth of firm-value and not contribute to reducing agency costs between shareholders and executives.

In turn, stock option for executive may not play a crucial role as a long-term compensation plan. ESO may be considered fixed-pay compensation for past performance rather than long-term compensation for the firm growth in the future. Although stock option can reduce agency costs under the assumptions of the paper, it is not clear how ESO affects agency costs.

10.2 Limitation

In this paper, the sample companies were selected from KOSDAQ market in Korea. Due to the fact that it is difficult to have an access to data for financial statements and compensation of Korean companies under limited authority of EUR, data selection may have a distorted influence on the test result. Even the sample obtained has some missing values in the sample period, then such missing values may affect the robustness of the result. And the sample period is relatively short when the long-term performance needs to be examined. 2 years before and after the announcement of ESO grants may not enough to see the long-term growth of firm value and the effect of stock option. Lastly, there may be more explaining variables for the designed regressions. Since ROE and ROA does not show any significant effect on both CAGR and agency costs, those better be excluded for more sophisticated regression.

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# Appendix

| Year | No. of listed companies | Companies adopted stock option |
|---|---|---|
| Before 2011 | 25 | Exempted |
| 2012 | 27 | 11 |
| 2013 | 25 | 4 |
| 2014 | 26 | 6 |
| 2015 | 10 | 10 |
| 2016 | 14 | 10 |
| 2017 | 13 | 9 |

**<Figure 1: Listed year and option adoption year of sample companies>**

Dependent Variable: CAGR_201
Method: Least Squares
Date: 07/08/18   Time: 19:25
Sample (adjusted): 1 112
Included observations: 79 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| TOTAL_ASSETS_201 | 0.147181 | 0.044127 | 3.335419 | 0.0013 |
| ROE_201 | -0.008296 | 0.005094 | -1.628529 | 0.1077 |
| ROA_201 | 0.023674 | 0.012546 | 1.887008 | 0.0631 |
| OTHER_OPERATING_EXPENSE_201 | 0.165185 | 0.051111 | 3.231857 | 0.0018 |
| STOCK_OPTION | 0.006013 | 0.035589 | 0.168953 | 0.8663 |

| | | | | |
|---|---|---|---|---|
| R-squared | 0.407428 | Mean dependent var | | 0.035436 |
| Adjusted R-squared | 0.375397 | S.D. dependent var | | 0.289374 |
| S.E. of regression | 0.228698 | Akaike info criterion | | -0.051633 |
| Sum squared resid | 3.870393 | Schwarz criterion | | 0.098333 |
| Log likelihood | 7.039485 | Hannan-Quinn criter. | | 0.008448 |
| Durbin-Watson stat | 2.429397 | | | |

Dependent Variable: CAGR_2
Method: Least Squares
Date: 07/05/18   Time: 10:36
Sample: 1 113
Included observations: 94

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| TOTAL_ASSETS_2 | 0.057943 | 0.021036 | 2.754505 | 0.0071 |
| ROE_2 | 0.007930 | 0.008312 | 0.954115 | 0.3426 |
| ROA_2 | -0.002648 | 0.006690 | -0.395811 | 0.6932 |
| OTHER_OPERATING_EXPENSE_2 | 0.151059 | 0.024315 | 6.212686 | 0.0000 |
| STOCK_OPTION | 0.043126 | 0.032825 | 1.313807 | 0.1923 |

| | | | | |
|---|---|---|---|---|
| R-squared | 0.350959 | Mean dependent var | | 0.151133 |
| Adjusted R-squared | 0.321788 | S.D. dependent var | | 0.236026 |
| S.E. of regression | 0.194376 | Akaike info criterion | | -0.386324 |
| Sum squared resid | 3.362589 | Schwarz criterion | | -0.251042 |
| Log likelihood | 23.15721 | Hannan-Quinn criter. | | -0.331680 |
| Durbin-Watson stat | 1.880517 | | | |

**<Figure 2: CAGR regression with dummy for the period 2 years before/after the announcement>**

Dependent Variable: CAGR0
Method: Least Squares
Date: 07/05/18   Time: 10:31
Sample (adjusted): 1 112
Included observations: 78 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| TOTAL_ASSETS0 | 0.070323 | 0.013621 | 5.163036 | 0.0000 |
| ROE0 | 0.012841 | 0.015817 | 0.811861 | 0.4195 |
| ROA0 | -0.013808 | 0.019571 | -0.705534 | 0.4827 |
| OTHER_OPERATING_EXPENSE0 | 0.018410 | 0.011865 | 1.551593 | 0.1250 |

| | | | | |
|---|---|---|---|---|
| R-squared | 0.345550 | Mean dependent var | | 0.057642 |
| Adjusted R-squared | 0.319018 | S.D. dependent var | | 0.144913 |
| S.E. of regression | 0.119585 | Akaike info criterion | | -1.359661 |
| Sum squared resid | 1.058240 | Schwarz criterion | | -1.238804 |
| Log likelihood | 57.02677 | Hannan-Quinn criter. | | -1.311280 |
| Durbin-Watson stat | 2.821135 | | | |

**<Figure 3: CAGR regression for whole period>**

Dependent Variable: CAGR_201
Method: Least Squares
Date: 07/05/18   Time: 10:35
Sample (adjusted): 1 112
Included observations: 79 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| TOTAL_ASSETS_201 | 0.148214 | 0.043417 | 3.413773 | 0.0010 |
| ROE_201 | -0.008132 | 0.004969 | -1.636704 | 0.1059 |
| ROA_201 | 0.023280 | 0.012247 | 1.900852 | 0.0612 |
| OTHER_OPERATING_EXPENSE_201 | 0.165690 | 0.050692 | 3.268559 | 0.0016 |

| | | | | |
|---|---|---|---|---|
| R-squared | 0.407200 | Mean dependent var | | 0.035436 |
| Adjusted R-squared | 0.383488 | S.D. dependent var | | 0.289374 |
| S.E. of regression | 0.227212 | Akaike info criterion | | -0.076563 |
| Sum squared resid | 3.871886 | Schwarz criterion | | 0.043409 |
| Log likelihood | 7.024251 | Hannan-Quinn criter. | | -0.028499 |
| Durbin-Watson stat | 2.429321 | | | |

Dependent Variable: CAGR_2
Method: Least Squares
Date: 07/05/18   Time: 10:33
Sample: 1 113
Included observations: 94

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| TOTAL_ASSETS_2 | 0.064692 | 0.020481 | 3.158655 | 0.0022 |
| ROE_2 | 0.006887 | 0.008307 | 0.829062 | 0.4093 |
| ROA_2 | -0.002030 | 0.006700 | -0.302919 | 0.7627 |
| OTHER_OPERATING_EXPENSE_2 | 0.165123 | 0.021919 | 7.533206 | 0.0000 |

| | | | | |
|---|---|---|---|---|
| R-squared | 0.338371 | Mean dependent var | | 0.151133 |
| Adjusted R-squared | 0.316317 | S.D. dependent var | | 0.236026 |
| S.E. of regression | 0.195158 | Akaike info criterion | | -0.388392 |
| Sum squared resid | 3.427804 | Schwarz criterion | | -0.280166 |
| Log likelihood | 22.25441 | Hannan-Quinn criter. | | -0.344676 |
| Durbin-Watson stat | 1.876988 | | | |

**<Figure 4: CAGR regression without dummy for the period 2 years before/after the announcement>**

Dependent Variable: AGENCY_COSTS_201
Method: Least Squares
Date: 07/08/18   Time: 23:31
Sample (adjusted): 1 112
Included observations: 59 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| ROE_201 | -0.005929 | 0.010464 | -0.566632 | 0.5733 |
| ROA_201 | -0.006714 | 0.027084 | -0.247885 | 0.8052 |
| CAGR_201 | 1.497370 | 0.220916 | 6.778003 | 0.0000 |
| SHAREHOLDERS_FUNDS_201 | -0.045203 | 0.056221 | -0.804036 | 0.4249 |
| STOCK_OPTION | 0.111663 | 0.092662 | 1.205059 | 0.2334 |

| | | | | |
|---|---|---|---|---|
| R-squared | 0.455044 | Mean dependent var | | 0.197316 |
| Adjusted R-squared | 0.414677 | S.D. dependent var | | 0.621585 |
| S.E. of regression | 0.475552 | Akaike info criterion | | 1.432257 |
| Sum squared resid | 12.21208 | Schwarz criterion | | 1.608320 |
| Log likelihood | -37.25158 | Hannan-Quinn criter. | | 1.500985 |
| Durbin-Watson stat | 1.683219 | | | |

Dependent Variable: AGENCY_COSTS_2
Method: Least Squares
Date: 07/08/18   Time: 23:30
Sample: 1 113
Included observations: 83

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| ROE_2 | -0.003539 | 0.014790 | -0.239293 | 0.8115 |
| ROA_2 | 0.002963 | 0.011843 | 0.250180 | 0.8031 |
| CAGR_2 | 0.899280 | 0.175625 | 5.120463 | 0.0000 |
| SHAREHOLDERS_FUNDS_2 | 0.110607 | 0.048203 | 2.294612 | 0.0244 |
| STOCK_OPTION | -0.274257 | 0.063664 | -4.307860 | 0.0000 |

| | | | | |
|---|---|---|---|---|
| R-squared | 0.304444 | Mean dependent var | | -0.027661 |
| Adjusted R-squared | 0.268774 | S.D. dependent var | | 0.397000 |
| S.E. of regression | 0.339482 | Akaike info criterion | | 0.735557 |
| Sum squared resid | 8.989334 | Schwarz criterion | | 0.881270 |
| Log likelihood | -25.52562 | Hannan-Quinn criter. | | 0.794097 |
| Durbin-Watson stat | 1.797337 | | | |

**<Figure 5: Agency costs with dummy for the period 2 years before/after the announcement>**

Dependent Variable: SHAREHOLDERS_FUNDS_2
Method: Least Squares
Date: 07/09/18   Time: 00:05
Sample: 1 113
Included observations: 96

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.435085 | 0.098586 | 4.413259 | 0.0000 |
| STOCK_OPTION | -0.117381 | 0.142420 | -0.824192 | 0.4119 |

| | | | | |
|---|---|---|---|---|
| R-squared | 0.007175 | Mean dependent var | | 0.378839 |
| Adjusted R-squared | -0.003387 | S.D. dependent var | | 0.695929 |
| S.E. of regression | 0.697107 | Akaike info criterion | | 2.136856 |
| Sum squared resid | 45.68002 | Schwarz criterion | | 2.190280 |
| Log likelihood | -100.5691 | Hannan-Quinn criter. | | 2.158451 |
| F-statistic | 0.679293 | Durbin-Watson stat | | 1.944194 |
| Prob(F-statistic) | 0.411917 | | | |

**<Figure 6: The relationship between shareholder funds and stock option>**

| Company name | F-value | Company name | F-value |
|---|---|---|---|
| COM2US CORPORATION | -0.00244 | KOREA ELECTRONIC CERTIFICATION AUTHORITY | -0.00189 |
| NHN KCP CORP. | -0.00135 | DEXTER STUDIOS CO., LTD. | -0.00217 |
| KT HITEL CO.,LTD. | -0.00189 | CUBE ENTERTAINMENT, INC. | -0.00189 |
| NEOWIZ  CORPORATION | -0.00259 | RSUPPORT CO.,LTD. | -0.00189 |
| HANCOM INC. | -0.00518 | PLANTYNET CO.,LTD. | -0.00185 |
| MEGA STUDY CO.,LTD. | -0.00153 | RAONSECURE CO.,LTD. | -0.00189 |
| INFO BANK CORP. | -0.00362 | YD ONLINE CORP. | -0.00189 |
| HANIL NETWORKS CO.,LTD. | -0.00098 | SAMHWA NETWORKS CO.,LTD. | -0.00189 |
| WEMADE ENTERTAINMENT CO.,LTD. | 0.004085 | NEPTUNE COMPANY | -0.00201 |
| DANAWA CO.,LTD. | -0.00189 | ENTERMATE CO.,LTD. | -0.00189 |
| KEYEAST CO.,LTD. | 0.011943 | DEVSISTERS CORPORATION LTD. | -0.00137 |
| JYP ENTERTAINMENT CORPORATION | -0.00188 | HANCOM SECURE INC. | -0.00223 |
| NEXT ENTERTAINMENT WORLD CO.,LTD. | -0.00321 | THE SPORTS SEOUL CO.,LTD. | -0.00189 |
| JOYCITY CORPORATION | -0.00258 | PLAYWITH INC. | -0.00307 |
| MINWISE CO.,LTD. | Inf | HANCOM GMD INC. | -0.00189 |
| BRAIN CONTENTS CO.,LTD. | -0.00189 | CHIPS & MEDIA INC. | -0.00189 |
| SUNDAYTOZ CORP. | 0.000978 | J WAY CO.,LTD. | -0.00189 |
| IGLOO SECURITY INC. | -0.00189 | YEARIM DANG PUBLISHING CO.,LTD. | -0.00189 |
| CHOROKBAEM MEDIA CO.,LTD. | -0.00189 | KMH CO.,LTD. | -0.00236 |
| ESTSOFT CORP. | -0.00152 | AHNLAB, INC. | -0.00189 |
| KINX INC. | -0.00078 | GABIA INC. | -0.00067 |
| SELVAS AI INC. | -0.00189 | UBIVELOX CO.,LTD. | -0.00907 |
| OMNITEL, INC. | -0.00181 | INFOVINE CO.,LTD. | -0.00189 |
| TOBE SOFT CO.,LTD. | -0.00402 | | |
| HANBIT SOFT INC. | 0.001187 | | |
| KL-NET CORP. | 0.003007 | | |
| JOYMAX CO.,LTD. | -0.00231 | | |
| BARUNSON ENTERTAINMENT & ARTS | -0.00189 | | |
| SINCETIMES CO.,LTD. | -0.00189 | | |
| FASOO.COM INC. | -0.00496 | | |
| GY COMMERCE CO.,LTD. | -0.00451 | | |
| ME2ON CO., LTD. | -0.00216 | | |

**<Figure 7: F-value of chow breakpoint test for the companies which announced stock option grants>**