
MASTER THESIS

CEO Stock Option Compensation: Investigation of Economic Periods

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Handed in: 04 2016

Keywords:

CEO stock options, firm performance, CEO compensation, economic expansions, recessions, cycles

A B S T R A C T

The paper focuses on three aspects of CEO stock options compensation: the determinants of stock options, stock options' relationship with firm performance and difference between the efficiency of the stock options' payments during two economic extremes – economic expansions and recessions. The study analyses the data of 1992 – 2014 and subdivides it into 5 periods based on qualitative and quantitative GDP assessments. The results revealed that CEO stock options' payments are positively influenced by firm size, risk, growth opportunities and noise in accounting numbers and negatively by CEO stock ownership, firm liquidity and leverage. Moreover, the study revealed that stock options negatively influence firm performance, negating the general theory of Optimal Contracting and giving some thought for “Managerial Power” compensation setting approach. Furthermore, the exhaustion of Confidence Intervals research approach, provided no evidence on the hypothesis that CEO stock compensation is more efficient during economic expansions.

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Chapter 1

INTRODUCTION

ECONOMIC TRENDS

Nowadays, corporate environment is continuously hit by various exogenous shocks such as economic crises, changes in political regulations or even by natural disasters. There are an uncountable number of events that can affect market participants and top corporate officials have little power in avoiding the risks related to such economic, political and natural tremors. Especially, economic ups and downs play a relatively important role in shaping the success of the newly established and, also, mature corporations. The crises can cause heightened risks, increased competition intensity, due to contracted consumer spending, lower consumer confidence or even struggles to raise money in debt and equity markets to support lucrative investments. Due to the environment recessions build, some companies may even struggle to remain viable businesses.

1.1 Current Economic situation

Different world geographical regions have their own specific economic environments. Primarily, the cultures, religion, political settings, the mind-sets of people, how they perceive development and historical events shape the world's economic situation. Some countries struggle, some are way ahead of others.

The U.S. the economy has recently been growing at a steady pace. The country's GDP increased by a steady 2.25% in 2015. Consumer confidence and spending improved, which was the result of declines in crude oil prices, low unemployment rates (around 5.5%) and escalations in consumers' disposable income. The dollar strengthened and reached its six-year high against the euro, which, on the other hand, reduced the flow of American exports to European countries (Onvural, 2015). Production of goods followed the increase in demand, with an annual growth rate 3.8%. In general, the economic outlook for the U.S. economy was definitely positioned on the bright side in 2015 (Dietrich, 2014).

The largest U.S. firms have also been prospering in 2015. The S&P 500 Index grew by more than 3% (money.cnn.com, 2015). According to the "CFO outlook Survey"¹, the officials were more confident about the economy and business' expectations than they had been in 2014.

In Europe, however, growth was weak with a forecasted GDP growth of 1.3% in 2015. Such growth rate more or less represented that the economy was in a stagnant phase, as the inflation, or, increasing prices, offsets any additional income people might receive. In some countries such as Great Britain and Spain, the growth was more moderate and steady, while in others, such as Germany, France and Italy, the economies were on a

¹ Every year Granite Research Consulting conducts interviews with the major private and public corporations' CFOs to obtain their opinion about their economic expectations for the upcoming year. The 2015 CFO Outlook was formed from 602 interviews (Bank of America Corporation, 2015).

slow recovery path following the recent Eurozone plunge. The situation was quite fragile with predictions that EU countries might experience another economic downturn in the near future (Mafi-Kreft, 2014).

The exports reduced due to the conflicts in Ukraine and a slowdown in China, though weakening euro currency gave a positive push to the augmentation of sold goods to non-EU countries (Economic Outlook, 2014). Inflation was close to zero in the first half of 2015 and budget deficits continued to fall, indicating declining governmental spending. Yet, there was an improvement in the labour markets with rising employment levels (Ec.europa.eu, 2015).

In the Southeast Asian countries, the production rose by 2.2%, with the highest rate of growth in Philippines (Dietrich, 2014). The growth in China was slowing down from double-digit numbers to a humble expected 7% in 2015. India, having a great potential due to its resourcefulness in human labour and natural reserves, still suffered from its unfavourable regulatory environment and underdeveloped infrastructure. The risky business surroundings continued to suspend the entrepreneurial activities and the stimulus of the economic expansion (Mafi-Kreft, 2014).

1.2 Economic Theory

To understand the concept of recessions and expansions and what causes them, we need economic measures. Groot and Franses (2008; 2009; 2012) provided extensive research on the subject, especially concerning the cyclicity of economic variables. For example, they found that basic innovations' cycles closely resemble economy cycles, which means that one could be the determinant of the other. Also, Groot and Franses (2008; 2009; 2012) looked into the cyclical behaviours of socio-economic variables such as Consumer Price Index, Employment, Interest rates, Commodity prices and GDP. They find that, indeed, these variables follow a cyclical pattern.

Thus, one good proxy to indicate whether the economy suffers from a contraction or is experiencing a boom is GDP. The measure expresses the wellness of the country's economy in numerical terms, making it easy to interpret and understand. GDP is known as an estimate capturing the total value of goods and services produced by a single country and can be adjusted by the population levels in order to measure the welfare of an individual (GDP per capita) (Khan, 2014).

Economic expansion (growth in GDP) is also usually followed by other favourable macroeconomic conditions, such as decreasing unemployment and low interest rates. Low borrowing rates tend to stimulate investment and spending therefore pushing the inflation rates a bit higher than they are in economic slowdowns. These figures, together with GDP fluctuations, can also represent in what stage the economy is in.

One of the reasons for the outbreaks of economic recessions (contractions in GDP) is the impairment of businesses' and consumers' confidence. The confidence can be harmed by unpredictability of the future events such as international crises, changing governmental domestic policies, which altogether impacts the future economic outlook. In such conditions, people and firms decide to start saving and remain in the "safe position",

since they believe that in the future they might be short in money. So rather than going for risky investments or purchases, such as new apartments, cars or other luxurious commodities, they save for “more difficult times”. Thus, the uncertainties slow down the economy - people save more, firms earn less profits and the overall economic situation stagnates.

The government can also exacerbate the situation even more by making improper economy policy choices. The government is a legal body that is responsible for people’s wellness. The authorities are required to alleviate the issues of the public goods and the “the free riders”². However, it depends on the competency of the people working in the governmental institutions, their understanding of the overall economic situation and their experience, how well they can handle the economic downturns and what policy choices they come up with. But overall, government has the power to change the situation for the better.

Moreover, a boom in the preceding period can trigger a recession. When businesses are in highly prosperous cycles, they become overconfident and too much involved in the risky projects, which are usually attractive due to their short-term, heightened returns. Financial institutions, such as banks, mutual funds, investment companies or trusts should curb the excessive borrowings, especially to the risky entities, which are more likely to default on their debts. However, historically, we can see that that is not the case. Banks, being too egoistic themselves and being too short-term minded, increase the money supply beyond what should be within reasonable limits (Wall Street Journal, 1965).

On the other hand, the economic growth factors either evolve from the product demand or supply side. On the supply side, technological innovation, the quality and quantity of natural resources and labour force, promote growth and the efficiency of business operations. Companies can afford to produce more goods for lower prices. On the demand side, the population and income growth, exports and incentives, provided by political policies, are major factors contributing to the economic expansions (Skominas, 2006).

In addition, some theorists and economists praise the theory of free, self-correcting markets, also known as “laissez-faire”. They claim that only free economy can be the provider of the continuous prosperity. However, the history of the 20th century shows that economies have departed from free demand and supply model (Handlin, 1963). Currently some levels of regulation exist to correct for some unavoidable externalities, to provide public goods and decrease the asymmetrical information irregularities (Friedman, 1986). Therefore, policy choices, such as pondered monetary and fiscal policies to control for inflation, interest rates and unemployment, can lead to better equilibrium of the economy and also minimize the costs imposed by market failures or industry shocks. In general, with all the means what economy is trying to achieve, is a perpetual prosperity (Wall Street Journal, 1965).

² “A free rider problem” – a free rider is a person who uses goods, which have been paid by some other user. These goods are normally considered as public goods, since they are available to more than one user. Good examples are: education, street lighting (Pasour, 1981)

1.3 Historical Overview

1.3.1 Dot-Com Bubble

The period of 1992 - 2000 was characterized by a rapid development, particularly in information and communication technologies (ICT). Prosperity and economic growth was steady, production and consumption levels escalated (Daveri, 2002). After the invention of the Internet, entrepreneurs discovered the potentiality of e-commerce, requiring low investment in corporate assets. This new platform represented a new business distribution channel for the selling of services and products. In this period, many businessmen started their companies, or the so called “dot com” firms, which entirely ran their businesses via the Internet. In the late 1990s, entrepreneurs launched a staggering number of about 8500 new online businesses, in the hope of becoming rich through the exhaustion of this innovative market branch (Wang, 2007).

The period ended in a collapse of many small companies with losses reaching trillions of dollars. The declines in stock prices brought 4.4 trillions of dollars of market value loss triggering a short economic recession (Goldfarb et al, 2007). The Dow Jones Industrial average reached its high in 2000, but shortly started to fall and by the late 2002 it lost 43% of its value (Martin and Ventura, 2012). NASDAQ lost 78% of its value and a stunning number of 5000 “dot-com” firms exited the market in the early 21st century (Wang, 2007).

The most widely recognized feature of the dot-com bubble is the overpricing of the Internet Initial Public Offerings. In 1999, the first day returns of IPOs reached a staggering 73 percent, while only three years ago, in 1996, its average was at 17 percent (Ljungqvist and Wilhelm, 2003).

Usually, the stock price is set in accordance to the firms’ earnings, but at this period, IPOs traded at multiples of the profits. Such elevated stock prices were irrational and too exuberant leading to major losses when the bubble burst in 2000. As online businesses grew in numbers, some argued that earnings were no longer relevant to define the stock price. Metrics, such as the number of clicks or page views, and investors’ confidence in the business were the drivers of stock price (Morris and Alam, 2012).

1.3.2 Booming 2003 – 2007 years

In 2003 – 2007 the economy underwent a steady expansion. This period is also known as the years of “Great Moderation” with low inflation levels and steady growth, fostering complacency and investments in risky projects (The Economist, 2013). In the U.S., the growth of GDP reached 2.6% per year and, internationally, GDP grew by an outstanding one-third (Kotz, 2011; Grigor’ev & Salikhov, 2009). The boom was primarily influenced by governmental spending and growing consumption, which, in turn, positively affected business investments. The robust growth was reached in 2004 – 2005 period with consumer spending leading the GDP boost. However, as consumer spending elevated beyond its normal relation to household income, it induced capital over-investment in fixed assets, which eventually was one of the reasons of 2008 liquidity crisis (Kotz, 2011).

1.3.3 Global Economic Recession

The 2008 liquidity crisis was ensued by a deep global recession. The world has not experienced such economic meltdown since the times of a Great Depression in 1929 with consequences spreading all over the globe. Starting in the U.S., the crisis hit the strongest economies and even led to a bankruptcy of the Lehman Brothers in September, 2008 (The Economist, 2013; Kapan & Minoiu, 2014). The bankruptcy reduced consumer confidence showing that there was a scarcity of reliable brands (Grigor'ev & Salikhov, 2009). Other major financial institutions nearly came to destruction and only governmental bailouts reaching trillions of dollars saved the banking system from collapsing (Mathiason, 2008).

The crisis began with the mortgage crisis in U.S. when enormous write-downs took place leading to initial losses of approximately 800 billion dollars from July, 2007, up until August, 2008 (Grigor'ev & Salikhov, 2009). During the prosperous 2003 – 2007 period, American banks gratuitously granted subprime mortgages to risky borrowers which were highly unlikely to pay their debts on time. The greedy mortgage brokers deliberately lowered the requirements for mortgage claims and created excessive risks to the banks, just to receive higher commissions and bonuses. Initially, the short-term returns looked very appealing, but after the bubble burst, lots of bad mortgages had to be written down (Aleksashenko, 2009).

According to Kotz (2011) one of the reasons of the major financial crisis could also have been over-investment. When companies produce too much fixed capital relative to demand, it leads to decreasing utilization and capacity rates. Such over-investment results from corporate goals to increase market share, however, it is impossible for all companies to boost their market share because it only adds up to 100 percent in any industry.

The financial crisis led to contractions in GDP of developed countries (Grigor'ev & Salikhov, 2009). In the U.S., it stalled at an annual growth of 0.7 % in the first half of 2008. In the fourth quarter it fell and reached a low of -6.8%. The fall in GDP was accredited to reduced business investment and consumer spending (Kotz, 2011).

1.3.4 Recovery

Since 2008 financial crisis, economy has been on a slow recovery mode. The financial sector recuperated with steadily growing financial profits and market capitalizations. Corporate profits bounced back and arrived at a record high of a share of GDP in 2013. It rose by approximately 20.1% a year stabilizing the depressed economies (Plumer, 2013). Most of the world economies experienced convalescing GDP changes since 2009.

EQUITY BASED PAY IN COMPENSATION CONTRACTS

Compensation is a part of every employment contract that any worker receives when he/she starts one's the position. They are the means that help to control for corporation risks of goal misalignment between the labour and the owners of the company, for example, by using the key performance indicators as compensation drivers. The contract defines what sort of payments employee will receive and to what extent.

1.4 Compensation Structure

Every CEO compensation contract is different in terms of various sorts of pay it offers. Executives may receive their compensation in the form of base salary, annual bonuses, restricted stock, performance shares, stock options, retirement benefits and other perquisites related to health care, memberships and the use of corporate assets (Murphy, 2013). The value of some of the forms of payments such as restricted stock and stock options depends on executive's performance, especially if he/she managed to generate high returns and, in turn, elevate the share price from which he/she can benefit. Other forms of payments are received as a one-off amount. These include severance payments given upon contract termination and change-of-control payments, which are paid after the mergers (Murphy, 2013).

1.5 Historical Overview

1.5.1 Stock Options Explosion

From 1992 to 2001, stock options usage in compensation contracts sprang up. Favourable conditions for stock options' issuance to corporate officials led to their growing popularity. By 1996, options became the most used component of pay in S&P 500 firms (Murphy, 2013).

One of the factors that contributed to such tremendous growth was a rising belief that executives should be paid for superior performance, variable to their compensation. Such views gained approval from shareholder activists and spurred advocacy of more stock ownership and extensive use of stock options (Murphy, 2013).

Another major factor of stock options' explosion in compensation contracts was favourable accounting rules. For example, on May 1, 1991, SEC adopted a rule stating that option grant accounted as a stock purchase. The SEC Holding-Period rules indicated that managers cannot sell the shares after the purchase for 6 months. Therefore the new law allowed officials to sell their shares immediately upon the exercise (they would wait for six months after the grant) (Murphy, 2013). In addition, in 1995, FASB launched a regulation which only recommended but did not require to expense the fair value of options granted assuming that this form of compensation creates zero costs to the company. The presumption, of course, was not true, since the grants had opportunity costs, which comprised the size of what the company could have received if it sold the option to the open market (Murphy, 2013).

1.5.2 Changing Regulations

In the early 2000s major accounting frauds committed by large corporations were unfolded. Enron, Worldcom, Global Crossing and many more were found guilty of various accounting crimes. The scandals led to the regulators passing the Sarbanes-Oxley Act, 2002, which not only expanded the standards for auditors, board of directors and accounting firms, but also put some regulations on executive pay (Murphy, 2013). Its major contributions to compensation contracts were the prohibition of personal loans to executives and the disclosure requirements for stock option grants. A new rule established that new grants should be disclosed within two business days, which, apparently, prevented stock option backdating. The existence of this fraudulent practice, however, was only discovered more than two years later (Murphy, 2013).

Another important legislation that was put in place was the revised FAS123 in 2005. The law finally required all U.S. firms to recognize the new grants of stock options as an accounting expense. The change in the accounting treatment of executive options largely affected the popularity of stock options as a form of compensation (Murphy, 2013). Hayes et al (2012) found evidence that the accounting benefits related to stock options were an important driver of their usage prior the implementation of the revised FAS123.

After the imposed regulations, major accounting scandals that put pressure on firms to report the stock option expenses, and also the stock market crash in 2000s, stock options usage fell considerably. Still in 2001, stock options accounted for more than a half of the compensation pay. In a decade, its usage dropped to 21%. Though, in replacement, executives received higher bundles of other equity payments such as restricted stock and performance shares. In 2011, such restricted stock presented 31% of pay, on average (Murphy, 2013).

1.5.3 The Dodd-Frank Act and “Say on Pay”

In the wake of the financial crisis, U.S. president Obama signed the Dodd-Frank Act in July 2010. The Act imposed new regulations and pay restrictions for all financial institutions, for example, requiring to fully disclose any incentive-based compensation that could result in material financial losses or encouragement of inappropriate risks (Murphy, 2013).

The Act also seized the opportunity to put restrictions on all publicly traded firms. “Say on Pay”, a non-binding shareholder vote on executive compensation, was made mandatory. The legislation requires the U.S. companies to hold the vote on executive pay at least every three years. In accordance, companies are also insisted to compare the compensation package of CEO with the median compensation of other workers. This provision was especially one of the most hurtful ones since it imposed large costs to companies, particularly to those with decentralized payroll systems (Murphy, 2013).

The Dodd-Frank Act also assumed the responsibility to improve corporate governance by addressing compensation committees’ independence, however, it had little successive effect. Prior regulations such as listing requirements in NASDAQ and NYSE necessitated the unbiasedness of compensation committees in 2003. Internal Revenue Service in U.S. also required that compensation committees would mostly be

composed of independent directors from as early as 1994 (Murphy, 2013). Nevertheless, the Act contributed to the strengthening of the existing rules.

RESEARCH

1.6 Research Question

Parts 1 and 2 depicted the whole picture of the topic and historically viewed how the economic times and the structure of the compensation have changed over the years. The Timelines, in the further section 3.2, summarize all the main historical events and cycles from the 1992 up until 2014. The timelines help to see how executive compensation contracts and different economic periods are related to each other. It also raises a question – are they truly related? Is the compensation structure and the size of the compensation linked to different economic periods?

It follows that the questions of this research are: what determines CEO stock option compensation, how do stock options' incentives throughout different periods influence firm performance? When stock options' payment is more efficient, during economic expansions or recessions? The interest lies in whether compensation contracts are effective in achieving their implicit goal of incentivizing performance.

1.7 Motivation

Executive compensation, typically comprising a considerable portion of company's profits, is relevant to various institutional and individual shareholders, investors, debtholders and other stakeholders involved in corporate matters. According to Bebchuck and Fried (2003), almost 8% of corporate profits were distributed to CEOs of 1500 firms included in the ExecuComp database in 2003. Knowing that there are corporations that earn millions of profits, it really becomes a concern to various stakeholders, whether executives truly deserve such a high compensation payoffs? Is the performance of the company totally determined by the choices of the top players within the company?

Nevertheless, the executive pay had grown rapidly during the bull market in 1990s and such intensified unprecedented boost was criticized as being the outcome of increasing managerial power (Bebchuck and Fried, 2002; Bebchuck and Fried, 2003). However, Kaplan (2008) disagrees and claims that CEO pay is determined by market forces. He provides five arguments to support his view: 1) CEO pay has been subject to expansion in economies, 2) other talented groups such as hedge funds, private equity, venture capitalists, professional sports players have also seen large increases in wages, 3) CEOs are paid for better performance 4) CEO job is becoming riskier as turnover levels are declining and 5) the job is now more stressful and less enjoyable. The controversy between academics requires further investigation of executive compensation practices.

The politicians are also not satisfied with growing executive pay and are continuously trying to curb the CEO and CFO compensations through various regulations such as Sarbanes-Oxley Act or Emergency

Economic stabilization Act, which placed pay restrictions on TARP recipients³ (Murphy, 2013). Such regulations were needed to limit excessive risk-taking and executive short-sightedness (Flor et al, 2013). Since revenue allocation must have reasonable grounds, there should be a proof that executives deserve their high wages. Executive compensation, acting as a generator of incentives to managers, is an agency expense of shareholders. The goal is to find the size and structure of executive pay that could contribute to the maximization of shareholders' wealth.

CEO compensation contracts have been viewed as an important tool in mitigating the conflicts of interests between managers and shareholders. It has been broadly acknowledged that compensation packages play a key role in incentivizing the board. Thus, it is imperative to understand how the compensation is set and whether there is a link between the compensation and performance. By studying the compensation packages and its effects during different periods, it is possible to determine how the compensation should be restructured given economic recessions and expansions.

1.8 Contribution

1.8.1 Academic Relevance

Given the controversies between the academic viewpoints, the current study further enhances the understanding between the relation of equity-based compensation and firm performance. The paper also contributes to the research of the pay practice, specifically the optimal contracting and managerial power approaches introduced by Bebchuk and Fried (2003). By analysing various corporate governance indicators influencing compensation, one could reason which viewpoint is stronger in explaining differences between executive pay in the firms with their unique characteristics and in different time periods.

1.8.2 Practical Relevance

As already mentioned, the determination of executive compensation is relevant to various parties. Politicians provided with the results of the study could be helped in delivering evidence and could be advised for taking further actions on regulatory system, especially relating to variations in economy cycles. During the crises or expansions different regulations might need to be put in place to address the situation and ensure that the economy is not too volatile. If the economy is suffering from constant ups and downs, business confidence would be severely damaged and appropriate decisions would be hard to make for market participants. The setting of appropriate pay, size and structure, whilst taking into consideration the variability of industries and other firm characteristics could be one of the ways to ensure that managers are properly incentivized so that they run their businesses without taking too much risk. As recently many laws have been put in place to restrict

³ TARP - Troubled Asset Relief Program. It was introduced after the enactment of The Emergency Economic Stabilization Act in October 2008. The Act was proposed to relieve the liquidity problems of financial systems during 2007 – 2008 crisis through buying illiquid assets from the banks and other financial institutions. A budget of a staggering \$700 billion was used for these incentives (Murphy, 2013; Ericson et al, 2015).

the pay practices, due to negative opinions that executives are being overpaid and because of various economic shocks that occurred in the last 20 years, the study could provide justification for establishment of new laws or to support the existing ones.

Shareholders are also interested in the pay practices, since the compensation is deducted from their share of the profits. The study could give required evidence on whether executives are overpaid and what is the best structure of pay given the changes in economy cycles. Such evidence could help owners of the company to understand the executive pay better. During the “Say on Pay” poll, the study could provide them with an informed view whether to accept the proposed executive compensation or to vote against it. According to Murphy (2013) “Say on Pay” is quite a new practice, especially in the U.S., therefore shareholders need more advice on this matter. The revelations of the study could be passed on to the shareholders through the executive compensation consultant companies.

Corporate officials also need justifications for their compensation. If there is evidence that compensation is tied to firm performance, then CEOs could rest assured about their pay rises. Kaplan (2008) listed reasoned five arguments why CEOs are likely to be underpaid rather than overpaid. If CEOs are truly underpaid then the labour market of corporate officials suffers from these informational frictions and beliefs of too high executive compensation. The study could contribute in helping to set appropriate compensation for corporate officials and induce more talented individuals to become CEOs and CFOs.

1.9 Structure

The structure of the thesis is as follows: Chapter 2 reviews the literature on executive compensation with a significant focus on the variable pay. Chapter 3 introduces theoretical explanations, which are used to build the main hypotheses. Chapter 4 discusses the methodology and Chapter 5 gives a profound description of the results. Chapter 6 concludes and provides recommendations for practice together with limitations of the study and propositions for further research.

Chapter 2

LITERATURE REVIEW

2.1 Executive Compensation and Risk Taking Incentives

Managers usually tend to be rather risk averse when considering investment projects, which results in rejection of highly positive, but rather unsafe NPV projects. Shareholders want to induce more risk-taking since, in this way, they can maximize their returns. Executive compensation contracts and especially the equity based pay serves as a means to overcome the problems of risk-aversion in management decisions. However, equity pay, especially the stock option grants, can also impel managers to take on too much risk, since the value of the call options increases with the stock volatility (Ju et al, 2014). Thus, a fraction of literature on executive compensation studies the relation between the equity pay and incentives to take on risks and whether it induces excessive risk taking.

Ju et al (2014) studies the risk choice and optimal compensation contracts. The pay is a function of various forms of compensation – fixed payments, stock and stock options, either lookback⁴ or ordinary. The authors find very interesting results related to different equity payments and the effects on risk taking. Using the simulation methodology, Ju et al (2014) discover that lookback options are the most optimal compensation form to achieve the finest levels of investment risk. The stock options were found to be least optimal, followed by less risk distortion through the grants of restricted stock⁵. They also claim that lookback call options are similar to option repricings⁶ but without their drawbacks, such as provision of wrong incentives *ex post*. Therefore, they prove to be superior for inducing optimal risk taking incentives and higher value generation for stockholders.

Another study by Dong et al (2010) examines the equity pay and how it affects the capital raising decisions. Such choices also contribute to the volatility of firms returns, since, even though debt has its benefits (interest is tax deductible), more debt creates additional risk. Some firms therefore are either overleveraged or underleveraged. Dong et al (2010) uses the literature on target capital structure to arrive at optimal debt and equity levels for every firm using a sample of 3734 security offerings from 1993 to 2007. They find that managers indeed tend to issue debt rather than equity when they have larger holdings of stock options and the results hold for both, overleveraged and underleveraged firms. Another important finding by Dong et al (2010) is that equity ownership does not have the same effect on the directors' preference for debt over equity in financing decisions. In general, their findings do not support the theory of goal alignment between shareholders

⁴ Lookback call option is a type of stock option that is always granted in the money (Ju et al, 2014).

⁵ Restricted stock is a type of stock grant which vests after some passage of time (Murphy, 2013).

⁶ Option repricings – when call options are deep out of the money (the actual stock price is below the exercise price), call options are repriced to restore the managerial incentives (Ju et al, 2014).

and directors achieved with the use of the grants of stock options. Rather, it induces sub-optimal capital structure decisions and might even cause heightened risk levels that are beyond shareholders' desires.

Chen et al (2006) research the stock options' effect on risk incentives in the banking industry. The industry in itself is highly regulated in comparison to other industries and therefore one of the motivations behind the study was the increasing banks' independence during 1990s. As Chen et al (2006) report, in 1990 the Federal Reserve permitted banks to sell stocks with a ceiling of 10% of their revenues, raised to 25% in 1994. The authors used four measures of bank risk to capture the concept: total, idiosyncratic, systematic and interest rate risks. A sample consists of 591 observations from 68 banks over the 1992 – 2000 year period. Using the four models for every risk, they find robust results for each model that executive stock options in the banking industry, indeed, induce risk-taking. They also find that stock option usage in the industry increased significantly in 1992 – 2000 as a result of deregulation.

Armstrong and Vashishtha (2012) divide the risk into systematic and idiosyncratic and study how ESOs (Executive stock options) affect each of them. They examine 1992 – 2007 period assembling more than 13,000 observations. Their results indicate that stock options induce taking risky projects. Especially if managers face the multitude of different business ventures characterized by different risks, they would prefer to choose those investments that have a larger systematic rather than idiosyncratic risk component. This can be explained by the fact that systematic risk can be hedged by executives. Armstrong and Vashishtha (2012) also find that equity ownership increases the incentive to take on more idiosyncratic risk proving the theory that equity ownership of executives aligns the interests between managers and shareholders.

By using three-stage-least square model, Chen and Ma (2011) examines the risk-taking effect of ESOs on firm performance. They set up three equations. In first equation they derive the function of stock options by including the factors that most likely affect the decision to use stock options in the executive compensation. Second equation uses the latter one to determine the risk measure. Lastly, the third equation incorporates the risk measure and determines the firm performance. Chen and Ma (2011) find that there exists a non-linear relationship between stock option grants and risk. It means that too much executive compensation in stock options can have negative effects on firm's optimal risk and a low level of ESOs can positively affect risk-taking. Subsequently, they find that the risk induced by ESOs have a positive effect on firm performance measured by average returns on invested capital (accounting performance) and average monthly stock returns (stock performance). As they differentiate between the long- and short-term performances, their findings also show that risk-taking effect of stock options is evident and positive in the long-run, while negative in the short-run.

Another study by Hayes et al (2012) could not support the relationship between stock options and risk incentives. The study researches risk-taking effect of stock options 3 years before and after the exogenous shock in 2005, the implementation of revised FAS123. FAS123 changed the accounting treatment of stock options. Before the rule's enactment, no compensation was recorded if the exercise price of options was fixed

at the stock price on the grant date. This law eliminated the accounting benefits of stock options and mandated to expense them at their intrinsic value. Thus, Hayes et al (2012) find a decreasing trend in the use of stock options after 2005. Their results show that stock options are not used as an incentive to stimulate risk-taking behaviour since they do not find that the decline in stock options has been accompanied by a decrease in firm's risk.

The study by Wu and Tu (2007) considers the risk as the propensity to invest into R&D projects. Investments in R&D have large initial outlay costs and their returns are very uncertain creating large risks to the company. Therefore, Wu and Tu (2007) test whether CEO stock option pay induces R&D spending or, in other words, risk-taking behaviour. The design of the research includes the firms from 4 industries with highest expenditures on R&D – the pharmaceuticals, chemicals, electronics and aerospace. It takes into account the period of 1995 – 2004 and the firms from S&P500 Index. The most important finding of the study reveals that R&D is, indeed, significantly affected by the CEO stock option pay. Wu and Tu (2007) also conclude that firm performance have a moderating influence on the relationship: when performance is high, the stock option effect on R&D expenditures is positive, when performance is low, the effect is not evident.

2.2 Executive Compensation and Firm Performance

Clearly, due to the rise in stock options' usage in 1990s, a lot of research has been done on the question whether executive compensation, especially the variable, equity-based pay, is one of the drivers of firm performance. A large pay could influence the manager to make value maximizing decisions, since he/she would want to retain his/her position in the company. However, shareholders are unaware if the decisions executives make are the best. Managers could also seek personal benefits and disguise it with quite profitable performance without the owner realizing it. The equity-based pay is believed to minimize the agency problems and provide the right incentives. Thus, a plethora of research tests the theories on executive compensation and tries to derive the optimal pay.

One of the earlier studies on executive compensation was made by Mehran (1995). He examines the relationship between compensation structure and firm performance using Tobin's Q and return on assets. His sample includes 153 manufacturing firms and the study embraces the period of 1979 – 1980. By applying OLS and adding essential control variables, such as growth opportunities, leverage ratio, business risk and firm size, Mehran (1995) discovers that the form rather than the size of compensation is what matters. Mehran (1995) specifically finds that equity-based compensation and stock executive ownership is positively related to firm performance meaning that stock options can help to mitigate the conflicts of interest between owners and directors.

Aboudy et al (2010) differentiates between executive and non-executive directors and study whether repricings of stock options leads to an improved firm operating performance. The main reason behind the

repricings is the restoration of incentives in the case of stock price drop below the exercise price⁷. The researchers use the 1990 – 1996 period with the sample of 1364 firm-year observations. The firms were selected based on existence of three features – they had at least an annual 30% drop in stock price, market value was above 10 million dollars and the ratio between the shares reserved for stock options and common shares was above 10%. The results show that option repricings do, indeed, positively influence firm performance on a long-term through the restored incentives. They also find evidence that executive stock option repricings provide incentives to improve performance, while non-executive repricings do not exhibit subsequent improvements in relation to control group. These findings support the claims that the option grants to lower-ranking employees are not sufficient incentives to affect firm performance.

Another study by Core et al (1999) investigates how corporate governance, expressed in terms of various board ownership and structure characteristics, affects firm performance. As certain board characteristics enable management to exercise power and extract higher compensation, the authors create a variable called “predicted excess compensation”, which is the amount that is paid extra on top of the equilibrium wage that is determined by market forces. The variable is regressed against firm performance for the sample of 205 publicly traded U.S. firms in the period 1982 - 1984. The results show that excess compensation has a negative effect on firm performance. Such outcomes lead to the conclusion that bad corporate governance or high managerial power in firms leads to an impairment of performance. The study therefore emphasizes the importance of board characteristics and corporate governance mechanisms, which are important factors in determination of compensation and firm profitability.

Again, one of the research questions of the Conyon’s (2013) study also asks what the impact of executive compensation on firm performance is. He uses the period of 2008 – 2012 and the data from S&P 1500 firms. Conyon’s (2013) research follows other studies on executive compensation and uses two measures to calculate firm performance: market-based stock returns and accounting-based return on assets (ROA). He provides evidence that on average, executive pay is significantly related to firm performance, contributing to existing theories that executive pay contracts can create positive incentives to directors.

Brisker et al (2014) study how managers’ wealth sensitivity to stock price, expressed as the sum of the top five executives’ total portfolio delta divided by total compensation (TPD5), is associated with post stock issue and operating performance. The authors use S&P 1500 firms for the period 1993 – 2006 for seasoned equity offerings and 1993 – 2009 for monthly stock performance. They find that in those firms where executives receive higher equity-based compensation, the stock performance underperforms after the equity issue. Also, operating performance in high TPD5 firms is worse than in low TPD5 firms following the equity issue. The results mean that managers’ and current shareholders’ goals are aligned, in a sense, through the usage of executive stock option grants. Executives, having more equity-based pay, are more likely to time equity

⁷ As call option grants give executives the possibility to buy the stock at a predetermined exercise price, the option is only valuable to utilize if the exercise price is below the market price. If the market price is lower, then executives would be better off buying the stock on the market instead of using their options. Thus, such options lower managers’ incentives

offerings to new shareholders when the share price is at its peak or is overvalued. By issuing overvalued shares, directors are able to allocate wealth to the existing stockholders at the expense of new ones.

Chen and Lee (2010) develop a dynamic model to measure how long the incentive effect of the ESOs lasts on firm performance. They find that ESOs induced by firm growth opportunities and risk positively influence firm performance for 1 year. If executives respond to ESOs by raising investment by 1%, the firm performance measured as return on invested capital will increase by 1.24%. They use 1992 – 2005 period covering 2010 firms.

2.3 Executive Compensation Determination

Chourou et al (2008) research looks into factors that influence the level of CEO stock option compensation. Specifically, they study the effects of firm and individual level determinants, such as firm size, specific risk, firm leverage, CEO age, tenure, stock ownership, etc., on stock option grants. As most of the research focuses on American firms, Chourou et al (2008) contribute by looking into Canadian market and thus fill the research gap resulting from researchers' ignorance on other markets. They use the Tobit model. The findings show that stock-option compensation is induced concavely by specific risk, negatively by CEO stock ownership, blockholder ownership, CEO age and leverage, positively by firm's growth opportunities and firm size.

Another study by Tzioumis (2008) researches the U.S. market. His period of research is quite expansive embracing the period of 10 years from 1994 – 2004. The author specifically looks into whether CEO turnover, firm liquidity, CEO horizon hypothesis, firm's pursuit for executive talent and agency costs influence the adoption of stock options. He also includes other control variables to improve the model fit. By exhausting the Logit estimation benefits, the researcher finds various results for his independent variable. He discovers that CEO turnover occurrence improves the reliance on stock option grants. A firm that experiences a CEO turnover is more likely to adopt stock options as CEO pay by 30%. Such results support the theory that CEO stock options alleviate the sorting and screening costs of recruitment since executive contract serves as an incentive to a new CEO to show dedication and assurance of his/her abilities. Tzioumis (2008) could not find support for the horizon problem⁸ and liquidity hypotheses⁹ but he finds that there is a strong negative relationship between CEO age, stock ownership and the likelihood of stock options' adoption. The stock ownership negative effect can be explained by the fact that executives, already owning considerably large portion of a company, have their interests aligned with the stockholders. In this case, options can give little additional incentives. Also, as CEOs age, they are less likely to exercise their options and they have an inclination for risk aversion. Thus, such trends render stock option compensation less optimal for executives that are older.

⁸ Horizon problem – CEOs close to the retirement age might prefer safer and less expensive R&D projects. These investments enhance firm's accounting returns in the short-term and discount long-term efficiency improvements (Tzioumis, 2008)

⁹ Liquidity hypothesis – firms having liquidity problems will choose to pay their employees more in stock options to preserve cash (Tzioumis, 2008)

Yermack (1995) provides one of the earlier studies on various factors that influence the stock option awards. His period of research is 1984 – 1991 giving a profound understanding why companies might have used stock options at that period characterized by quite unlike economic and firm level conditions to today’s environment. Nevertheless, he proposes 9 hypotheses, uses Tobit regression to test them, but finds support only for three of them. First, he concludes that industries that are highly regulated (utility, banking and insurance) rely less on stock options awards. Second, firms provide more options to executives when the accounting numbers contains more ‘noise’¹⁰. Third, liquidity problems shift the compensation practices from cash salaries to the use of stock option compensation.

The study of Lin et al (2012) proposes that those firms that are more financed with debt construct managers’ compensations in a way that provide greater incentive strength. They find support for their proposition by showing that financial leverage (book or market) is strongly and positively associated with CEO stock option grants. Following the previous researches they construct a Tobit model and produce various robustness checks that strengthen the validity of their results. Some other results that the authors provide are the positive influences of firm size, growth opportunities, financial liquidity and risk and negative effect of CEO age on option-based compensation.

The table below presents the summary of the findings of the four authors.

Table 1 Determinants of Stock Compensation

	Authors			
	Chourou et al, 2008	Tzioumis, 2008	Yermack, 1995	Lin et al, 2012
CEO age	-	-	No support	-
Liquidity	No support	No support	-	-
Firm size	+	No support		+
Risk	Concave	+		+
Firm leverage	-		No support	+
Stock ownership	-	-	No support	
Growth opportunities	+		-	+
CEO horizon	No support	No support	No support	
Regulated industries	-	-	-	
Noise in Accounting numbers	+		+	
Tenure	No support			
Blockholder ownership	-			
CEO turnover		+		

In the Table 1 we can see all the variables studied by the four researchers and that were expected to possibly have an effect on stock compensation. Minuses and pluses indicate whether the variable has a positive or negative influence. The “no support” statement means that the study could not find support for the hypothesis, or, in other words, that no relationship exists between the variable and executive compensation.

¹⁰ Noise in accounting numbers can be calculated by comparing the accounting based returns (return on equity) with the stock-based returns (shareholders’ returns) (Yermack, 1995).

2.4 Equity-Based Compensation and Corporate Governance

Some studies on equity-based compensation and corporate governance are also important since good corporate governance mechanisms could be the drivers of firm performance. For example, Jeong and Kim (2013) study how equity-based pay given to outside directors influence accounting conservatism. Conservative accounting, in a way, is related to corporate governance. Firms that have good corporate governance mechanisms have fractional informational asymmetries between shareholders and owners and accounting conservatism is also related to reduction of these agency costs. Therefore, Jeong and Kim (2013) use OLS regression and find evidence that equity based compensation to outside directors is a positive incentive to use conservative accounting. The researchers prove that equity-based pay to outside directors can induce the enhancement of corporate governance mechanisms that, in turn, reduces the information asymmetries.

2.5 Economic Cyclicity

Is economic cyclicity a real phenomenon? Can it be determined, how long does it last and why do variations in economy happen? As is commonly known, economic cyclicity refers to the ups and downs of the economy usually referred to as economic recessions and expansions. Some believe that economic cyclicity is a causal effect of exogenous, unpredictable shocks to the economy. Another view is that cyclicity is always there with its deterministic nature (Groot and Franses, 2008). B. D. Groot and P. H. Franses give extensive contribution to the literature on cyclical behaviour of economic variables.

The first work of Groot and Franses (2008) on cyclicity involves consideration of 33 economic variables¹¹ from three industrialized countries: U.K., U.S. and the Netherlands. The time horizons for each variable studied lay in the period of 1600 – 1999 years. Groot and Franses (2008) find that economic variables do display cyclical behaviour, where the cycles can be characterized into four groups with periods of 10, 26, 57 and 92 years, on average.

In addition, another study by Groot and Franses (2009) further reveals how important innovations are to economic cycles. They used an extensive period of 1764 – 1976 from the Silverberg and Verspagen basic innovation super sample and exhaust Harmonic Poisson regression models to address the problem of limited discrete Y_i values. They prove the three hypotheses they propose: innovations are cyclical, they tend to cluster and there is a relationship between the cycles of innovations and economy. The results imply that stagnation (boost) of innovation could be a driver of economic slowdown (expansion).

Lastly, Groot and Franses (2012) look into Kondratieff-wave literature on cyclicity and conduct a meta-analysis. By considering the results of a plethora of papers, they discover that the cyclical behaviour of the economic variables clusters around the standard deviations with its mean around 8, 21, 32 and 55 years. It quite closely resembles the results of Groot and Franses (2007). As this paper takes into account most of the

¹¹ The variables they study include: national product mix, industrial production mix, Employment, consumer price index, wage index, short interest rate, long interest rate, equity price index, dividend yield, population, corporate bond yield (US, UK), equity total return index (UK).

research done on socio-economic variables, the results establish how often the economy could change, on aggregate.

2.6 General Review

The summary of the literatures can be found in the Table 2 (Appendix, p.52 - 62). The Table lists all the authors (years), the names of the papers, research questions, data, methodologies and key findings. The main idea that comes from the literature review is that executive compensation is, indeed, a good medium to address the agency problems that arise from increasing ownership dispersion and separation between ownership and control. Most of the papers on risk-taking incentives provide evidence that equity pay induces more risk taking (Chen et al, 2006; Wu and Tu, 2007; Armstrong and Vashishtha, 2012; Ju et al, 2014). Chen and Ma (2011) further prove that risk-taking induced by ESOs, in turn, positively affects long-run firm performance. Chen and Ma's (2011) results are in line with other literature on executive compensation and firm performance, which mostly find that equity-pay can improve firm's performance (Mehran, 1995; Aboody et al, 2010; Chen and Lee, 2010; Conyon, 2013; Briskier et al, 2014). Jeong and Kim (2013) also find that some corporate governance mechanisms (accounting conservatism) can be bettered through the use of equity-based compensation.

Some papers, though, cannot establish that equity-pay aligns the interests of owners and directors. Dong et al (2010) finds that managers that hold stock options, do not opt for optimal capital raising decisions. They tend to choose debt instead of equity, disregarding what the optimal level of company's leverage should be. In addition, Hayes et al (2012) find that stock options, before the implementation of FAS123, were evidently used due to their accounting benefits, not because of positive incentives. After the enactment of Revised FAS123 many companies started abandoning stock options and embracing other forms of payment. Furthermore, the study by Core et al (1999) finds that some board variables in the company can produce excess compensation that negatively affects firm performance. Their results indicate that directors pay's effectiveness is also determined by different corporate governance variables in the company.

Literature Review also studies what variables causes the company to choose more equity-based pay. Reviewing four scientific papers, major conclusions can be drawn, summarized in Table 1. Truly, CEO age, stock ownership and regulated industries induces the companies to pay less equity-based compensation, while liquidity, firm size, risk and noisiness in accounting numbers produces positive incentive to use equity-payments.

Considering the economic recessions and expansions I further looked into the research on cyclicity of the economies. The research by Groot and Franses (2008; 2009; 2012) gave an insight into how innovation and various variables are related to economic cyclicity. The major conclusion of their studies is that cyclicity appears around the mean of 8, 21, 32 and 55 years (Groot and Franses, 2012).

Chapter 3

HYPOTHESES DEVELOPMENT

3.1 Underlying Theories

3.1.1 Agency Problem

Dating back to the beginning of the 20th century, there have already been evidence that stock ownership had been becoming more and more dispersed. From 1900 to 1928 the number of people owning the U.S. firms increased by four times. The growing number of people owning corporate stock negated the Marx's contention that corporate wealth will be more concentrated in a capitalist society (Hessen, 1983). The growth in the number of people owning large American corporations changed the management style and increasingly larger number of firms became controlled by persons who did not have any or just a small stake in the company's shares. These directors were assigned by the owners trusting their company's success and profitability on their appointees (Hessen, 1983). The increasing dilution of ownership, therefore, was a foundation to the creation of agency problems such as conflicts of interests and informational asymmetries later recognized by Jensen and Meckling (1976).

According to Jensen and Meckling (1976, p. 4) agency relationship is "a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent". They also claim that since every individual is a utility maximizer, agents do not always act in the best interest of the principal. To ensure the better alignment of interests, shareholders have to monitor directors and actively participate in the nomination and election of directors, which requires owners to incur extra shareholding costs (Jensen and Meckling, 1976; Hessen 1983). These costs are present not only in a commercial context but also in governmental organizations, universities, unions, etc. Therefore, agency theory is very broad in its application.

Agency costs mostly arise from the separation of ownership and control of the firm. In this case, managers have little incentive to be efficient since they are not entitled to the perks that come from increased corporation's profitability (Hessen, 1983). To improve the corporate efficiency, especially in a competitive environment, managers are required to expend extra effort and so a fixed payment cannot compensate for managers' hard work and good results.

3.1.2 Agency Problem Solution

The organization of the optimal contractual relation providing incentives through the compensation arrangements can act as a way to deal with the agency problem (Jensen and Meckling, 1976). Before the employment, principals should take action to prevent moral hazard problems, which occur when agents, being in their positions, start pursuing their own goals. By arranging performance-sensitive compensation contracts, the moral hazard problem can be partly escaped. If the pay is a function of performance-based and fixed

remuneration, an employee can be provided with the incentives to improve performance since better firm performance will lead to better managers' utility levels (Barbosa et al, 2014). Therefore, it is reasonable to believe that performance-based remuneration improves firm performance.

The best instruments to use to induce performance improvements are those that links pay with firm performance. These components of compensation allow employees to increase their wages only in a case of the enhancement of firm performance. By introducing executive stock options, restricted stock, or other equity-based compensation that varies with firm's returns, a firm can improve its performance (Murphy, 2013) by motivating managers to make beneficial decisions for the company's value.

3.1.3 *“Managerial power” Approach versus “Optimal contracting”*

One of the primary shareholders' responsibilities is to determine executive compensation - its structure and size. According to “Managerial Power” approach of compensation setting, the pay can also be influenced by powerful executives in various ways. The researchers Lucian Bebchuk and Jesse Fried (2003) argue that executive compensation is a part of the agency problem itself, since rent-seeking managers are able to influence their pay through the power they hold in their positions. On the other hand, if compensation was determined by the market forces, meaning that individuals are paid for their talent and good performance, then we would describe the compensation setting as an “Optimal Contracting” approach. This approach represents an ideal situation, when managers are compensated for their true effort.

Bebchuk and Fried (2003) also argue that one determinant of managerial power is the possibility that the compensation arrangements will not be approved by the public, for example, by shareholders or governmental institutions. An outrage could be produced if the compensation is too high or not properly structured. The scandal due to inflated compensation could cause directors' embarrassment or event more hurtful experience - damage of reputations. Public may see directors as rent-seeking, selfish individuals improving their wages above agreeable levels. The extent of managerial power therefore is a function of the possibility that such public disagreement might take place.

Another building block of managerial power is the ability to camouflage (obscure and legitimize) the compensation. CEOs can reduce the disagreement from the public by legitimising the compensation for example by attaining the approval from outside compensation consultants. Managers can also conceal the compensation by using stealth compensation such as severance¹² payments, retirement perks, below-market-rate executive loans (prohibited after SOX Act, 2002) (Bebchuk and Fried, 2003). Bebchuk and Fried (2003) argue that even though executive compensation recently became more equity-based, the cash compensation was not reduced to account for the increase in stock options. Fixed compensation remained the same during 1990s. One would expect that substitution between these components of pay should take place. As executive

¹² A severance payment is granted to the executive after his/her dismissal due to take-overs or his/her dismal performance (Bebchuk and Fried, 2003)

compensation has only been increasing in 1990s, due to stock option explosion, such trend accentuates managerial influence and directors' ability to impact their remuneration.

According to the optimal contracting theory the compensation is a product efficiently set to achieve the best incentives for optimal firm value or to reach equilibrium in the market of managerial talent (Murphy, 2013). The compensation is derived from either bargaining between executives and the board or from market forces. The pay serves as a solution to the agency problem (Bebchuk and Fried, 2003). Optimal contracting theory is in line with what economists would believe the market tendencies of executive compensation should be like. As already discussed in motivation section 1.7, Kaplan (2008) strongly supports "efficient contracting" theory. He justifies the increasing executive compensation and refuses the managerial power theory. However, looking at the option-based compensation increase in 1990s, the optimal contracting approach offers few justifications for the boost (Murphy, 2013). Thus, both theories could provide justification for compensation arrangements and one should not be seen as a substitute for the other (Bebchuk and Fried, 2003).

3.1.4 Economy, Price Mechanisms and How It Affects Firms

The economy fluctuates above and below its average trend. If we would draw a smooth curve to represent the general trend we would see that the whole economy tend to rise above and below the mean tendency line. Such fluctuations in economy usually are referred to as business cycles, otherwise known as economic expansions and recessions. However, Fisher (1925) claimed that the fluctuations around the mean cannot be called a "cycle", since it is a common feature of any trend (such as population¹³). It is impossible to have an economy where it is always above its mean or characterized by ever-growing prosperity. Therefore, even though Fisher (1925) disagrees with the existence of business cycles, a drop in economic activity or, to put it simply, a recession, is unavoidable part of every economy.

The higher prices in the economy or, in other words, growing inflation benefit the businesses. Business accumulates greater profits where the prices are growing at the aggregate economy level. In addition, usually the increases in wages do not result in higher wages instantly. The same trend is evident in rent and interest payments, since they are fixed by contractual arrangements. Thus, the trend of increasing prices in the economy has a positive effect on firm's profits. Such increasing movement of earnings is called a business boom (Fisher, 1925). The opposite is evident, when the economy is depressed.

A business cycle is a co-movement of individual economic variables such as output, income, prices, interest rates, banking transactions and transportation services. These variables change in tandem affecting the regimes of the economy from time to time. The unobserved changes in economic cycles might prove costly to businesses, since managers, who ignore the turning points of the economy, may incur enormous costs. The recognition of changing economy regimes can result in large differences in profits (Diebold and Rudebusch, 1996).

¹³ General population also rises and falls below its mean growth level (Fisher, 1925)

Some of the daunting effects of recessions are that it prompts the bankruptcies of many infant firms. Some firms are very prospective in their potentiality in production, however, recessions hampers the development of these businesses. At initial business growth phases, companies do not know their quality due to unobserved likelihood for the product, talent of the manager or customer appeal of selling location. If business experiences revenue growth, it indicates that business has a quality. Yet, time is needed to realize if the company has a true potential. During recessions, profitability declines in general so a firm cannot realize if it has quality (Ouyang, 2009).

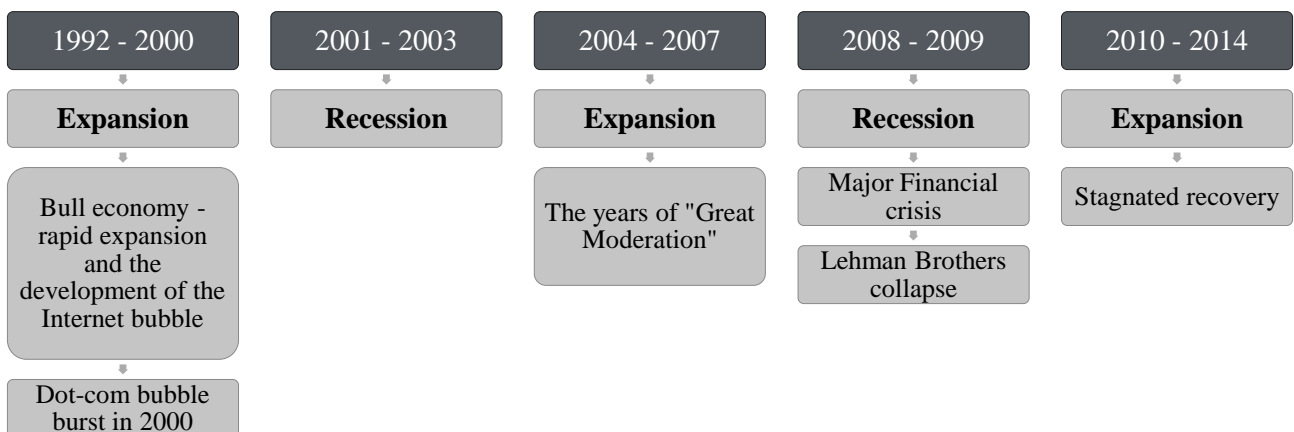
3.2 Hypotheses

The second and third chapters described the Literature Review and reviewed the underlying theories surrounding the executive compensation and economy cycles' spheres. The chapters provide a good background to formulate the hypotheses. The Introduction also looked into different economic periods and this information is used as a proxy to classify the periods.

Burns and Mitchell (1947) extensively examined the business cycles and identified 9 different economic phases. For the research simplicity and comprehensibility, only two of their discussed business cycles are used, which represent economy extremes: economic expansions and recessions. 2 recessions and 3 economic booms are identified within the period of 1992 – 2014.

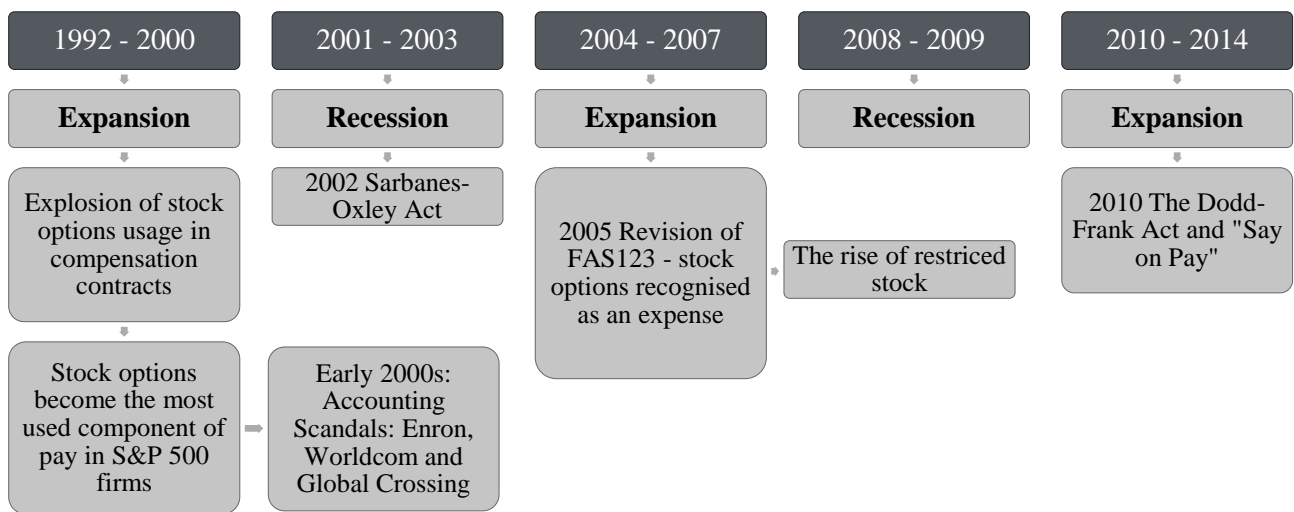
Therefore, based on the qualitative analysis, described in Introduction (see section 1.3), the periods are classified as follows:

Timeline 1. Period Classification



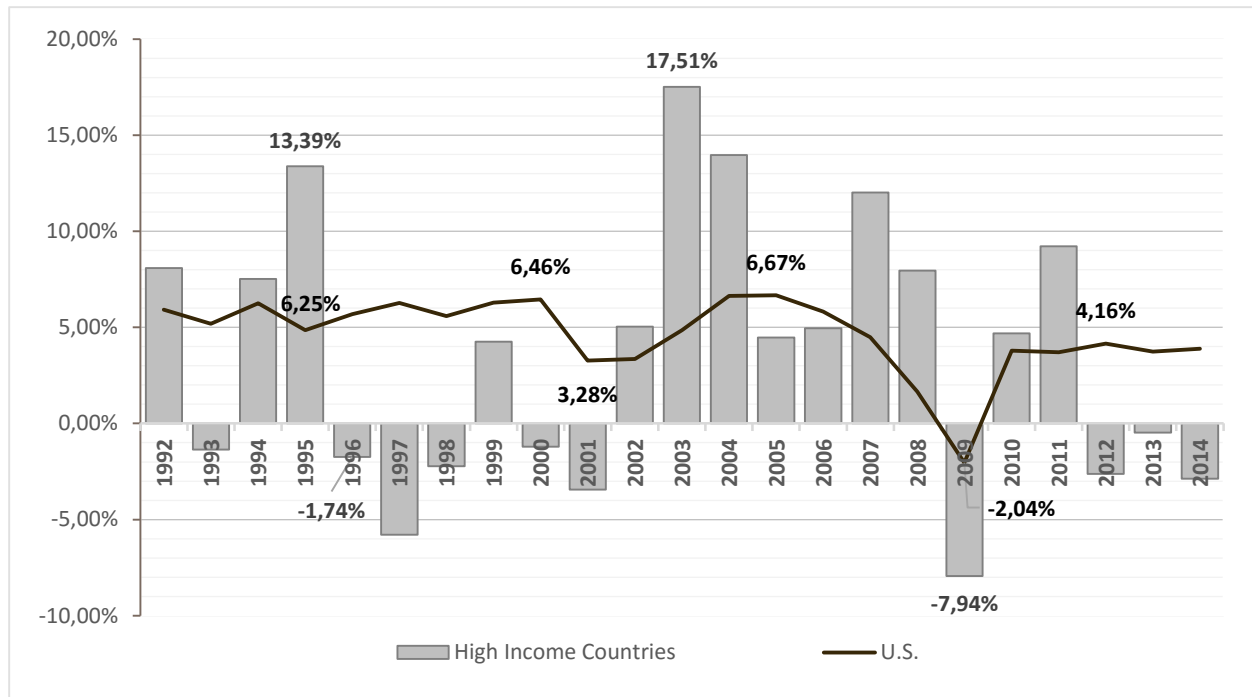
In addition, the timeline below summarizes the main events within the compensation sphere throughout the same period of 1992 – 2014:

Timeline 2. Stock Option Compensation



Another way to determine economic periods is to use GDP change as a proxy determinant of expansion or recession. The Graph 1 plots how the U.S. GDP changed during the period from 1992 to 2013. From the look at the graph it is easy to determine when the economy underwent difficulties, how impactful was the recession and what its rate of recovery was. The graph indicates that in the period 1993 – 2000, the economy was stable and GDP annual change varied around 5.5%. After this period, there was a dip in GDP, which can be explained by the dot-com bubble burst and revelations of major scandals of companies such as Enron and Worldcom. Fortunately, it did not last long; economy started recovering around 2003. From 2004 up until 2008 the U.S. economy was booming, GDP almost reached a high of 7% change from 2004 to 2005 period. However, in 2008, the major financial crisis ensued. It led to a massive drop in GDP growth. GDP growth reached an outstanding low of -2 % in 2009. The crisis was a huge hit to many corporations that led to many bankruptcies. From 2010, GDP started recovering and now it is fluctuating around 4% annual growth.

Graph 1. GDP Change in U.S. and Other High Income Countries



Data source: <http://data.worldbank.org/indicator/NY.GDP.MKTP.CD>

Graph 1 was produced by downloading the aggregate world countries' GDP figures expressed in U.S. dollars and calculating the annual % change. High Income countries are Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, South Korea, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom, and United States.

It can also be spotted that GDP growth is gradually decreasing. Drawing a straight line through the data points can reveal that growth is getting closer to the 0 point over time. This is an ordinary trend, since economy can only achieve higher growth due to the population growth, technological innovation, natural resources, etc. as discussed in section 1.2. Groot and Franses (2009) also prove how important is innovation in the economic cycles. Without these factors GDP growth might be a mere product of raising prices.

Graph 1 also looks into the GDP changes of other high income countries. It can be seen that the average growth is not always similar to the U.S. rate, for example, during the period 1996 – 2000, the U.S. economy was booming while other countries' economies were experiencing difficulties. Also, it can be spotted that Other High Income Countries have higher variance in GDP changes. During 2008 recession, these countries' GDP went down by a staggering -7.94%, while U.S. economy was impacted by a minor 2% fall.

Another economic variable, which is a good indicator of recessions and expansions, is unemployment rate. In economic downturns, unemployment rises up, since many companies end up winding up and laying off people due to the reduction in profits. Also, as people start saving more, the demand for certain products goes down, meaning that companies need to find ways to reduce their costs. One of the ways to do so is to employ less people. During the economic expansions, as the product demand increases, companies are prospering and

expanding, therefore are looking for new talents. Such situation increases the demand for labour force and thus reduces the unemployment.

The Graph 2 shows how the U.S. employment levels changed in the period of 1992 – 2015. It is evident from the graph that unemployment rose in the periods of 2001 – 2003 and 2008 – 2010, supporting the reasoning that in these periods economy underwent a recession. In other periods, unemployment was steadily decreasing. Moreover, these tendencies also correspond and follow the trends of GDP – in times of a higher and stable GDP, employment levels are restored, while in slowdowns of the economy, unemployment starts rising.

Graph 2. U.S. Unemployment Levels



Data source: <http://www.tradingeconomics.com/united-states/unemployment-rate>

The Graph exhibits cyclical matching to the GDP movements. In the years of 1992 - 2001, 2004 – 2008 and 2010 – 2014, when GDP was higher, unemployment was decreasing and vice versa.

3.2.1 The first hypotheses

The Literature Review contained the description of some papers that studied how different economic determinants, such as CEO age, liquidity, firm size, risk, etc. influence stock compensation. Therefore, the first set of hypotheses take into consideration these economic variables. Referring to Table 1, the variables were picked from Chourou et al (2008), Tzioumis (2008), Yermack (1995) and Lin et al (2012) studies, but only those were considered that had supporting evidence from the researches. The variables of CEO horizon and tenure were excluded since neither of the studies could find existent relationship with stock option compensation.

H1a: Economic determinants such as firm liquidity, size, risk, growth opportunities and noise in accounting numbers have a positive effect on CEO stock options compensation

H1b: Economic determinants such as CEO age, stock ownership and firm leverage have a negative effect on CEO stock options compensation

The variables are clustered into those that have positive and negative relationship with CEO stock option compensation based on the findings in the studies listed in the Table 1. Also, Table 3 below lists all the variables and theories that explain the predicted relationship signs.

Table 3. Theories on Determinants of Stock Option Pay

Variable	Predicted relation	Theory
Firm liquidity	-	Firms facing greater liquidity problems are more likely to compensate CEOs in stock options in order to preserve cash
Firm risk	+	The greater is the volatility of firm's returns, the more the firm utilizes incentive compensation to protect risk-averse CEOs from downside risk
Growth opportunities	+	As CEOs have more private information about the value of growth opportunities, it is difficult to evaluate their success in choosing among investments for parties not participating in firm's management. Thus, companies with larger growth opportunities, are likely to pay more stock options to ensure that CEOs make proper decisions regarding investments
Noise in accounting numbers	+	According to the informativeness principle, the weight assigned to the performance measure that contains significant noise should be minimized. Thus, larger noise in accounting performance should increase the reliance on stock option compensation
Leverage	-	The greater is the amount of equity compensation, the more exacerbated are the agency problems of debt
Firm size	+	The greater is the firm size, the more complex is the CEO position. Thus, larger firms pay more for their CEOs
Stock ownership	-	A small percentage of stock ownership by CEOs is a symptom of agency problem. Thus, the less (more) CEO holds common stock, the more (less) he/she is paid in stock options
CEO age	-	CEOs that are nearing the retirement are less likely to exercise stock options. In addition, risk aversion increases with age, thus reducing the preference for risky stock compensation

3.2.2 The Second Hypothesis

Literature Review reviewed some of the positive aspects of equity-pay. Many researchers found evidence of stock remuneration benefits such as improvement in risk-taking policies, corporate governance mechanisms, which in turn influences firm performance (Mehran, 1995; Chen et al, 2006; Wu and Tu, 2007; Aboody et al, 2010; Chen and Lee, 2011; Chen and Ma, 2011; Conyon, 2013; Jeong and Kim, 2013; Briskier et al, 2014; Ju et al, 2014). The theories on executive compensation, though, are controversial, but a general opinion from most of them is that performance-based pay can mitigate the problems of agency conflicts by improving the alignment of interests between owners and directors. Directors have more incentives to improve firm performance when their wage depends on firm's returns. It is assumed that the benefits of executive, equity-based pay extracted from mitigating the agency problem exceed the costs of managerial power.

***H2:** CEO stock option compensation positively influences firm performance during economic expansions and recessions*

3.2.3 The Third Hypothesis

Another hypothesis looks into whether the effectiveness of stock option compensation alters throughout the periods. On one hand, during economic expansions, managers are less induced to perform well, since firm's profitability may be the result of favourable economic conditions. The directors receiving equity compensation may have to exert less effort in times of economic prosperity than in the periods of economic recessions. Therefore, the contractual incentives may have less effect on firm performance during economic expansions.

On the other hand, if economy is in a recession, executives may be discouraged to perform well, if their compensation is performance-based. The performance of the firm is likely to be largely affected by recession depressing executive pay. Stock options would almost be worthless to exercise because the stock price generally falls during recessions. Therefore, equity-pay might not be a proper way to reward CEOs' effort. In addition, after recessions, many changes follow to improve the corporate governance mechanisms and to repair executive incentives. For example, after the Internet bubble and the major 2008 crisis, the well-known legislations, Sarbanes Oxley Act in 2002 and Dodd-Frank Act in 2010 were enacted.

***H3:** Executive pay contracts are more efficient during economic expansions than economic recessions*

Chapter 4

METHODOLOGY

4.1 Research Design

Two separate models were built to test H₁ and H₂. The first model tested the relationship between various board and firm characteristics on the level of CEO stock options' pay (Eq. 1). The second model further looked into how the level of CEO stock compensation influences firm performance (Eq. 2). Other control variables were added in Eq.2 to capture any likely determinants of firm performance. These variables were widely applied in other studies and were found to have a significant relationship with firm performance (Mehran, 1995, Huang, 2013 and Core et al., 1999)

$$\text{Eq. (1) } OPT_MIX = const_{it} + b_1LIQ_{it} + b_2CEO_AGE_{it} + b_3GROWTH_{it} + b_4LEV_{it} + b_5RISK_{it} + b_6FIRM_SIZE_{it} + b_7NOISE_{it} + b_8STOCK_OWN_{it} + b_9INDUSTRY_{it} + b_{10}YEAR + error\ term_{it}$$

$$\text{Eq. (2) } ROA/EPS = const_{it} + b_1OPT_MIX_{it} + b_2STOCK_OWN_{it} + b_3GROWTH_{it} + b_4LEV_{it} + b_5RISK_{it} + b_6FIRM_SIZE_{it} + b_7BOARD_SIZE_{it} + b_8BOARD_AGE_{it} + b_9INDUSTRY_{it} + b_{10}YEAR + error\ term_{it}$$

The coefficients of the models (b₁; b₂;...b_n) were calculated using OLS (Ordinary Least Squares) methodology and the hypotheses were tested using the t-tests of significance on the time-series, cross-sectional data (Mehran, 1995). The "error term" in the models represented the concept of uncontrolled effects, which could not be explained by other variables within the research design. The main focus of the research was the weights of the independent variables and their significance. Also, to ensure multicollinearity-free, reliable results, Pearson correlations were checked.

In addition to that, another focus of this research is to examine whether there is a difference between the CEO stock options' effect on firm performance during economic booms and recessions. Thus, the study relies on the tests of overlapping confidence intervals (CI) to see if there is a proof of significant difference.

Cunning and Finch (2005) claim that CIs and significance values (p) are linked and thus the inference can be drawn from the graphical representations of the values' lower and upper bounds. According to their fourth rule of eye, a significant difference between the coefficients could be detected if the 95% confidence intervals do not overlap by more than a half of the average margin of error. The convenience of this type of research design is that it allows to draw the CIs and make conclusions from the graph itself. If it is hard to determine from the look of an eye, the average margin of error will be estimated.

In order to use the CIs, the bootstrapping tests were run on the data. Bootstrapping essentially refers to the duplication of the original data and then drawing samples to obtain the estimators' distribution of possible values (Shapland and Leong, 2010). 1000 of such samples were used to calculate the bounds. Such test revealed

the CIs for the coefficient estimates of stock options on firm performance. Then, the CIs were plotted to determine the overlap and if it is less than 50% of the margin of error.

Equation 1. CI 95% Average Margin of Error Calculation

	Lower	Point	Upper
Expansions coefficient	b_{L1}	b_{P1}	b_{U1}
Recessions coefficient	b_{L2}	b_{P2}	b_{U2}
	Difference	Result	
Expansions coefficient	$Abs(b_{P1}-b_{L1})$	x_1	
Recessions coefficient	$Abs(b_{U2}-b_{P2})$	x_2	
Average	$M = (x_1+x_2)/2$		
50% of distance	$M/2$		
Result	$b_{L1}+M/2$		

If the calculations reveals that $b_{U2} > b_{L1}+M/2$, then the conclusion will be that there is no significant difference between the stock options’ expansions and recessions coefficients. If the result is $b_{U2} < b_{L1}+M/2$, it can be concluded that there is evidence for significance, meaning that in economic expansions, the coefficient is more positive (stock options to CEOs has a more positive effect on firm performance during economic booms).

4.2 Data Sets

To test the hypotheses two datasets were obtained. Both of them contain the data from the period 1992 – 2014. The period of 22 years was used in order to incorporate more economic variations within extensive range of years. The phases during these years have distinct characteristics, thus the results for the periods can vary. For example, one recession can be very different from another one.

The sample consists of CEO-firm-year observations. S&P 500 firms were used, since the composite includes the largest U.S. firms by their market capitalization and therefore makes the results more generalizable to certain group of companies. In addition, these corporations are more likely to have complex compensation schemes with various classes of equity-based payments. Large firms usually have higher ownership dispersion and hence are more likely to use equity payments to motivate CEOs to improve performance.

Highly regulated industries and financial firms were left out, since they possess a very unique financial structure (Lin et al, 2012). Thus, the firms with SIC codes ranging from 4900-4999 and 6000-6999 were taken out from the datasets. One of the main data sources was COMPUSTAT database. It was mostly used to obtain firm level related variables. CEO compensation variables and other data related to the CEO characteristics

(age, stock ownership) were sourced from ExecuComp. In addition, CRSP database was used to get monthly and quarterly stock returns for the firm risk and noise in accounting numbers' calculations.

To have a complete dataset, all the observations that are missing any of the variables were excluded. Most of the deleted observations had more than one missing variable, thus around only 5% of the lines had to be taken out. Furthermore, the most complete variable for the CEO age available in ExecuComp was "Current Executive age", hence, the formulas were used to derive the CEO age at a given year¹⁴.

The outliers of the dependent variables were also removed (around 2 percent of observations). These observations had unusual, very high or low estimations, thus had to be excluded not to impact the results, making them more generalizable for regular firm-years.

For the third hypothesis, the second set of the data is subdivided into two groups: one set contains only the observations from the years 1992 – 2000, 2004 – 2007, 2010 – 2014 (economic expansions) and another, from 2001 – 2003, 2008 – 2009 (economic recessions). The tests are performed for these two sets to obtain the coefficients and test their difference as explained in the 4.1 section.

4.3 Variable Definition

The predictive validity framework ("Libby boxes") (see Appendix, Libby Boxes: Predictive Validity Framework) displays the main variables of interest and their operationalization for both models. The independent variables of interest are the economic determinants and stock options' compensation. The dependent variables are the stock options' payment and firm performance.

Furthermore, the description of how each variable is operationalized can be found in the Table 4. The table also displays the prediction of the relationship sign between the variable and stock option compensation/firm performance based on the previous studies on the same subject. Once the results are finalized, it will be easy to compare them with the majority of what other studies have found by summarizing the predictions, which are based on other studies' results or theories.

¹⁴ Current Age - (2014 - Observation Year)

Table 4. Variable Operationalization

Variable	Measure	Predicted relation
<i>Dependent variables</i>		
Stock Options	Stock options value divided by cash compensation	
Firm Performance (ROA)	Net Income divided by Total Assets	
Firm Performance (EPS)	Net Income minus dividends divided by number of shares	
<i>Independent variables Model 1</i>		
Firm Liquidity	1 if the firm pays cash dividends, 0 otherwise	-
Firm Risk	Standard deviation of monthly stock returns	+
Growth Opportunities	(Market value of equity + book value of debt)/book value of assets	+
Noise in Accounting Numbers	Variance on quarterly return on assets scaled by variance of quarterly stock returns	+
Leverage	Debt divided by assets	-
Firm Size	Natural logarithm of the firm's market value	+
Stock Ownership	The percentage of common shares owned by the CEO	-
CEO Age	Age in years	-
<i>Independent variables Model 2</i>		
Stock Options	Stock options value divided by cash compensation	+
Stock Ownership	The percentage of common shares owned by the CEO	-
Growth Opportunities	(Market value of equity + book value of debt)/book value of assets	+
Leverage	Debt divided by assets	-
Firm Risk	Standard deviation of monthly stock returns	-
Firm Size	Natural logarithm of the firm's market value	+
Board Size	Number of directors on the board	-
Board Age	Total age of all the directors divided by the number of the directors	+

4.3.1 Dependent Variables

In the first model, stock option value is going to be evaluated using Black Scholes/Fair Value methods and the dependent variable will be derived by dividing option value by cash compensation for a given year. This dependent variable represents the proportion of the stock option compensation to the cash compensation, which is the most common type of payment. For the cash compensation estimate, two most liquid components of pay are added together: salary and bonuses.

The stock option measure is obtained from ExecuComp database. This data pool contains options' value estimated using Black Scholes formula (up until 2006). However, the data is missing from 2006 onwards, since the valuation method of options changed after the FAS123 implementation in 2005. As the law enforced that options would be recognized as an expense in company's books, the better representation of option value

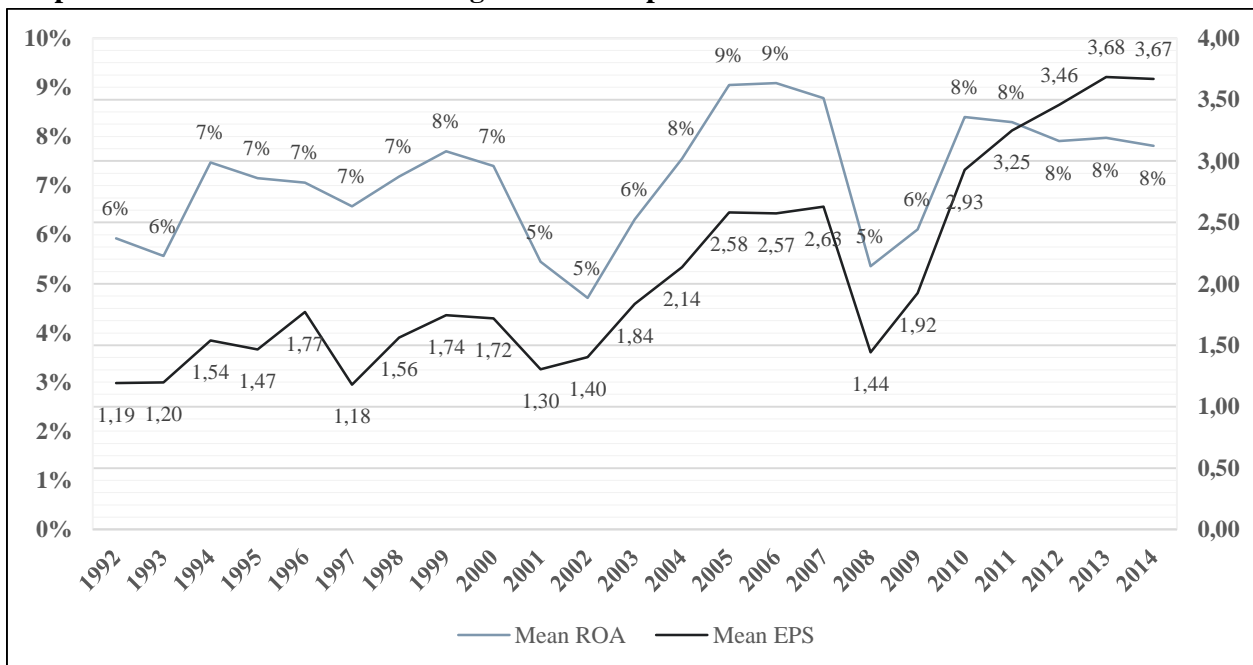
became fair value measurement. Thus, these two measures are used to estimate the Stock Option Compensation variable.

For the second model, two proxies for firm performance evaluation, EPS and ROA are used, since having two variables allows more valid and reliable results. ‘Earnings per share’ relates to the value created for investors and is the most important variable determined by share prices. It is a market-based measure representing the degree of alignment between the owner and management’s interests (Murphy, 1999; Conyon, 2013). It is calculated as: net income/average outstanding shares.

ROA is the return on assets, computed as ratio of Total Debt to Total Assets, an accounting-based measure. It is an indicator of profitability with relation to the company’s assets. It was used in Conyon’s (2013) study as one of the proxies for firm performance.

The Graph 3 displays the comparison between the movement of means of the firm performance variables, ROA and EPS. The Graph includes firms from S&P 500 composite, excluding the financial and regulated firms in addition to the firms that had to be taken out due to the data absence. The graph is plotted to validate that the variables can be used interchangeably, if they follow a similar trend and correlate with each other. It can be seen that both variables have a positive relationship with each other, meaning that higher/lower EPS is followed with a similar change in ROA. It is reasonable to expect that both variables correlate, since if the firm is performing well based on the accounting estimates (e.g. how much 1 dollar of assets generate income - ROA), then the market measures of performance should also pick up the same trend.

Graph 3. ROA and EPS means during 1992 – 2014 period of S&P 500 firms



4.3.2 Independent Variables

The main independent variables of interest for the first model are comprised of the various firm and board characteristics that could influence the possibility of more or less stock options being paid to the CEOs. Firm liquidity (“LIQ”), CEO age (“CEO_AGE”), firm growth opportunities (“GROWTH”), leverage (“LEV”), firm risk (“RISK”), firm size (“FIRM_SIZE”), noise in accounting numbers (“NOISE”) and Stock Ownership by CEOs (“STOCK_OWN”) are explicitly used as influencers of stock option compensation. Each variable has been calculated based on the explanations in the Table 4.

In the second model, stock option compensation is the independent variable. So, the study further looks into if the CEO stock option compensation has an incentive effect on CEOs to increase firm performance. In addition, other extraneous variables need to be included in this model to increase the model fit and to avoid the omitted variable bias problem¹⁵. These are: Stock Ownership (STOCK_OWN), Growth Opportunities (GROWTH), Leverage (LEV), Firm Risk (RISK), Firm Size (FIRM_SIZE), Board Size (BOARD_SIZE) and Board Age (BOARD_AGE). These variables were used in other studies such as Mehran’s (1995), Huang’s (2013) and Core et al. (1999).

Industry effects and year effects will be included for the both models. Industry effects are controlled using SIC code classification (first two digits of SIC Code). By including these effects the regression intercept is allowed to vary across the years and industries. This means that the YEAR variable equals one if the observation is from Year Y, zero otherwise. The same is done for the Industry effects, where INDUSTRY variable equals one if the firm is in Industry N, zero otherwise (following Aboody et al, 2010). Thus, k-1 number of dummy variables is created for years and industries, where the bases were chosen as the first year for the different datasets (1992; 2001; 2004; 2008; 2010) and Manufacturing industry’s companies.

¹⁵ Omitted variable bias – if a variable has a non-zero covariance with the independent variable, then its omission biases the regression result. The bias violates Gauss-Markov theorem that the regression’s estimators are best, linear and unbiased meaning that if a positive/negative covariance exists between the omitted variable and independent and dependent variable, the estimate of the independent variable coefficient might appear greater/lower than the true value (Chamberlain, 1978)

Chapter 5

RESULTS AND EXTENTIONS

5.1 Sample Characteristics

5.1.1 Industry Level Characteristics

The Graph 4 displays the number of firms in the sample per year and per Industry as identified by the first digit of the SIC code. In addition, the Total figure shows how many firm-year observations the sample contains. It can be seen that the number of firms increases throughout the period, reaching 355 in 2014.

Throughout the entire period of 1992 – 2014, the manufacturing industry's companies comprise the largest portion of the sample, followed by Retail Trade and Services. Some of the more known companies in the dataset are Apple, Boeing, Procter and Gamble and Coca Cola for Manufacturing, Amazon.com, GAP, McDonald's, Starbucks and Wall-Markt Stores for Retail and Ebay, Adobe Systems, Facebook, Microsoft, TripAdvisor and Netflix for Services industries. The best performing industries by ROA and EPS appear to be Manufacturing, Retail Trade and Services' sectors. The Construction Industry is the worst performer with an average ROA of 4% and EPS of 2.17 U.S. dollars (refer to Table 5). On the company level, the best 5 performing firms throughout the entire period are Priceline Group, CF Industries Holdings, Autozone, IBM and Apple and the worst performers are EnSCO, Endo International, CSC, American Airlines Group and Sealed Air Corporation (measured by EPS).

Table 5. Mean ROA and EPS

Industry	Mean ROA	Mean EPS
Manufacturing	7.80%	2.75
Retail Trade	9.01%	2.37
Services	9.12%	2.17
Mining	4.87%	2.44
Agriculture, Forestry, and Fishing	5.08%	2.23
Transportation and Public Utilities	4.56%	2.18
Construction	4.08%	2.17

5.1.2 Descriptive Statistics

Table 6 (Appendix, p. 65) shows the descriptive statistics (minimum, maximum and mean values) of all the variables, dependent and independent. It can be seen that the value of the Stock Option Mix ratio, ranges from 0 to 141.55, if the whole period of 1992 - 2014 is taken into account. The ratio of 141.55 indicates that the stock option compensation was 141.55 times higher than the cash compensation for the given CEO in a given year, where cash compensation is measured as salary plus bonus payments. In addition, it is possible to see the descriptive statistics for the variations of periods. It can be noticed that the ratio is decreasing from one period to another, on a general basis. The declining trend can be explained by the consequences the

implementation of the FAS123 reform had on firm's accounting. The Act required that stock options would be recognised as an expense in the firm's financial statements, thus reducing the popularity of stock options in compensation structures.

Graph 3 in the Section 4.3 (see p. 35) have shown the changing patterns of ROA and EPS means, which clearly showed that companies' performances were affected by the crises (the dips in performance). The Table 6 also shows the minimum and maximum values per period. The lowest ROA and EPS values for all the sample were (-20.11%) and (-2.52) and the highest were (27.78%) and (9.04), respectively.

5.2 Results

After running OLS regressions, the main results for the first and second model are obtained. The first model's results are displayed in Table 6, while for the second model, the numbers are presented in Table 7 and 8, for dependent variables ROA and EPS, respectively.

The Pearson's correlations between the independent variables are also checked to ensure the results are not biased. By studying the figures in Tables 10 and 11, it can be seen that all the correlations are low meaning that the multicollinearity problem is not evident.

5.2.1 Model 1

Table 6 reveals which variables appear to have a significant relationship with Stock option compensation. Firm size, stock ownership, liquidity, firm risk, growth opportunities, noise in accounting numbers and leverage all contribute, more or less, to the size of the stock compensation, comparative to the level of cash salary and bonus payments. The only variable that I could not find significant relationship with is CEO age. Thus, the theory that older CEOs are less likely to be paid in stock options due to their risk aversion, is rejected.

By looking at the signs of the coefficients, it is evident that firm size, firm risk, growth opportunities and noise in accounting numbers have a positive relationship with stock option compensation variable, while the stock ownership, liquidity and leverage have an opposite, negative relationship. The comparison of the results with Table 3 reveals that the predicted signs match with the findings. Thus, the theories explaining the relationships between the independent variables and stock option compensation variable are all valid and proved by my outcomes.

The positive relationship between firm size and stock option compensation was also found by Chourou et al (2008) and Lin et al (2012). Thus, I find proof that in larger firms, CEOs must be provided with greater incentives due to the greater scope of their position - more responsibilities and complex tasks. In addition, there could be other reasons of firm's size significance, which were not established by other studies. It is possible that the greater stock compensation due to the larger firm size can be also caused by intermediate effects between these two variables, such as, firm size affecting the size of tradeable stocks, or, the number of issued shares, which, in turn, influences the stock option payments to CEOs.

Table 6. Model 1 Results

Independent Variable	1992 – 2014	1992 - 2000	2001 - 2003	2004 - 2007	2008 - 2009	2010 - 2014
Constant	-4.624*** (-2.995)	-4.730 (-0.924)	-2.979 (-0.764)	-1.834 (-0.917)	-3.046 (-1.254)	-1.218 (-0.738)
Firm Size	0.504*** (5.88)	0.936*** (2.588)	0.608** (2.35)	0.293** (2.067)	0.625*** (3.446)	0.268** (2.213)
CEO Age	.012 (0.754)	-0.050 (-0.563)	0.035 (0.591)	0.05* (1.935)	0.005 (0.163)	-0.012 (-0.664)
Stock Ownership	-0.045** (-2.031)	-0.111 (-1.398)	-0.060 (-0.888)	0.025 (0.705)	0.18*** (3.67)	-0.08** (-2.224)
Liquidity	-1.144*** (-4.907)	-3.251*** (-3.216)	-0.379 (-0.498)	-1.171*** (-3.018)	-0.634 (-1.346)	-1.11*** (-3.589)
Firm Risk	0.077*** (3.724)	0.062 (1.051)	0.176*** (2.939)	-0.060 (-1.027)	-0.010 (-0.255)	0.13*** (3.327)
Growth Opportunities	0.652*** (8.888)	1.102*** (4.495)	0.148 (0.579)	0.120 (0.82)	0.308 (1.439)	0.604*** (5.583)
Noise in Accounting Numbers	0.172* (1.699)	0.110 (0.133)	0.445 (0.424)	-0.247 (-0.706)	2.234*** (6.202)	0.081 (0.924)
Leverage	-0.864* (-1.755)	-0.253 (-0.1)	-3.219* (-1.767)	-1.143 (-1.215)	-1.634* (-1.757)	-0.202 (-0.34)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	8%	16%	9%	6%	17%	6%
Observations	3849	537	439	822	511	1540

This table shows the parameter estimates and t-statistics (in parentheses) for the 5 regressions for different periods. ***, **, * indicates the significance at the 1%, 5% and 10% levels, respectively.

The similar explanation can be applied for the growth opportunities' positive coefficient sign. When the firm is expected to grow in the future, it has to compensate CEOs for the augmenting complexity and the scope of the position. In addition, other studies provide theories about the informational asymmetries of growth opportunities between managers and company's owners. As managers are more aware of the company's growth opportunities, it is difficult for the owners to evaluate whether managers are choosing the best investment options from the range of possibilities. Thus, if the company has more potentiality to grow in the future, more stock options are likely to be paid to CEOs, to encourage them to make proper decisions regarding new investments (Chourou et al, 2008).

Noise in accounting numbers, calculated by comparing the accounting measure to the market measure of stock returns' variances, were also hypothesized to have a positive relationship with stock option compensation. Larger noise in accounting numbers means that there is a considerable difference between the variance in accounting returns and market returns. If accounting measures have significant noise, then the weight assigned to these measures in performance evaluation exercise should be reduced. Thus, as stock options' compensation rewards CEOs for the increase in firm's market performance, such performance evaluators and initiators are more likely to be used (as proved by my study and Chourou et al (2008) and Yermack (1995)).

Firm risk was also proven to have a positive relationship with stock option compensation by Tzioumis (2008) and Lin et al (2012). It means that the higher is the volatility of firms' returns, the higher is the likelihood that the CEO of the firm in a given year will be paid more in stock options. This can be explained by the fact that risk-averse CEOs might exacerbate the situation by their unwillingness to take risky decisions when already exposed to high risk. In this situation, stock options serves as a means to ensure that CEOs make the right decisions for the improvement of firm's returns and value.

The results have shown that stock ownership has a negative relationship with stock option compensation. Chourou et al (2008) and Tzioumis (2008) also found the same relationship existing. It is reasonable to believe that the more the CEO owns of the shares, the less he/she will receive as payments in stock options, since additional stock options might have a diminishing incentive effect on the CEO. In addition, a low ownership of stocks by firm directors, is a symptom of agency problems. Thus, the less stock the CEO owns, the more he/she is likely to receive stock options as a compensation.

The proof of the liquidity theory was also provided by the study. It is quite straightforward that the firm facing liquidity problems¹⁶ will favour stock options as compensation payment in order to preserve cash. Thus, the study consent to the Yermack's (1995) and Lin et al (2012) results and does not support Chourou et al (2008) and Tzioumis (2008) on the saying that liquidity issues have no effect on stock option compensation payments. Also, it is interesting that during economic recessions of 2001 – 2003 and 2008 – 2009, the liquidity coefficient weight is not significant, though for other periods it is very significant at 1% level. It means that in downturns, the firm's liquidity situation does not have any effect on the amount of stock options paid to CEOs.

Last but not least, the results for leverage variable seem to support Chourou et al (2008) study. The outcomes for this variable are very contradictory to the four authors' comparative results. Yermack (1995) found no support and Lin et al (2012) found a positive relationship between the leverage and stock option compensation. The study's results give more evidence on the theory that a greater amount of equity compensation could further exacerbate the agency problems of debt and thus less stock options are likely to be paid to the CEOs in the companies that have a high ratio of debt to equity. In addition, it can be seen that this variable is only significant during economic crises, meaning that during difficult economic periods, firms are more likely to reduce stock option's payments to CEOs, while in more stable periods, there is no evidence of the existent relationship between leverage and CEO stock options.

It is important to mention that the results described are for the period 1992 – 2014 as indicated in the first column of the Table 11. The breakdown of years shows that not in all the cases the variables have significant relationships with the dependent variable, stock options value ratio to cash compensation. For example, during the years 1992 – 2000 it seems only firm size, liquidity and growth opportunities have an impact on stock

¹⁶ Liquidity problems – a firm that has a scarcity of cash or any other liquid assets (easily convertible to cash) may have issues with the payments to their creditors and vendors, which cause heightened risks for inability to pay for one's obligations. Such inability might inflict firm's relationships with their business partners and may be the cause of bankruptcy

options, while others have no significant effect. Overall, the summary of the significant variables for the different periods can be found in the Table 9, displayed below.

Table 9. Significant Independent Variables of Model 1

	1992 – 2014	1992 – 2000	2001 - 2003	2004 - 2007	2008 - 2009	2010 – 2014
Significant Independent variables	Firm size, stock ownership, liquidity, firm risk, growth opportunities, noise in accounting numbers, leverage	Firm size, liquidity, growth opportunities	Firm size, firm risk, leverage	Firm size, CEO age, liquidity	Firm size, stock ownership, noise in accounting numbers, leverage	Firm size, stock ownership, liquidity, firm risk, growth opportunities

5.2.2 Model 2

Tables 7 and 8 present the results for Model 2. The variable of interest is Stock option Mix ratio. The glimpse at the Table 7, with listed results on the ROA dependent variable, oddly reveals that Stock option mix ratio is negatively and significantly related to firm performance. For the whole period of 1992 – 2014, the Stock options variable is highly significant with the coefficient of -0.085, meaning that an increase in stock options ratio to cash compensation by 1, would cause 8.5% decrease in firm performance. As an increase by 1 is unlikely to happen, since options would have to surpass cash compensation by 100%, it is better to say that 0.1 increase in the ratio causes, on average, 0.85% decrease in performance and so on. This estimation is really significant and does not support the theories raised in the previous chapters that stock options paid to CEOs serve as an incentive to improve firm performance.

Results for other periods reveal that not always stock options as a source of compensation might cause decreases/increases in firm performance. For the periods 1992 – 2000, 2004 – 2007 and 2008 – 2009 there appears to be no significant relationship between stock options ratio and firm performance as expressed in ROA.

Table 8 displays the results for Model 2, where the dependent variable is firm performance expressed in EPS (Earnings per share). The results are very similar to the ones, where dependent variable was ROA. It can be seen in the table below that Stock options have a negative, significant coefficient for the whole range of years 1992 – 2014 and also for the shorter periods of 1992 – 2000, 2001 – 2003 and 2004 – 2007. After 2007, there is evidence that stock options have no effect on firm performance. These models also appear to explain the variations in EPS worse than the models in the Table 7. In the Table 8, R-squared value indicates how well the variables included in the model are able to explain the changes in dependent variable (Hansen, 2016). As for the whole period, R-squared is 20%, this means that all other effects that were not included account for 80%. The R-squared in the Table 8 for the years 1992 – 2014 is 43%, meaning that the results for the dependent variable ROA is more reliable.

Table 7. Model 2 Results (ROA)

Independent Variable	1992 - 2014	1992 - 2000	2001 - 2003	2004 – 2007	2008 - 2009	2010 - 2014
Constant	-0.06 (-0.04)	0.042 (1.259)	0.019 (0.515)	-0.024 (-0.982)	-0.04 (-1.048)	-0.009 (-0.435)
Stock Option Ratio	-0.085*** (-6.701)	0 (-1.361)	-0.001** (-2.566)	0 (-0.643)	-0.001 (-1.486)	-0.001*** (-6.033)
Firm Size	0.215*** (3.182)	0.008*** (3.732)	-0.002 (-1.107)	0.005*** (3.816)	0.005** (2.557)	0.003*** (2.849)
Stock Ownership	-4.493*** (-2.724)	-0.028 (-0.724)	-0.003 (-0.076)	-0.015 (-0.502)	-0.126** (-2.344)	-0.168*** (-5.547)
Firm Risk	-0.24*** (-14.847)	-0.002*** (-6.191)	-0.004*** (-8.343)	-0.002*** (-3.039)	-0.002*** (-3.972)	-0.002*** (-5.542)
Growth Opportunities	2.185*** (37.314)	0.009*** (6.327)	0.021*** (11.217)	0.026*** (20.166)	0.04*** (16.808)	0.027*** (28.367)
Leverage	-4.972*** (-12.981)	-0.122*** (-8.665)	-0.051*** (-3.974)	-0.058*** (-7.15)	-0.047*** (-4.605)	-0.04*** (-7.938)
Board Size	-0.231*** (-3.236)	-0.003* (-1.856)	0.001 (0.694)	-0.002 (-1.416)	-0.004* (-1.826)	-0.002* (-1.755)
Board Age	0.111*** (5.73)	0.001 (1.421)	0.001** (2.299)	0.001*** (2.843)	0.001** (2.166)	0.001*** (4.384)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	42%	42%	44%	52%	49%	45%
Observations	3849	537	439	822	511	1540

This table shows the parameter estimates and t-statistics (in parentheses) for the 5 regressions for different periods. ***, **, * indicates the significance at the 1%, 5% and 10% levels, respectively.

To summarize, the study provides evidence that stock options payment to CEOs has a negative influence on firm performance. Thus, the theories that equity payments to the managers could alleviate agency problems are not supported. It could be that due to the settings of this study and the sample used, the results are contradictory to many of the researchers that found that stock options have a positive influence on firm performance (Mehran, 1995; Aboody et al, 2010; Conyon, 2013; Chen and Lee, 2010).

On the contrary, it seems that the study gives proof that the “Managerial Power”, discussed by Bebschuk and Fried (2003), could be a better explanation about what the effect of higher compensations on firm performance is. It could be that CEOs are very powerful in their positions and can influence their payments without the need to perform better. In addition, it is possible that CEOs alone cannot impact firm performance on their own as it requires a large team of talented individuals to drive firm’s success. As many other studies focused on the whole board of directors’ pay contracts, instead of only on Chief Officers, it is likely that taking into consideration the whole management of the company and their pay, results in different outcomes.

Table 8. Model 2 Results (EPS)

Independent Variable	1992 - 2014	1992 - 2000	2001 - 2003	2004 - 2007	2008 - 2009	2010 – 2014
Constant	-1.953*** (-3.405)	-0.778 (-0.949)	0.514 (0.521)	-1.201 (-1.142)	-0.817 (-0.583)	-3.125*** (-3.192)
Stock Option Ratio	-0.016*** (-3.301)	-0.013** (-2.085)	-0.02** (-2.043)	-0.033** (-2.498)	-0.027 (-1.534)	-0.008 (-0.725)
Firm size	0.252*** (9.712)	0.298*** (5.761)	0.076 (1.469)	0.259*** (4.835)	0.236*** (3.163)	0.306*** (6.009)
Stock ownership	1.028 (1.626)	0.304 (0.316)	0.744 (0.61)	3.78*** (2.995)	-1.192 (-0.603)	0.888 (0.6)
Firm risk	-0.049*** (-7.889)	-0.029*** (-3.584)	-0.074*** (-6.459)	-0.067*** (-3.137)	-0.064*** (-4.194)	-0.043*** (-2.669)
Growth opportunities	-0.094*** (-4.198)	-0.16*** (-4.56)	-0.108** (-2.134)	-0.222*** (-3.999)	0.036 (0.414)	-0.055 (-1.212)
Leverage	0.126 (0.855)	-0.702** (-2.024)	0.344 (0.985)	0.308 (0.88)	-0.7* (-1.878)	0.268 (1.09)
Board size	-0.068** (-2.471)	0.047 (1.093)	0.057 (1.098)	-0.152*** (-2.587)	-0.033 (-0.393)	-0.163*** (-2.824)
Board age	0.052*** (6.971)	0.016 (1.195)	0.019 (1.172)	0.056*** (3.492)	0.051** (2.391)	0.083*** (6.063)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	20%	20%	30%	25%	16%	11%
Observations	3849	537	439	822	511	1540

This table shows the parameter estimates and t-statistics (in parentheses) for the 5 regressions for different periods. ***, **, * indicates the significance at the 1%, 5% and 10% levels, respectively.

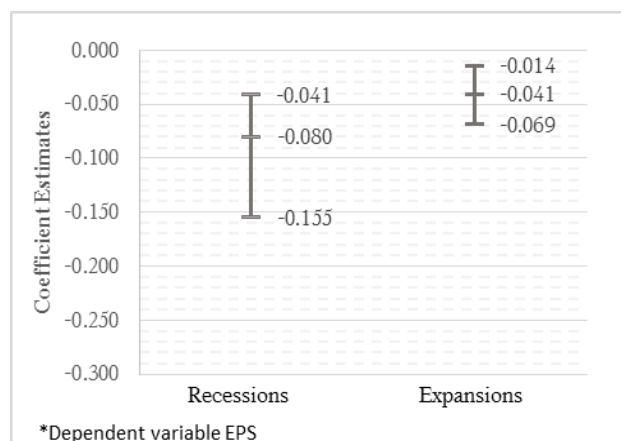
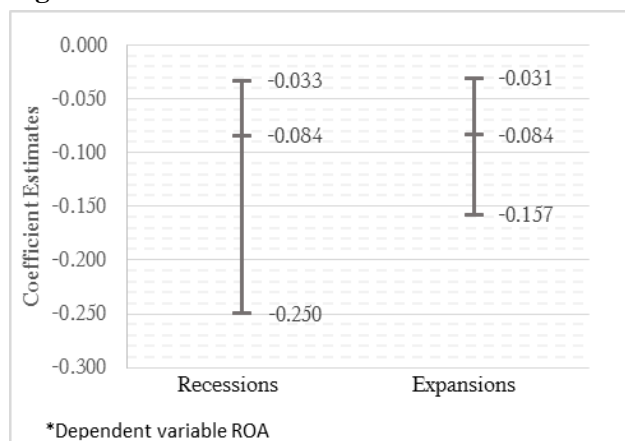
5.2.3 CEO Stock Options' Efficiency

The Figures 1 and 2 below, show the 95% CIs of the recessions and expansions coefficients. In the figure 1, it can be clearly seen that the overlap is much greater than 50% of the average margin of error. Actually, it is evident that the overlap is around 100% since the point estimates are exactly the same at the -0.084. That means that the study could not find evidence that during the economic booms, the CEO stock option compensation has a more positive effect on firm performance than during economic recessions.

In the Figure 2, where the EPS measure was used as a firm performance determinant, the result is the same as in Figure 1. The recessions upper bound (-0.041 to -0.08) overlaps by more than a half of the expansions' lower bound (-0.041 to -0.069). Therefore, the both figures give the same conclusion that there is no evidence of different effects of CEO stock option compensations on firm performance.

What can be noticed from the both figures is that the economic recessions coefficients have a higher distribution of plausible values. Also, the values distribution is much lower than for economic expansions' coefficients, such as in the first figure, the recession's lower bound is -0.25, while expansions is only -0.157. Though, on average, it cannot be concluded that there is a possibility of a difference between these two estimates.

Figures 1 and 2. 95% Confidence Intervals



The results imply that the economic cycles extensively studied by Groot and Franens (2008; 2009; 2012) does not have a differentiating effect on the stock option compensation causality on firm performance.

5.3 Discussion

The thesis has taken into account a broad range of research questions and thus it is important to summarize the main findings and compare them with the other literature on the same subject. The following sections will discuss, in general, what were the outcomes of the study and how it complements the theories established and researches done up to this point in time.

5.3.1 First hypotheses

The first set of hypotheses focused on the economic determinants of CEO compensation, which were: firm liquidity, size, growth opportunities, noise in accounting numbers, CEO age, stock ownership and firm leverage. The main interest was to learn whether these variables have any effect on CEO stock compensation also taking into account the economic variations. In addition, it was important to understand the magnitude of the relationship – which variables have more positive/negative effect on CEO stock compensation.

Having 5 regressions for different economic periods revealed that not always the same variables have an impact on CEO stock compensation. Table 9 showed what the significant variables (either at 1%, 5% or 10%) at particular years were. All the variables were found to have a significant relationship with CEO stock compensation at some point in time, though CEO Age, Noise in Accounting Numbers and Firm Leverage had the lowest likelihood for the support of the relationship. Other variables seemed to have a high probability to have an effect on stock compensation, especially if we look into the 1992 – 2014 period.

It is quite easy to explain the meaning of the results since they correspond to the theories in the Table 3. For example, it was found that firm liquidity has a negative relationship with CEO stock compensation, meaning that those firms that face liquidity problems are more likely to compensate CEOs in stock options.

The negative relationship with leverage is possibly due to the agency problems debts bring in existence of high equity compensation.

The papers best representing the focus of the first hypotheses and that could be used as a basis for comparison are those written by Chourou et al (2008), Tziomis (2008), Yermack (1995) and Lin et al (2012). All of these authors studied throughoutly the effects of various possible determinants on the stock option compensation. The main outcomes of their researches on the various variables can be found in the Table 1.

The thesis agreed to most of the results that were found by the four authors, especially regarding the firm size, stock ownership, liquidity, firm risk and noise in accounting numbers variables. Though, it is quite surprising that CEO Age could not have been proven to affect stock option compensation. Most of the authors found the causality effect between Executive Age and stock option compensation, thus disagreeing to this study's outcomes. Though, Yermack (1995), also, did not find any relationship with CEO age.

Growth Opportunities and Leverage variables were quite controversial and before the study it was hard to establish the theories to rely on. Growth Opportunities variable was found to accord to the predictions and results of the studies of Lin et al (2012) and Chourou et al (2008) and not to support Yermack (1995). Yermack (1995) himself theorized that companies with larger growth opportunities will use more stock options. He used Tobin's Q as a proxy variable (Market-to-book value ratio), which was also used by other authors (Chourou et al, 2008, Tziomis, 2008). Yermack (1995) also reestimated the model in his study using R&D variable as a proxy for growth opportunities, however he found no present effect.

5.3.2 *Second hypothesis*

The second hypothesis tackled the relationship between the CEO stock compensation and firm performance. It was theorized that during economic expansions and recessions stock options positively pushes firm performance. Despite the findings in literature that stock compensation has a positive influence, the research found an adverse effect that CEO stock option compensation negatively influences firm performance, hence disapproving the hypothesis.

The best explanation and theory that could be offered to clarify such outcomes is that of Bebchuk and Fried (2003). They argue that the design of the compensation contract is also a product of the agency problem, since managers (in this case CEOs) have high power to influence his or her pay. This means that a higher compensation in stock options do not necessarily brings enlarged profits for the company due to the incentive effect that this type of compensation provides. On the contrary, in presence of such power, CEO becomes less inclined to improve firm's performance. Core et al (1999) provided further evidence that excessive compensation do lead to reduced firm profits.

However, these results contradict to the most theories claiming that high stock ownership of the CEO reduces the agency problems and hence improves firm performance (Mehran, 1995; Aboody, 2010; Conyon, 2013). Kaplan (2008) in his paper discusses the reasons why U.S. CEOs are not being overpaid, despite their

ever increasing compensation. He backs up his argument by emphasizing that other groups and talents, such as lawyers and sportsmen have also seen large increases in their wages over the last 10 or 15 years. The results of this study contradicts that CEOs are being paid for their performance, since that would impose a positive relationship between the pay and firm performance.

5.3.2 Third hypothesis

Lastly, the third hypothesis presumed that executive pay contracts are more efficient during economic expansions than recessions. The presumption was based on the fact that during recessions, it is likely that the performance of the company will go down and the stock price will be pushed down due to the unfavourable macroeconomic environment. Such movement might make the stock options worthless to the CEOs to exercise and thus is not an ideal compensation component to induce better performance during difficult economic periods. However, the theory was negated by the results of the thesis – no support could be found that during economic recessions Stock Option Compensation has a lesser impact on firm performance than during economically stable times.

It is likely that the research design could not allow to find evidence for this hypothesis. Especially, the lack of variations in the economic periods could have prevented the support of the thought that economic periods have an efficiency effect on CEO stock options. The study only took into account two recessions with relatively short duration. Moreover, the spilling effects of recessions and expansions should have also been taken into consideration to improve the reliability of the results. Furthermore, it is possible that CEOs receive stock options at a discount, with a very favourable exercise price. That would mean that regardless of the economic period, CEOs can still make a profit from the options and thus this compensation type would have the same incentive effect on firm performance. In general, the thesis helps to prove that it is not important to consider economic environment when making CEO compensation levels' decisions in order to improve incentives.

5.3.4 Favourable and Unfavourable Research

Many of the papers were found to agree and even more to disagree with the current research on the same topic of CEO and executives' compensation. Overall, the thesis were more consenting with the authors who wrote on the topic of determinants of stock option compensation. However, the results of the papers on the stock options effect on firm performance are truly different from what this paper concluded. Just couple of the researchers (Bebchuk and Fried, 2003; Core et al, 1999) would actually be in favour of derived results. The Table 10 depicted below, gives a count of the papers that is in favour and does not consent to the thesis' outcomes.

Table 10. Favourable and Unfavourable Papers Count

	Number of Papers (favourable)	Number of papers (unfavourable)
Consent to the findings of the thesis	6	7

Chapter 6

CONCLUSION

The thesis made interesting revelations and contributed to the existent variety of researches on the subject of directors' compensation. The paper exclusively differentiated the periods of economic recessions from expansions in order to look into the results of the different periods and reveal any potential discrepancies. Groot and Franses (2008; 2009; 2012) in their research have concluded that economy, indeed, goes through cyclical tendencies, though not much research has been conducted on how it affects firms. This study consisted of three distinct research points, starting from researching the economic determinants of stock options' compensation, then looking into how such compensation affects firm performance and lastly utilizing of the Confidence Intervals to study whether in economic expansions, CEO stock compensation had a more positive effect on firm performance. The hypothesis was based on the fact that in economic recessions, stock options' might not be a right compensation type to reward CEOs for their effort, due to the general tendency of the stock prices to fall during hard economic times. If the stock prices are plummeting, stock options might become worthless to the CEOs.

The controversies of the academic viewpoints on this topic was also a motivator of this study. Thus, the results of this paper further proved/disproved certain theories on the determinants of CEO stock option compensation and how it affects firm performance. Specifically, it was found that firm size, firm risk, growth opportunities and noise in accounting numbers have a positive relationship with the level of CEO stock options paid, while stock ownership, liquidity and leverage negatively influences this type of CEO pay. Most of the research on the same subject that was studied in this paper concluded very similar results, thus major theories were given ground (in the Table 3) and given additional support with this thesis results (Lin et al, 2012; Chourou et al, 2008; Yermack, 1995; Tziomis, 2008).

In addition, the theory of the Bebchuk and Fried (2003) of the "Managerial Power approach" gained more evidence than the "Optimal Contracting", based on the results of the second equation of the research design. The study found, otherwise than expected, that CEO stock option compensation has a negative effect on firm performance. This could be explained via the theory that CEOs have high power in their positions and thus a larger compensation in stock options does not necessarily mean that firm performance will be positively pushed. Other papers written on this subject such as those by Aboody (2010), Mehran (1995), Conyon (2013) could not be supported.

Also, the third hypothesis could not be proved also pinpointing that this research has some limitations in its design regarding the years of study. By exhausting the bootstrapping and confidence intervals to research the stock option compensation effect on firm performance, the study did not find evidence on the fact that CEO stock option pay more positively influences firm performance during economic expansions than recessions.

6.1 Recommendations

Given the results of the study, it is possible to provide recommendations for the public of researchers and give practical advice to the businesses and authorities. To begin with, it would be recommended for firms to curb the CEO stock options as a compensation share and focus on other incentive type payments, such as restricted stock or performance shares. As this study proves, there is a possibility that CEO stock options can negatively influence firm performance, though to a very marginal, conceivably unnoticeable level. Thus, more research has to be conducted on what sorts of incentives best induces CEOs to perform better – not only the payment, but also other type of stimulus has to be considered.

Government could also take up an active role to ensure that stock options are not excessively paid to the higher corporate officials. The best decision would be to make investments into the research that could precisely determine how the firm performance is influenced by the various sorts of payments to board of directors. Such research could give grounds for the required regulations, which could further protect the shareholder's interests.

Remuneration committees within the companies should be independent from the CEOs, having more members of non-executive type, who are less involved in the firm's daily matters and are thus less biased towards their decisions. Such committees should not have CEO as a member and especially he or she should be prevented from becoming a leader of the group. This could allow to curb CEO power in the decisions of CEO compensation.

Board of directors should also be aware that certain rules should be implemented to disallow the use of power and they should work towards improvement of corporate governance mechanisms within the control group of the company. The board should have enough non-executive directors to support the right decisions for such improvements. Non-executive directors could be composed of the people who are independent from CEO, such as not having close ties or relationships.

6.2 Limitations

The study touched the major concepts and aspects of the CEO stock option compensation on firm performance. Nevertheless, it still lacks in some dimensions that could have been studied or more attention should have been given to improve the extensity of the research.

Firstly, one of the limitations of this research is that it excluded the mid- and small-sized companies, which could have had some weight on the results. Even though, exclusion of these firms allowed to achieve more generalizable results to the large-sized companies, it is still important to investigate the data on other firms as well.

Many other CEO compensation types were also not investigated. The CEO compensation contracts are usually based on many variables, such as KPIs, and different types of payments that are given to directors to

account for their performance and accomplishment of their responsibilities. The restricted stock, bonuses and many other sorts of pay were excluded from the research.

The research design also contains some shortcomings. The results indicated a small R-Squared figure, showing that there is a lack of the explanatory variables in the research. It could be that adding more variables would utterly change the outcomes. Also, possible lags were not considered. It could be that the CEO stock options pay has a lagged influence on firm performance and thus, the lagged variables should have been used within the research design.

6.3 Further research

Even though a plethora of research has been conducted on the executive compensation, there is still room for improvement on the current theories and findings. Also, the limitations of this study indicated the weakness points of this research that could be taken into consideration during further investigations.

As the corporate environment is constantly changing and new regulations are being put in place, it is important to continue performing more research on this topic without assuming that the same results apply, which were found in backdated studies. Many researchers provide very contradictory results, thus it is truly difficult to establish, which theories to utilize given different firms', economy's and board of director's characteristics. Thus, more research should be conducted to give more generalizability emphasising different corporate and economic environments.

Furthermore, this study only focuses on two extremes of economy variations. Burn and Mitchel (1947) showed that there are more types of economy cycles and further research could use their economy cycles division to study the discrepancies of economic periods. Also, Bert and Franses (2009), who studied the relationship between innovation and economic cycles, take into consideration a long period of more than 200 years, which is important to exhaust in the studies on economic variations. The further studies could look into the longer periods and how economic cycles are reflected in the CEO or other executives' compensation structure and size.

More research should also be conducted on medium and smaller companies with more components of pay investigated. The significance of the differences between the differently sized companies could be investigated to make more precise conclusions.

Also, it was mentioned before, that firm size alone does not necessarily influence CEO stock option pay. It is possible that it affects other firm characteristics that, in turn, influences the value of stock options paid. One of the variables that could be affected through the firm size is the value of shares issued – there is a potentiality that it could affect the stock options, and further research could investigate this supposition.

Last but not least, more qualitative investigation should be carried out on the “Managerial power” theory. The study has given ground that this theory is superior to explain the CEO stock options compensation

relationship with firm performance. Though, as it is hard to establish the reasoning behind, future research could exhaust this limitation to improve the understanding for practice and give more detailed recommendations.

APPENDIX

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TABLES AND GRAPHS

Table 2. Literature Summary

No	Authors (Year)	Title	Research theme/question	Variables	Data	Period	Method	Outcome	Comparison
1	N. Ju, H. Leland, L. W. Senbet (2014)	Options, option repricing in managerial compensation: their effects on corporate investment risk	What is the effect of options on corporate investment risk policies?	Options, lookback call options, optimal risk policy	N/A	N/A	Simulation	The inclusion of lookback call options in compensation packages has desirable effects on managerial choice of corporate risk policies and induce risk policies that increase shareholders' wealth/ lookback call options are analogous to the observed practice of option repricing/ a typical compensation contract with call options leads to more conservative risk levels, thus simple options in managerial compensation is distortinary	N/A
2	Z. Dong, C. Wang, F. Xie (2010)	Do executive stock options induce excessive risk taking?	Do the executive stock options induce excessive risk taking in firms' security issue decisions (debt or equity issue)?	Delta, vega, probability that takes the value of 1 for equity offerings and 0 for debt offerings	3734 security offerings by large US public companies	1993 - 2007	Multivariate probability regression analysis	Find that CEOs whose wealth is more sensitive to stock price volatility due to their option holdings are more likely to choose debt over equity as a capital-raising vehicle. The pattern holds not only for firms that are underlevered relative to their optimal capital structure but also for overlevered firms.	N/A
3	C. R. Chen, T. L. Steiner, A. M. Whyte (2006)	Does stock option-based executive compensation induce risk-taking? An analysis of the banking industry	What is the relation between option-based executive compensation and market measures of risk for commercial banks?	Four market-based risk measures, stock option compensation	591 bank - CEO -year observations	1992 - 2000	OLS regression analysis	The structure of executive compensation induces risk-taking, and the stock of option-based wealth also induces risk taking. Overall, the results support the management risk-taking hypothesis over a managerial risk aversion hypothesis.	N/A

4	C. S. Armstrong, R. Vashishtha (2012)	Executive stock options, differential risk-taking incentives, and firm value	How executive stock options (ESOs) give chief executive officers (CEOs) differential incentives to alter their firms' systematic and idiosyncratic risks?	Risk, vega, delta	13,233 firm-year observations, large firms	1992 - 2007	Two-stage least squares	The authors find that vega gives CEOs incentives to increase their firms' total risk by increasing systematic risk but not idiosyncratic risk. The results suggest that stock options might not always encourage managers to pursue projects that are primarily characterized by idiosyncratic risk when projects with systematic risk are available as an alternative.	N/A
5	Y. R. Chen, Y. Ma (2011)	Revisiting the risk-taking effect of executive stock options on firm performance	What is the risk-taking effect of ESOs on firm performance? What is the time frame in which ESO awards influence the risk-taking behaviour and, in turn, firm performance?	1) multi-year option compensation, risk measure, long-term firm performance 2) Single-year option compensation, risk measure, near term performance	S&P firms 1) 6069 observations 2) 8292 observations	1)1992 - 2000 2) 1992 - 2003	Three-stage least square methodology	There exists a nonlinear relationship between a firm's ESO award and its investment risk. A high level of option awards has a negative effect on risk-taking, while a low level of ESOs has a positive effect on risk-taking/ higher unexercised ESO holdings would induce a firm's manager to undertake more risky investments/ higher investment risk induced by a firm's ESO awards has a positive effect on the firm's future performance.	N/A
6	R. M. Hayes, M. Lemmon, M. Qiu (2012)	Stock options and managerial incentives for risk taking: Evidence from FAS 123R	What is the relation between option-based compensation and risk-taking behaviour following the change in the accounting treatment of stock options after the adoption of FAS 123R in 2005?	Options, delta, vega	6,983 firm-year observations	2002 - 2008	Regression	They find strong evidence that firms that would face higher accounting charges under FAS 123R reduced their reliance on stock options the most. In response, firms increased their reliance on bonuses, restricted stock and long-term incentive awards. Findings suggest that accounting benefits were an important driver of the use of stock options prior to implementation of FAS 123R.	N/A

7	J. Wu, R. Tu (2007)	CEO stock option pay and R&D spending: a behavioral agency explanation	How does CEO stock option pay influence long-term risky investment such as R&D? What are the contextual factors that moderate such a linkage?	Stock options, R&D spending	Even though the number of firms is 273 and the total number of observations is 1534	1995 - 2004	OLS regression analysis	CEO stock option pay has a significantly positive effect on R&D spending. Also, CEO stock option pay and R&D spending is moderated by firm performance. When firm performance is high, the impact of CEO stock option pay on R&D spending is positive; and when performance is low, such effect is not obvious.	N/A
8	H. Mehran (1995)	Executive compensation structure, ownership, and firm performance	What is the relation between compensation structure and firm performance?	Compensation structure, firm performance	153 randomly selected manufacturing firms	1979 - 1980	OLS regression analysis	The form of compensation is what motivates the managers to increase firm value. Firm performance is positively related to the percentage of equity held by managers and to the percentage of their compensation that is equity-based.	Disagree
9	D. Aboody, N. B. Johnson, R. Kasznik (2010)	Employee stock options and future firm performance: Evidence from option repricings	What is the effect of broad-based stock option plans of executive and non-executive employees and the subsequent operating performance of the firms that repriced their out of the money stock options?	Repricing, firm performance	1364 firms with employee stock option plans	1990 - 1996	Robust regressions, Logit regression	Repricing firms significantly outperform the control group of non-repricing firms in terms of changes in operating income (operating cash flows) over the three- and five- year period following the event year. The executive-level options provide incentives that are sufficiently large to be reflected in the firm performance, but firms with non-executive-only repricings exhibit no improvement in performance relative with control group.	Disagree

10	J. E. Core, R. W. Holthausen, D. F. Larcker (1999)	Corporate governance, chief executive compensation, and firm performance	Do the measures of board and ownership structure explain variation in CEO compensation? How do corporate governance affect executive compensation? What is the effect on firm performance arising from such characteristics of board and ownership structures?	1) CEO compensation, economic determinants of CEO compensation 2) firm performance and predicted excess compensation	495 observations of 205 publicly traded U.S. firms	1982, 1983 and 1984	Cross-sectional multiple regression	Both, board of directors' characteristics and ownership structure have a substantive cross-sectional association with the level of CEO compensation. In general, firms with weaker governance structures have greater agency problems; that CEOs at firms with greater agency problems extract greater compensation; and that firms with greater agency problems perform worse.	Agree
11	M. J. Conyon (2013)	Executive compensation and board governance in US firms	Does independent compensation committees and boards affect CEO compensation?	Executive compensation, performance, board governance	S&P 1500	2008 - 2012	Regression	The study finds that, on average, executive compensation is statistically and significantly correlated to measures of firm performance. It finds no evidence on that the executive pay is related to affiliated compensation committees. The study also finds that executive compensation is positively correlated with firm size, female executives are paid less than their male counterparts and compensation committees almost universally use compensation consultants to advise them on executive pay. However, they find partial evidence that executive pay is negatively related to the presence of an affiliated director on the board.	Partly Agree

12	E. R. Brisker, D. M. Autorne, G. Colak, D. R. Peterson (2014)	Executive compensation structure and motivations for seasoned equity offerings	Do the extent of equity based compensation for top executives is associated with post-SEO long-run stock and operating performance?	Post-issue stock and operating performance, equity-based compensation	1287 SEOs, from the S&P 1500 firms	1993 - 2006 on SEO and 1993 - 2009 on monthly stock returns	OLS regression analysis	The results support the hypothesis of timing-related motive for issuers with managers receiving high equity-based compensation. They are consistent with the underlying hypothesis that equity-based compensation aligns managers with current shareholders and makes it more likely that they issue shares when the stock is overvalued. By issuing overvalued shares, these managers transfer wealth to existing shareholders at the expense of new ones.	N/A
13	Y. R. Chen, B. S. Lee (2010)	A dynamic analysis of executive stock options: Determinants and consequences	How long the incentive effect of ESOs on performance lasts? What is the dynamic response of ESO grants to growth opportunity and firm risk, controlling for the effect of corporate governance? What is the dynamic effect of over-investment on firm performance?	Growth opportunity, firm risk, ESOs, investment/ ESOs, risky investments, firm performance	The data set contains 15,198 observations covering 2010 firms	1992 - 2005	Dynamic model	Firm's growth opportunities and risk positively affect ESO grants. The net response of ESOs to growth opportunity vanishes after two to three years and net effect of risk converges to zero after three years. Also, they report that incentive compensation is low when corporate governance mechanisms are in effect. The positive relation between ESOs and risky investments is observed. The net effect of ESOs on risky investment converges to zero after three years. The effect of option compensation on risky investments is relatively short-lived. The executives respond to ESOs by increasing investment by one percent, the return on invested capital will increase 1.24 percent in the next year.	Agree

14	L. Chourou, E. Abaoub, S. Saadi (2008)	The economic determinants of CEO stock option compensation	What are the effects of various economic determinants at the firm and individual level on the CEO stock option compensation?	Growth opportunities, firm size, leverage, CEO age, CEO stock ownership, blockholder ownership, non-systematic risk, stock option mix, incentive intensity	All Canadian large publicly traded firms composing the S&P/TSX index	2001 - 2004	Tobit model	There is a concave relationship for the specific risk. CEO stock ownership is negatively related to the use of stock option compensation. They find that blockholder ownership reduces the need for stock option compensation. They find support for growth opportunities, firm size and capital structure hypotheses. Highly leveraged firms make less use of stock options. CEO age seems to negatively affect the stock option mix. Finally, in the financial industry firms are less likely to use stock options.	Agree
15	Konstantinos Tzioumis (2008)	Why do firms adopt CEO stock options? Evidence from the United States	How do the CEO turnover incidence, firm liquidity problems, the need to lengthen the incentives of CEO horizon and agency costs influence the adoption of CEO stock options?	CEO turnover, firm liquidity, CEO horizon, agency costs, stock option adoption	US firms from the S&P Index, a total sample of 909 observations	1994 - 2004	Logit estimation	It is found that the likelihood for adopting stock options as part of CEO compensation is significantly increased by the incidence of CEO turnover and decreased by CEO ownership and age. Firm experiencing CEO turnover is 30% more likely to adopt CEO stock options. The CEO ownership is negatively related to adoption of options. The 'horizon problem' is rejected. CEO age has a strong negative relation.	Partly agree

16	D. Yermack (1995)	Do corporations award CEO stock options effectively?	Do stock options' performance incentives have significant associations with explanatory variables related to agency cost reduction? Does the mix of compensation between cash and stock options can be explained by corporate liquidity, tax status or earnings management?	CEO stock ownership, horizon problem, growth opportunities, noisiness of accounting returns relative to stock returns, firm leverage, regulated industries, liquidity constraints, tax loss carry-forwards, financial reporting costs, stock options	792 U.S. public corporations, 5955 CEO-year observations	1984-1991	Tobit model	Testing nine hypotheses advanced by compensation theorists, he finds evidence to support only three propositions: that companies in highly regulated industries are less likely to use stock options as a source of managerial incentives; that firm provide their CEOs with greater incentives through stock options when accounting earnings contain large amount of 'noise', making managers difficult to monitor; and that corporations facing internal liquidity problems shift the mix of executive pay away from cash salaries and bonuses and toward stock options.	Agree
17	H.C. Lin, T. K. Chou, W. G. Wang (2012)	Capital structure and executive compensation contract design: A theoretical and empirical analysis	How shareholders make optimal managerial compensation decisions by solving the trade-off problem between the incentive and dilution effects derived from granting incentive instruments given their capital structure?	Option grant mix, leverage	US S&P 1500, excluding financial and regulated industries	1992-2006	Tobit model	They find that the performance sensitivity induced by CEO's new stock option awards increases with debt leverage, suggesting that firms with higher debt leverage tend to design CEO compensation themes with greater incentive intensity. They also find a positive relationship between financial leverage and the percentage of CEO pay in the form of stock options.	Disagree

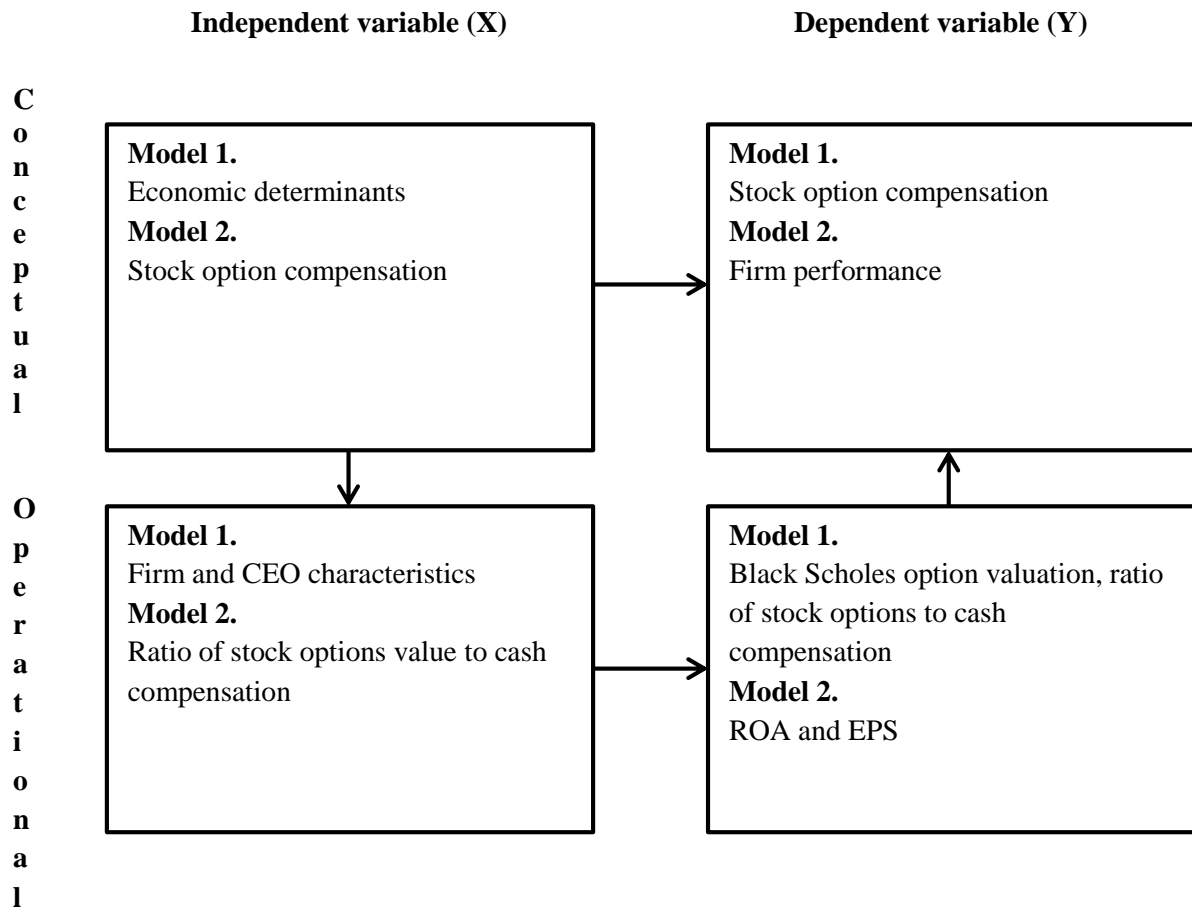
18	K. Jeong, H. Kim (2013)	Equity-Based compensation to outside directors and accounting conservatism	Does the equity-based compensation to the outside directors has an effect on the level of accounting conservatism?	Accounting conservatism, equity-based compensation	3,104 firm-year observations	2006 - 2008	OLS regression analysis	Equity-based compensation to outside directors encourages directors to put more effort into reducing the information asymmetry using conservative accounting (earnings are recognized more conservatively, enhances corporate governance)	N/A
19	R. Hessen (1983)	The modern corporation and private property: a reappraisal	The reappraisal of famous Berle and Means (1932) book	N/A	N/A	N/A	N/A	Berle and Means' book documented that there was a growing dispersion of stock ownership in America's largest corporations. This was a devastating rebuttal to Marx's assertion that wealth in a capitalist society would be increasingly concentrated in fewer and fewer hands. "The traditional logic of profits" requires that the officer managers receive profits as an incentive for them to make reasonable decisions and run the firm efficiently. Berle and Means conclude that in the giant corporations the managers have no incentive to be efficient since they are not entitled to the bulk of the profits.	Disagree

20	M. C. Jensen, W. H. Meckling (1976)	Theory of the firm: managerial behaviour, agency costs and ownership structure	Agency costs, separation and control issue, develops a theory of the ownership structure of the firm	N/A	N/A	N/A	N/A	The agency relationship is defined as a contract under one or more persons (the principals) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent. If both parties are utility maximizers, there is a good reason to believe that the agent will not always act in the best interest of the principal. The agent can limit divergence by establishing appropriate incentives and by incurring monitoring costs.	N/A
21	L. A. Bebchuk and J. M. Fried (2003)	Executive compensation as an agency problem	N/A	N/A	The focus is on publicly traded companies without controlling shareholder	N/A	N/A	The design of compensation arrangements is also partly a product of the agency problem. Discussion of managerial power approach, but they do not propose it as a replacement to 'optimal contracting approach'. Executives have substantial influence over their own pay. The managerial power approach predicts that managers have relatively more power when: the board is relatively weak, there is no large shareholder, there are few institutional shareholders, and managers are protected by antitakeover arrangements. They emphasize their support for equity-based compensation, which if well designed, could provide managers with desirable intentions.	Agree

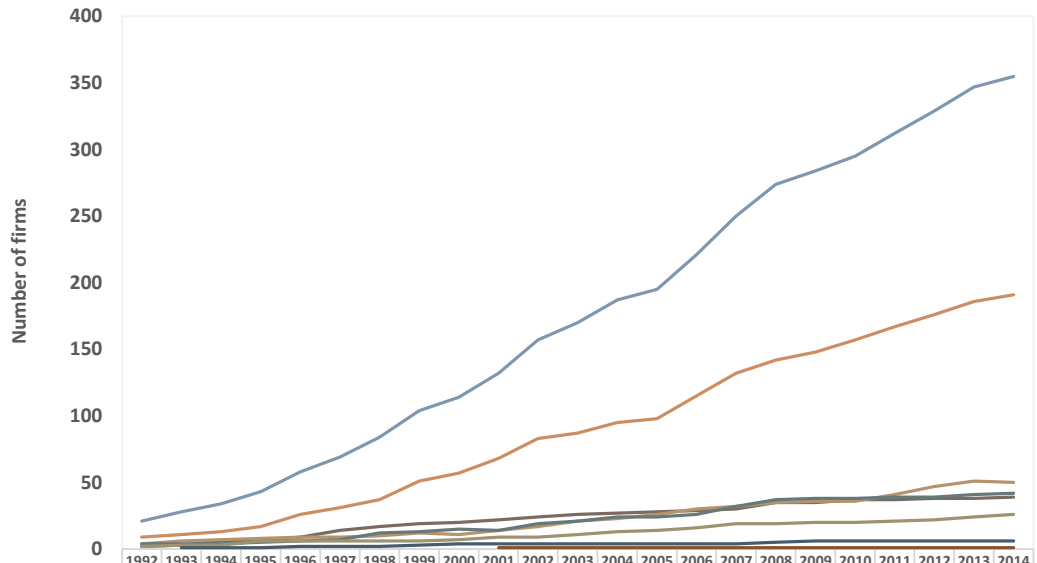
22	S. N. Kaplan (2008)	Are U.S CEOs Overpaid ?	Many critics suggest that CEOs are overpaid, they are paid not for performance, or boards do a poor job of compensating and monitoring CEOs. The paper argues against such arguments	N/A	N/A	N/A	N/A	He argues that even though CEOs earn a great deal, other groups with similar backgrounds and talents have done at least as well over the last 10 or 15 years. They argue that CEOs are paid for performance. Also, he says that some arguments suggest that the CEO job has become increasingly difficult and less pleasant. He argues that increased regulation on CEO pay is unwarranted and unnecessary and particularly true with "Say on Pay" bill passed by the House of Representatives in 2007. It would impose costs on firms with little additional benefit. The CEO job is riskier today than it has been in the past. Second, CEO turnover is strongly related to poor performance. This indicate that boards are not too friendly with CEOs.	Disagree
23	I. Fisher (1925)	Our Unstable Dollar and The So-Called Business Cycle	Is there a correlation between the fluctuations of the dollar and the volume of business?	The index of wholesale prices and the Index of Trade	N/A	August 1915 - March 1923	Correlation estimation	Changes in price level almost completely explain fluctuations in trade. Rejects the idea of the business cycle. It is merely a statistical fact that business fluctuate above and below its average trend. It is impossible in that the series would never fall below its average and often would rise above it.	N/A
24	Ouyang (2009)	The scarring effect of recessions	How do recessions affect resource allocation?	Cleansing and scarring effects	N/A	N/A	Develops a series of propositions and assumptions and solves the formula basis	Proves the scarring effect: Recessions impede the development of potentially superior firms by destroying them during their infancy. Scarring effect dominates the cleansing one: recessions improve resource allocation by driving out less productive firms.	N/A

25	B. D. Groot and P. H. Franses (2009)	Cycles in basic innovations	Do the cycle periods for economic data correspond with cycles in basic innovations?	Innovation, the length of cycles, number of cycles	Silve rberg and Vers page n basic inno vatio n supe r samp le	176 4 - 197 6	Har mon ic Pois son regr essi on mod el	First, they find that there are various cycles in innovation data. Second, these innovations cluster. Third, there is a link between cycles in innovations and economy.	N/A
26	B. D. Groot and P. H. Franses (2008)	Stability through cycles	Can multiple cycles be associated with long-run stability of economic system assuming that the cycles are not caused by exogenous shocks?	Cycle periods, 33 key variables	US, UK and the Neth erlan ds	160 0 - 199 9	Har mon ic regr essi ons	Economic cycle periods can be classified into four distinct groups with cycle periods, on average, 10, 26, 57 and 92. Overall, economic variables displays multiple cycles, there cycle periods do not interfere.	N/A
27	B. D. Groot and P. H. Franses (2012)	Common socio-economic cycle periods	What is the outcome of the analysis of documented cycle periods of most socio-economic variables in the most K-wave literature?	N/A	71 socio - econ omic cycle perio ds	N/A	Met a- anal ysis (ana lysis of anal yses)	The key finding that there is a set of cycle periods that is common across economic variables. The data can be best described by a mixture of 4 normal distributions with clusters around 8, 21, 32 and 55 years.	N/A

Libby boxes: Predictive Validity Framework



Graph 4. Number of firms in the sample by first digit SIC Code Industry Classification



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Manufacturing	9	11	13	17	26	31	37	51	57	68	83	87	95	98	115	132	142	148	157	167	176	186	191
Retail Trade	2	3	6	6	9	14	17	19	20	22	24	26	27	28	29	30	35	35	37	37	38	38	39
Services	4	6	7	8	9	9	10	12	11	14	17	21	23	26	30	32	35	36	36	41	47	51	50
Transportation and Public Utilities	4	4	4	5	6	7	12	13	15	14	19	21	24	24	26	32	37	38	38	39	39	41	42
Mining	2	3	3	6	6	6	6	6	7	9	9	11	13	14	16	19	19	20	20	21	22	24	26
Construction		1	1	1	2	2	2	3	4	4	4	4	4	4	4	4	5	6	6	6	6	6	6
Agriculture, Forestry, and Fishing										1	1		1	1	1	1	1	1	1	1	1	1	1
Total	21	28	34	43	58	69	84	104	114	132	157	170	187	195	221	250	274	284	295	312	329	347	355

— Manufacturing
 — Retail Trade
 — Services
— Transportation and Public Utilities
 — Mining
 — Construction

Table 6. Descriptive statistics

Variables	1992 - 2014			1992 - 2000			2001 - 2003			2004 - 2007			2008 - 2009			2010 - 2014		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Dependent Variables																		
Model 1																		
Stock Option mix ratio	0.00	141.55	2.14	0.00	133.91	2.91	0.00	98.17	2.50	0.00	71.37	1.80	0.00	78.42	2.12	0.00	141.55	1.95
Model 2																		
ROA	-20.11%	27.78%	7.73%	-19.53%	26.96%	7.55%	-20.11%	24.75%	6.16%	-17.49%	27.68%	8.61%	-16.02%	27.30%	7.41%	-19.19%	27.78%	7.87%
EPS	-2.52	9.04	2.49	-2.52	8.51	1.68	-2.48	8.55	1.67	-2.41	8.83	2.51	-2.45	8.78	2.28	-2.45	9.04	3.07
Independent Variables																		
Model 1																		
CEO Age	28	84	51.73	33	70	44.83	33	73	47.95	34	77	50.59	35	79	52.50	28	84	55.56
Firm risk	0.48	107.41	8.80	2.74	107.41	12.12	0.48	50.60	10.57	1.34	27.06	6.95	3.24	46.01	11.60	1.94	44.94	7.20
Firm size	3.74	13.24	9.21	4.59	13.16	8.24	3.74	12.94	8.70	5.59	13.07	9.28	6.14	12.96	9.20	6.75	13.24	9.66
Growth opportunities	0.46	15.92	2.28	0.46	15.92	2.80	0.59	9.02	2.32	0.56	8.72	2.35	0.56	6.48	1.96	0.75	9.22	2.15
Leverage	0.05	1.80	0.55	0.05	1.26	0.52	0.08	1.68	0.52	0.11	1.56	0.52	0.10	1.57	0.57	0.10	1.80	0.58
Liquidity var (2)	0	1	0.72	0	1	0.63	0	1	0.64	0	1	0.69	0	1	0.72	0	1	0.79
Noise in accounting numbers	-2.99	107.82	0.68	-2.99	50.61	0.34	-0.80	24.35	0.39	-1.99	107.82	1.05	-0.34	57.06	0.39	-2.75	57.67	0.77
Stock ownership	0.00%	42.77%	1.24%	0.00%	42.77%	2.21%	0.00%	37.20%	1.37%	0.00%	39.70%	1.22%	0.00%	31.80%	1.07%	0.00%	24.42%	0.94%
Model 2																		
Stock Option mix ratio	0	141.55	2.14	0	133.91	2.91	0	98.17	2.50	0	71.37	1.80	0	78.42	2.12	0	141.55	1.95
Board age	33.00	79.33	52.53	33.00	65.33	49.83	38.50	68.33	50.69	41.75	72.33	52.20	43.80	74.33	53.03	38.00	79.33	54.01
Board size	2	15	5.77	3	15	6.31	3	11	6.25	3	12	5.68	3	9	5.63	2	12	5.53
Firm risk	0.48	107.41	8.80	2.74	107.41	12.12	0.48	50.60	10.57	1.34	27.06	6.95	3.24	46.01	11.60	1.94	44.94	7.20
Firm size	3.74	13.24	9.21	4.59	13.16	8.24	3.74	12.94	8.70	5.59	13.07	9.28	6.14	12.96	9.20	6.75	13.24	9.66
Growth opportunities	0.46	15.92	2.28	0.46	15.92	2.80	0.59	9.02	2.32	0.56	8.72	2.35	0.56	6.48	1.96	0.75	9.22	2.15
Leverage	0.05	1.80	0.55	0.05	1.26	0.52	0.08	1.68	0.52	0.11	1.56	0.52	0.10	1.57	0.57	0.10	1.80	0.58
Stock ownership	0.00%	42.77%	1.24%	0.00%	42.77%	2.21%	0.00%	37.20%	1.37%	0.00%	39.70%	1.22%	0.00%	31.80%	1.07%	0.00%	24.42%	0.94%

Table 11. Model 1 Correlations Matrix

	Stock Option mix ratio	Firm size	CEO Age	Stock ownership	Liquidity	Firm risk	Growth opportunities	Noise in Accounting Numbers	Leverage
Stock Option mix ratio		0.07	-0.04	0.00	-0.12	0.11	0.21	0.02	-0.09
Firm size	0.07		0.25	-0.10	0.25	-0.34	0.10	0.01	0.09
CEO Age	-0.04	0.25		0.19	0.15	-0.20	-0.14	0.00	0.10
Stock ownership	0.00	-0.10	0.19		-0.24	0.09	0.09	-0.01	-0.07
Liquidity	-0.12	0.25	0.15	-0.24		-0.29	-0.22	0.00	0.25
Firm risk	0.11	-0.34	-0.20	0.09	-0.29		0.11	-0.05	-0.11
Growth opportunities	0.21	0.10	-0.14	0.09	-0.22	0.11		0.02	-0.26
Noise in Accounting Numbers	0.02	0.01	0.00	-0.01	0.00	-0.05	0.02		0.00
Leverage	-0.09	0.09	0.10	-0.07	0.25	-0.11	-0.26	0.00	

Table 12. Model 2 Correlation Matrix

	Stock Option mix ratio	Firm size	Stock ownership	Firm risk	Growth opportunities	Leverage	Board size	Board age
Stock Option mix ratio		0.07	0.00	0.11	0.21	-0.09	0.04	-0.06
Firm size	0.07		-0.10	-0.34	0.10	0.09	-0.02	0.27
Stock ownership	0.00	-0.10		0.09	0.09	-0.07	-0.11	0.04
Firm risk	0.11	-0.34	0.09		0.11	-0.11	0.09	-0.27
Growth opportunities	0.21	0.10	0.09	0.11		-0.26	0.00	-0.24
Leverage	-0.09	0.09	-0.07	-0.11	-0.26		0.03	0.17
Board size	0.04	-0.02	-0.11	0.09	0.00	0.03		-0.15
Board age	-0.06	0.27	0.04	-0.27	-0.24	0.17	-0.15	