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An investigation into interlinkages between CEO compensation and firm risk

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Abstract

Title: An investigation into interlinkages between CEO compensation and firm risk

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Key words: CEO compensation, Incentives, Bonus, Stock options, Risk management, Firm risk, Firm size, Firm Leverage, Corporate governance, Agency theory, Managerial power theory, Regression analysis.

Purpose: The purpose of this research is to do an investigation on the interlinkages between CEO compensation and the firm risk. It further intends to see in particular, whether the firm risk has been interlinked with components of compensation like CEO's incentive/bonus and stock options.

Theoretical framework: CEO compensation, Incentives programs, Stock option, Risk management, Principal agency theory, Managerial power theory, Econometrics.

Method: Regression analysis were CEO compensation is a dependent variable in one regression, Proportion of incentive/bonus in one regression and Stock option as a limited dependent variable. Explanatory variables are firm risk, firm size and leverage. Quality test were performed on the data to secure the credibility and reliability of the data.

Empirical analysis: Found a significant relationship, but negative one, between CEO compensation with leverage. Insignificant relationship was both with firm risk and firm size. For analysis of the relationship of Proportion of incentives/bonus all of the explanatory variables were insignificant. Significant relationship was found between stock option and both leverage and firm size. A negative with leverage and a positive one for firm size. Insignificant relationship with firm risk. Based on 95% α-level.

Conclusion: Based on analysis of Swedish large cap companies the CEO compensation is mostly influenced by managerial power theory rather than agency theory. CEO supply and demand forces can influence the compensation structure. No evidence for the dependency of compensation with firm risk, leverage and size.

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1. Introduction

Corporate Governance plays a fundamental role in the continuing performance of a company (Crowther and Sefi, 2010). As a result, much significance has been paid to the governance procedures in the company. Amongst various aspects of corporate governance, executive compensation is one of the aspects attracting considerable attention in the recent years (Boyd et al, 2012). The increase in top executive compensation is one of the prevailing topics in the business world. Recent financial crisis and some scandals have been one of the reasons for increased emphasis on the topic. The perception that the financial crisis has been promoted by distortive executive compensation practices, combined with shortcomings in risk management systems and flaws in corporate governance arrangements, brings a need to foster a change in compensation systems (Aureli and Salvatori, 2013).

Regulatory authorities and government bodies have issued new rules on corporate governance structure aiming to improve companies' disclosure and accountability on both risk and compensation (Aureli and Salvatori, 2013). Some researchers like Canyon (2006) argue that corporate governance in general, and the boards in particular, play a major role in excessive compensation arrangements. Within executive compensation, CEO compensation in particular has been gaining deeper attention. Ozdemir et al (2013) explain this increased attention by pointing out that CEO's compensation significantly outweighs those of their immediate subordinates as well as those of line employees. Therefore, it has taken the core of the investigation in executive compensation. Additionally, organizational performance is linked to the leadership and managerial talent, which is also a reason for more focus on CEO compensation (Ozdemir et al, 2013).

The combination of risk assessment and management is one significant factor affected by norms of corporate governance (Crowther and Sefi, 2010). Corporate governance processes are said to facilitate the management of risk and should incorporate elements of risk management. That is how risk management is integrated into the governance process and how accountability is defined (Culp, 2001).

Risk management can add value to the company and shareholder based on Modigliani and Miller's assumption. M&M's assumptions cover imperfections in the capital market, i.e. unequal access of participants to the capital market and asymmetric information across market participants. These factors should all motivate companies to manage risk in a way that security holder will maximize their value. There are therefore some ways for a company to add value based on risk management, pure frictions in a capital market, conflict between managers and stakeholders, conflict among stakeholders and asymmetries in information. (Culp, 2001)

Contractual relations between stakeholders and managers create opportunities for value added risk management. When a manager is hired to represent the company and the interests of its shareholders, the manager becomes an agent. In many agency models information is assumed to be asymmetric because the performance of the agent cannot be observed by principals or shareholder. Hence it is a challenge to develop processes that incentivise the agent, as much as compensations do, to make the correct decisions on behalf of the principal or shareholder. (Culp, 2001).

1.1 Research Problem

Top executive compensation, especially CEOs compensations, is traditionally composed of basic salary and short term incentive and bonus. The financial crisis, scandals and frauds across the globe, however, prompted companies to change the traditional executive compensation schemes. According to Aureli and Salvatori (2012) it was perceived that traditional compensation measures didn't align with the long term sustainable performance of the company. Although in recent years, different types of incentives, shares and other non-cash based instruments, are also preferred as they seem better to align managers' decisions and behaviours to long term value creation and the time horizon of risk (Aureli and Salvatori, 2012). Consequently, the short term incentives/bonuses and share option plans were criticized by some researchers. Acharya and Richardson (2009) as cited in Aureli and Salvatori (2012) argue that even though short term incentives/bonuses and

options have been intended to reduce agency costs, they happen to create short term share price volatility instead of promoting shareholders' interests of long-term value creation

Additionally, in the context of compensation analysis much emphasis has been laid on interconnections between pay level and organizational performance (Gray and Cannella, 1997). This emphasis on associating pay with the performance seems to have arised from the dominance of agency theory as an explanation of the executive role. The prescription of agency theory that compensation arrangements should link the level of executive pay closely to firm performance seems very appealing for the researchers (Gray and Cannella, 1997). Performance of the firm is nevertheless subject to uncertainty and risk. And key risks curbing company performances can arise from various sources like day-to-day operations, sales, industry competition, financial instability etc. These factors have a strong influence on the performance of the firm.

But the risk factor has not been given much emphasis in the literature when referring to executive compensation. While, Haggard and Haggard (2008), Aureli and Salvatori (2012) suggest that company's performance measurement system should include risk indicators.

Furthermore, Aureli and Salvatori (2012) also mention that in linking incentives to risk management, measure of effectiveness seem like one solution but at the same time it may not be easy to evaluate the effectiveness of the company's risk management. Some measures of effectiveness could be the number of unforeseen events and in-year adjustments required by the redirection process, or the total hours of senior management time required for strategic risk workshops and approvals based workshops (Aureli and Salvatori, 2012). Hence a major challenge for firm risk management is designing compensation contracts which motivate managers to act in accordance with the risk preferences of shareholders while maintaining an appropriate level of risk for the firm (Murphy, 2000 as cited in Tao and Hutchinson, 2013).

Under those circumstances, we thought it would be interesting to analyze the structure of CEO compensation and see how and whether the factor of risk has been incorporated in them. Moreover, we wanted to see how the risk factor impacts some of the relevant components of CEO's compensation structure and examine the interplay of executive compensation and firm's risk in the backdrop of corporate governance.

1.2 Purpose of the study

The purpose of this research is to do an investigation on the interlinkages between CEO compensation in total and the firm risk. It further intends to see in particular, whether the firm risk has been interlinked with components of compensation like CEO's incentive/bonus and stock options.

1.3 Research Questions

1. Is there any interdependent relationship between CEO compensation and the firm risk?
2. Is the firm risk interlinked with CEO's incentive/bonus and stock options?

2. Theoretical Framework

In this chapter, we present the theoretical aspects relevant to the purpose of our study. It starts with a section on agency theory followed by managerial power theory. Thereafter executive compensation structure is presented. Later we have a section risk management and agency theory in which we also discuss the interplay of firm risk with agency theory and then compensation. Lastly, we conclude this chapter with development of our hypothesis based on our theoretical aspects.

2.1 Agency theory

The most common theoretical framework used to examine executive compensation is agency theory (Conyon, 2006). Principal–agent theory provides a solid theoretical foundation for understanding the structure of managerial compensation. Rogers (2002) mentions that shareholders tend to base some portion of the manager's compensation on signs that are seen as indicative of manager's productivity.

Haggard and Haggard (2008) state two basic tenets of agency theory; (1) agents tend to act in their own best interest, and (2) agents are more risk averse than principals (p.452). The first tenet concludes that the incentives of the executive should be aligned with those of the shareholders in the executive compensation in order to curtail managerial opportunism. The second tenet concludes that agents need to be compensated for taking the risks that principals want them to take. Because corporate executives are seen as 'risk-averse' people who are required to be given incentives for taking the risk. Consequently, the executives are often given incentives in the form of salary as well as other pecuniary and nonpecuniary rewards (Haggard & Haggard, 2008).

Most of the predominant approach to the study of executive compensation perceives these pay arrangements as a partial solution to the agency problem. Bebchuk and Fried (2003) mention it as "the optimal contracting approach," where boards are assumed to create compensation schemes to provide managers with sufficient incentives to maximize shareholder value. The basic framework

of principal–agent models generally assume risk-neutral shareholders (the principal) and a risk-averse manager (the agent). Agency theory suggests that there are different risk preferences of risk-neutral shareholders and risk-averse managers which brings the requirement of monitoring by the board (Hutchinson and Ngoc, 2012). The ideal contract in this setting usually includes a risk premium to motivate the manager to take the right choice of action (Rogers, 2002)

However, given the perspective that stock option-based incentives may gain more value with increased risk, it seems convincing that executives at firms with higher risk may desire option based compensation. Guay (1999) as quoted in Rogers (2002) finds that stock return volatility is a positive function of CEO incentives to increase risk. On the other hand, it suggests that high ex-ante risk levels may also be attractive for less risk averse executives. In turn, these executives may desire riskier pay packages. In such a scenario, risk-taking incentives associated with compensation may be a positive function of ex-ante risk level (Rogers, 2002).

Based on information symmetric agency cost, the cost of observing the agent comes in three forms. Number one is the cost of shareholders monitoring the behavior of managers and controlling the behavior through compensation, processes, rules, etc. The second cost stems from managers not taking the correct decisions in regard of shareholders interest. The third cost is residual loss of company value that will occur if the agency relationship is not managed and
controlled (Culp, 2001). Shareholders are mainly interested in the performance of their managers. Written contracts, such as compensation agreements are therefore connected to the manager's' performance since this cannot be determined by shareholders based on information asymmetries, unless they base the compensation contract on variables that can proximate the effort of managers, such as sales or growth.

2.2 Managerial power theory

Another approach to studying executive compensation focuses on a different link between the agency problem and executive compensation. This approach, which has been labelled as

"managerial power approach" views executive compensation as a part of the agency problem itself and not as a mere potential for addressing agency problems (Bebchuk and Fried, 2003). Managerial power seems to have a significant influence in designing executive compensation schemes. The managerial power approach is deemed to highlight many important features of the executive compensation structure that has been seen as complex by various researchers. Bebchuk and Fried (2003) mention that this managerial influence on the compensation might inflict substantial cost on shareholders. For instance in the form of excess pay that executives receive from distorting managers incentives and thereby affecting corporate performance negatively. Compensation schemes might be shaped both by market forces, which push toward value-maximization and by managerial influence, which leads in the directions favourable to managers (Bebchuk and Fried, 2003). "The managerial power approach simply claims that these departures from value-maximizing arrangements are substantial and that compensation practices thus cannot be adequately explained by optimal contracting alone" (Bebchuk and Fried, 2003, p.73).

Filatotchev and Allock (2012) state that executives, in particular CEOs, take advantage of their power in relation to designing of pay packages and are able to insulate themselves from constraints applied by regulators and shareholders. Conyon and Martin (1997) did a study of Corporate governance and executive compensation, the results of which showed various connections between governance variables and executive pay. Remuneration committees seem to have some influence on lower growth rate on executive compensation. Conyon based his estimate of best practice in corporate governance on the Cadbury (1992) *Guidelines for organisational structure*. Cadbury urged that top pay setting procedures should come under the remit of a remuneration committee which then formulate the appropriate reward structure for senior management. However, separating roles of CEO and chairman, appears to play no part in shaping executive compensation.

2.3 Executive Compensation structure

In the traditional compensation package, pay is usually related to performance and hence better performing executives are said to be paid higher compensation (Jensen and Murphy, 1990; Mehran,

1995; and Veliyath and Bishop, 1995 as cited in Ozdemir et al, 2013). Further, if this is combined with the 'riskiness' proposition, positive effect of performance on the CEO compensation level could be further enhanced. Ozdemir et al (2013) suggest that given that pay is positively affected by performance, increased riskiness can infer a higher compensation package for CEOs. Hence this suggests that better performing firms tend to pay a higher total compensation to their CEOs.

Ozdemir et al (2013) state that as systematic risk of a company increases, it induces an adjustment in the CEO compensation. In this context it is can also be inferred that executives facing high systematic risk in their company are likely to stay away from risky yet value increasing decisions which will consequently jeopardize their compensation. Thus, for a business where high systematic risk is of concern, the board of directors needs to tie the CEO's compensation more strictly to pay components that are also likely to increase firm value. With that argument, we would expect that increased firm risk induces higher use of equity-based compensation over total compensation.

2.3.1 Fixed Salary

The fixed salary or the base salary has been the key or mandatory component of the CEO compensation. These base salaries are said to represent the "fixed component" in executive contracts, thus risk-averse executives would probably prefer a dollar increase in base salary to a dollar increase in "target" bonus or variable compensation (Murphy, 1998, p.9). Additionally, most components of the total compensation are generally measured in relative terms of base or fixed salary levels (Murphy, 1998). For instance, target cash bonuses are normally expressed as a percentage of fixed salary and stock option grants are expressed generally as a multiple of fixed salary. Fixed salary is often set through benchmarking other firms or the competitive firms in the same or similar industry and also it represents the largest proportion in total CEO compensation.

2.3.2 Incentives/Bonus

Practically every profit making company provides an annual bonus plan for its top executives, usually paid on an annual basis relating to a single-year's performance (Murphy, 1998). Target

bonuses are mostly performance related and there is typically a cap on the bonus paid. CEO and other top executives will have their bonus or at least some part of bonus depending on their individual performance (Murphy, 1998). To calculate bonuses for executives, companies use a variety of financial and non-financial performance based measures relying on some measure of accounting profits like revenues, net income, operating profits (EBIT) etc. (Murphy, 1998).

2.3.3 Stock Options Incentives

Share based incentives or stock option compensation is the third key component of executive compensation. 'Stock options are contracts which give the recipient the right to buy a share of stock at a prespecified "exercise" (or "strike") price for a prespecified term' (Murphy, 1999, p. 15). Executive options only reward the stock price appreciation but not the total shareholder return since they do not include *dividends* (Murphy, 1999).

2.4 Risk management and agency theory

Contributions of agency theory also has implications for risk. Since organizations are assumed to have uncertainty in their future outcomes, Agency theory extends organizational thinking in this regard by viewing uncertainty in terms of risk/reward trade off beyond the terms of inability to preplan (Eisenhardt, 1989). The implication here is that outcome uncertainty, combined with differences in risk acceptance, tends to influence the principal and agent contracts.

2.4.1 Interplay between firm risk and agency theory

Firm risk refers to the underlying volatility of firms' earnings and has been identified as a source of agency conflict (Tao and Hutchinson, 2013). Firm risk is stated as a measure of the firm's information environment and the risk of its operating environment. It is also a potentially important determinant of firm performance. Agency theory infers that the role of the Compensation Committee is to design compensation contracts that induce risk-averse managers to undertake all risky projects that are representative of shareholders' interests (Tao and Hutchinson, 2013). Because the underlying assumption is that the risk preferences of shareholders and CEOs diverge. Specifically, since shareholders can diversify their wealth across multiple firms, they are assumed

to be risk neutral, and thus interested in maximizing returns. Conversely, because CEOs are prevented from effectively diversifying employment and compensation risk, they are assumed to favor risk-averse actions, which are argued to result in agency costs (Devers et al, 2008). Given that directly monitoring behavior is difficult, many scholars argue instead for aligning the risk preferences of CEOs and shareholders by awarding CEOs equity-based incentives which are assumed to reduce agency costs by discouraging CEO risk aversion (Devers et al, 2008).

2.4.2 Interplay between firm risk and compensation

The CEO of a riskier firm may require a higher risk premium, as well as lower pay-performance sensitivity (Aggarwal and Samwick, 1999). According to Aggarwal and Samwick (1999), an interdependent relation seemed to exist between risk management and executive compensation. Firms often face market-wide, industry-wide, and firm-specific risk. Consequently, CEOs are said to be compensated in different ways for taking on different risks, e.g. market, industry (systematic) and firm specific risks (Haggard and Haggard, 2008). For bearing these different risks, CEOs are being compensated through different means like salaries, incentives/bonus and options. Haggard and Haggard (2008) further argue that CEOs are being compensated for bearing firm-specific risks through compensation like salary, incentives/bonus, option grants and option exercises, whereas they are compensated through options grants for bearing market and industry risks. While the effectiveness of pay-based incentives to take risk might differ across companies and even industries, incentives/bonuses might play a significant role in affecting the overall risk of the firm. One argument is that, because incentives/bonus payments can only be received in a state of solvency, they incentivize CEOs to avoid bankruptcy (Vallascas & Hagendorff, 2013). Furthermore, it is argued that earnings-based cash incentives/bonus make managers seek stable cash flows to meet contractual debt obligations (Vallascas and Hagendroff, 2013).

The proportion of CEOs equity-based compensation to total compensation is said to be positively related to firm risk (Ozdemir et al, 2013). This indicates that having stock options in CEO compensation and the firm risk have a positive relationship. The presence of a share based incentive

like stock options in the CEO compensation is said to have given the CEOs a motivating incentive for additional risk taking. DeFusco et al (1990) state that the stock price volatility increases following the approval of stock options. Additionally, Armstrong and Vashishtha (2012) found evidence in their study that executive stock options are positively correlated with total firm risk.

2.5 Hypothesis development

Based on the above theoretical aspects which suggested interdependent relationship in the literature connecting firm risk with CEO compensation, we develop our hypothesis as

H_1 : There is a positive relationship between CEO compensation and firm risk

H_2 : There is a positive relationship between proportion of cash incentives to CEO total compensation and firm risk

H_3 : There is a positive relationship between presence of stock options in the CEO compensation and the firm risk.

3. Methodology

This chapter presents our choice of research approach, time period of our study and our choice of sample companies. We also discuss our data collection sources. Later we have a discussion on reliability and validity of our research results. Finally this chapter is concluded with a section on delimitations of our study.

3.1 Quantitative Approach

Quantitative approach has been adopted for this study. Since we are investigating CEO compensation structure to analyze the risk factor incorporated into it, we find quantitative approach more suitable than the qualitative approach. Also, few previous studies analyzing CEO compensation have used quantitative methods, hence we find it more appropriate for our research.

3.2 Time period

We have chosen the time frame from 2006-2013 for our research. We have analyzed the CEO compensation and the variables for measuring risk of our sample companies for this period. The reason for choosing this time period is that we thought it would be particularly interesting to do the study before and after the financial crisis (2007-2008) and capture the changes, if any.

3.3 Sampling

For this study, we started by looking into the large cap companies listed on OMX Nasdaq Stockholm. Only large cap firms have been taken in this study due to the availability of data. Meanwhile, for many small cap firms we encountered that the annual reports weren't accessible or that the firms' specific financial data couldn't be retrieved from the Datastream. Among the seven sectors available, we excluded the financial sector since the trends and firm specific financial data are a bit different than in non-financial sectors. Out of the remaining six sectors, we randomly picked three sectors and took a sample of 19 Swedish large cap companies from the Industrial, telecommunication and technology sector listed on OMX Nasdaq Stockholm. We consider these

sectors to be not as prone to the risk factor unlike some other sectors, e.g. the airline industry. Hence we thought it would make an interesting study to see how the factor of risk has been incorporated into the CEO compensation, regardless of their less risky industry features.

In conclusion, we have done mostly probability sampling, though some aspects have been considered due to availability of data. In this context, we realise that the issue of generalization has been the matter of concern in convenience sampling. However, it is also said that in the field of business research, convenience sampling has become very common and is said to be more prominent than samples based on probability (Bryman and Bell, 2015). Moreover, in quantitative studies like this, large cap companies are often chosen as samples due to the accessibility of their data. We therefore consider the sampling error in our study to be negligible.

3.4 Sample size

The sample size we have included ended in 152 observations with 19 companies for 8 years.

3.5 Data collection

Data for this study has been collected from secondary sources. It has been collected from OMX Nasdaq Stockholm webpage, Datastream and annual reports of the companies included in the study. The list of Swedish large cap companies was collected from OMX Nasdaq Stockholm website. Information pertaining to CEO compensation was collected from annual reports of the sample companies while firm specific financial data was retrieved from Thomson Reuters Datastream. Furthermore, in order to seek information for our theoretical framework, Google Scholar, LUB search and Lovisa, the library catalogue of Lund University, were used to find relevant articles and literature referred to in our study. The main keywords used in searching the articles were ‘CEO compensation’, ‘Executive compensation’, ‘Risk Management’, ‘Firm risk’, ‘CEO compensation structure’ and ‘Corporate governance’.

3.6 Reliability and Validity

Reliability is a significant issue, particularly in quantitative research. It is mainly concerned with whether the results of the study are repeatable given the same data (Bryman and Bell, 2015). The usage of secondary data may lead to reliability problem as the quality of the data cannot be controlled. The data used in our analysis has been collected from annual reports, which are systematically audited. Furthermore, one of our sources, Datastream, has access to primary information about companies. Both these sources are considered to be trustworthy and hence the reliability of our information sources acceptable. We consider the prospects of replicability of our study as good, thus having a high reliability.

Validity is another important criteria in quantitative research. It is concerned with the adequacy and accuracy of the measures used (Bryman and Bell, 2015). It is the extent to which a research process is accurate and reflects the realistic conditions. There are two types of validity, internal validity and external validity (Sreejesh et al, 2014). Internal validity measures the extent to which a change in a dependent variable can be explained by the independent variable whereas external validity measures to what extent the inferences derived in the study can be generalized to reality (Sreejesh et al, 2014). The variables used in this study have been used by many previous studies conducted to examine CEO compensation structure. We have taken into consideration the previous studies conducted in analyzing CEO compensation structure and have drawn our approach based on them after making some necessary adjustments to suit the purpose of our study. Additionally, due to high credibility of the sources from which the data was collected, we consider that our study has valid and reliable inferences.

3.7 Delimitations

Due to the time frame, we are limiting our study to this time period even though we realize that taking a much broader time period and including more sectors would have given a broader, more generalizable perspective. Taking all the companies in a particular sector irrespective of their size would also have enabled to see the patterns and trends in a industry more clearly, but it couldn’t be

done due difficulty in collecting data in small cap and non-listed firms. Furthermore, it would have been more constructive to analyze the factors that were considered when designing such compensation by interviewing members of remuneration committees. Since we are bound by a limited time frame, we left out the potential qualitative aspects of what went into designing CEO compensation structure. It may also be noted here that the formula we used to measure firm risk incorporated market risk and firm specific risk by using measures like stock market price, market beta, volatility of the firm. It may have given different results if the analysis is done from different risk measures separately, thus bifurcating firm specific risk, market risk and other risk measures.

4. Model specification

In this chapter, we present our measurements and variables along with our firm risk measure. We start defining our dependent variable and then move on to define our independent variables and lastly explain the risk measure used in this study.

4.1 Measurements and Variables

Many previous studies have shown that there is a relationship between executive compensation incentives based on stock options with increase in firm risk or systematic risk. It has also been argued that CEOs with option holdings, tend to increase their firm's volatility since the CEO wealth is sensitive to stock price fluctuations. There is a suggested link between option grants, increasing firm leverage and increasing stock volatility (Cohen, 2000).

4.2 Selection and defining of variables

The variables used in this study have been carefully chosen. We have included some variables based on what previous studies on this topic, e.g. Gray and Cannella (1997), Ozdemir et al (2013), Chen, Steiner, and Whyte (2005), and Cohen (2000) had chosen, but also some additional variables based on the theoretical framework our research has taken.This study adopts a regression model where CEO compensation is a dependent variable and a combination of a financial data is an independent variable. We define our chosen variables below:

4.3 Dependent variables

For our analysis of CEO compensation; information on fixed salaries, incentive/bonus and stock options will be collected from firms annual report. CEO stock options will increase in value when the price of the underlying asset will increases. These components add to the CEO incentive to influence the company's stock price and market value (Cohen, 2002).

4.3.1 CEO compensation

CEO compensation is defined as the total compensation of the CEO which includes fixed salary, incentive/bonuses (variable salary), stock options, other benefits and pension. We have divided the compensation variables into two different variables further to analyse the compensation structure.

4.3.2 Incentives/Bonuses

Incentives/Bonuses are the short term, mostly annual, bonuses and incentives paid in cash. Also we had three of our sample companies that had a three-year ongoing incentive program, which are paid in cash every year, are also included into incentives/bonuses for our data. It is then taken as the proportion of the total compensation for the purpose of analysis.

4.3.3 Stock Option

Options are the share-based incentives or the stock options which are the part of CEO compensation. In most of the annual reports of our sample companies, there wasn't specific mention of the number of shares included in CEO compensation as stock option and it was furthermore difficult to ascertain the value of these stock options. When qualitative, rather than quantitative, information is available, the qualitative information is coded as dummy variable and is treated differently (Brooks, 2014). This variable of compensation is therefore treated as a dummy variable, taking the value of 1, if the company has stock options in CEO compensation structure and the value of 0, if the company doesn't have stock options in CEO compensation.

$$Option_{fy} = \begin{cases} 1 \ if \ firm \ f \ uses \ an \ option \ based \ CEO \ compensation \ in \ year \ y \\ 0 \ otherwise \end{cases}$$

4.4 Independent variables - Explanatory variable

4.4.1 Firm Leverage

Most common measurement for firm leverage is financial leverage, based on year end total book value of debt divided by total assets. Leverage indicates companies dependance of its debt for its operations. Companies with high leverage are considered to be at risk. The influence of increasing

firms leverage further than its optimal capital structure, may destroy the firm value (Cohen, 2002) and increase the risk of default.

$$Financial\ Leverage = \frac{Debt}{Total\ Assets}$$

4.4.2 Firm size

Value of total assets is a measurement for firm size based on Chen, Steiner and Whyte (2005) study. Reason is that larger companies have more opportunities to invest, pay CEOs higher compensation, which can be reflect on the company's demand of high qualified managment. (Core, Holthausen, Larcker, 1999). We will use the logarithm of the value.

$$Size_{fy} = ln(\ Value\ of\ Tot\ Asset_{fy})$$

4.4.3 Firm risk based on the stock market

There are many types of risk measures for firm risk. When reviewing other studies we saw frequently used measurements are total risk, firm specific risk, interest rate risk and market risk.
By using market based risk measures, like stock market price and performance of the firm we can estimate the volatility of the firm and the risk taking from shareholders perspective. Based on Andersson and Fraser (1999) and Chen, Steiner, and Whyte (2005) this is the following factor to measure total firm risk using measures of market risk and firm specific risk.

$$(R_{fy}) = \alpha + (\beta_{fy}^{M})\ (R_{y}^{M}) + \varepsilon_{fy}$$

(R_{fy}) represents the daily stock return for firm *f*. (β_{fy}^{M}) is the market beta coefficient, calculated based on daily stock return of each firm and the market return. Market return for each year y (R_{y}^{M}) is based on historical information from the Swedish stock market index, OMXSPI. The firm specific risk is estimated by calculating the standard deviation (σ_{fy}^{u}) of residuals (ε_{fy}). Total risk is estimated using daily stock return for each company and calculating the standard deviation (σ_{fy}).

5. Empirical results and analysis

In this chapter, we describe our regression model, go through the validation of our data, analysis statistics, analysis our empirical findings and present the regression results. First we start with the detailed explanation of our regression model and validation test that we preformed on our data. Then we move on to empirical findings, statistics and our regression results.

5.1 Regression model

Regression model assumes a linear relationship between the independent variable and dependent variables (Sreejesh et al, 2014). We adopt an Ordinary Least Squares (OLS) model for our regression analysis, with fixed effect for each sample. OLS estimates for the minimum value of parameters of the residual sum of squares (Brooks, 2014). To valuate the explanations, given by the regression model, there are some econometrics tests that we need to conduct on our dataset. Fixed effect method estimates an individual intercept for each companies in our sample. Other possible effect method is random, where the difference in the intercept are random among the sample (Brooks, 2014). For our sample and working with panel data, it is more appropriate that intercept difference is based on fixed method rather than random, making our result more consistent but not always the most efficient (Stock and Watson, 2003).

For one of our regression we will have a dummy variable as our dependent variable. Based on Brooks (2014) using dummy variable as the explained variable, requires different regression model. This situation is called limited dependent variable. Because we will have the stock option as a dummy variable that takes the value 0 if the CEO has no stock option and 1 if the CEO has a stock option. The simplest way to deal with binary dependent variable is to apply the Linear probability model (LPM). The linear slope estimates that change in probability making the dependent variable to equal 1 for one unit change in the explanatory variable, if everything else is kept fixed. The linear regression model can be estimated by OLS (Brooks, 2014). To assess the probability of an

event, P_i is linearly related to a set of explanatory variables. Fitted values are the estimating probabilities that $y_i = 1$ for each observation i (Jens Forssbæck, 2015).

$$P_i = p(y_i = 1) = \beta_1 + \beta_2 x_{2i} + \beta_3 x_{3i} + \ldots + \beta_k x_{ki} + u_i$$

Due to limitation of the LPM some specific approaches have been developed for the estimation of the binary response. Most common is the logistic model, which is based on the cumulative probability distribution, where the logistic function places the value of $F(z_i)$ with an open interval of 0,1 based on the value of z_i. An alternative to the logit model is the probit model. The difference is that probit model is based on the cumulative normal distribution. Making the estimation of the coefficient values different (Jens Forssbæck, 2015).

$$F(z_i) = \Phi(z_i) = \int_{-\infty}^{z} \phi(z)dz$$

$$\text{where } \phi = \frac{1}{\sqrt{2\pi}} \exp(-z_i^2 / 2) \quad \text{(i.e. the std normal pdf)}$$

To be able to estimate the effect of changes in the probability in a binary, probit model is to calculate the marginal effects by taking the derivative of the estimated regression function, or the independent variable of interest. However, because the estimated function is nonlinear, we need the value of z. The estimation is usually done by the mean value of the independent variable. The marginal effect for probit model of independent variable k is based on this formula. We will use the probit model in our estimated regression of stock option variable.

$$m_k^{\text{probit}} = \beta_k \phi(z)$$

5.2 Hausman test

With the Hausman test we can evaluate if fixed or random effect should be used in our regression model. Null hypothesis is based on the coefficient estimation using the random effect is equal to the coefficient estimated using the fixed effect. We tested our data based on the Hausman test to

see if our null hypothesis can be rejected, which gives us the result that, for our panel data, using fixed effect is more adequate than using random effect.

5.3 Bera-Jarque - Normality testing

Here we test whether the coefficient of excess kurtosis and coefficient of skewness of normal distribution are jointly zero (Brooks, 2014). Kurtosis measures how flat the tail of the normal distribution curve is. Skewness measures the asymmetry of the mean value. Normal distribution needs to have coefficient of excess kurtosis of 3 and no skewness. Formulas for coefficients of skewness and kurtosis are:

$$b_1 = \frac{E[u^3]}{(\sigma^2)^{3/2}} \quad \text{and} \quad b_2 = \frac{E[u^4]}{(\sigma^2)^2}$$

Bera-Jarque statistic test is given as:

$$W = T\left[\frac{b_1^2}{6} + \frac{(b_2 - 3)^2}{24}\right]$$

T represents the sample size and the estimation for the two coefficient, b1 and b2, using the residuals from OLS regression. Based on the conclusion of the Bera-Jarque, that the residuals from the model are significantly skewed, leptokurtic or both, the Null hypothesis of normality should be rejected. (Brooks, 2014)

In our first test of Bera-Jarque normality, each of our variables were included in the regression. The conclusion of the test was that none of our variables were normally distributed, with skewness of zero and kurtosis of 3. If the residuals are normally distributed, the Bera-Jarque statistic should not be significant and the histogram should be bell shaped. When statistics are calculated based on normal distribution, the non-normality decreases the quality of inference. To increase the normality, some common methods were performed to exclude outliers and apply natural logarithm on the variables (Brooks, 2014). Natural logarithm was added to total compensation variable, Net sales and total assets. Due to extreme value, one of the companies in our sample was excluded from

the sample size, reducing the sample size from 20 companies to 19 and the observations from 160 to 152. Other outliers were removed using dummy variables - based on rule of thumb only 2 dummy variables were used to remove outliers (Brooks, 2014). However, transforming the data accordingly was not enough to achieve a normal distribution. Therefore in our first Bera-Jarque test of normality our null hypothesis was rejected based on p-value of 0,013 at significant level of 5%, see Appendix 1. Nevertheless, in accordance to central limit theorem, the mean of random sample of observation will in the end follow the normal distribution, as the sample size reaches infinity. For a big enough sample, the effects of non-normality will therefore become less significant and according to central limit theorem, applying regression on non-normality data can be statistically valid (Brooks, 2014). Based on the central limit theorem, and after further adjustments to our data and improving the Bera-Jarque normality test, we continued with our research.

5.4 Multicollinearity

When using OLS estimation in regression there is implicit assumption that there is no correlation between the explanatory variables, in which case the relationship is called orthogonal. If this orthogonality relationship between the explanatory variable is true, then it will not change the coefficient if variables are removed or added (Brooks, 2014). In practice there is always some correlation between explanatory variables, albeit to a small degree. If the correlation is low that will not cause a significant problem since it will not generate a loss in precision of the regression model. However, if the relationship between the explanatory variables is very highly correlated, the problem becomes significant and that is called multicollinearity. The regression model can ´look good´ with high standard errors for individual coefficients, but the measure of R2 will also be high, making individual variables insignificant. When the explanatory variables become closely related, a separation of individual variable within the model becomes difficult. Also removing or adding variables will have large effect on the value of coefficients or on the significant of other variables. Multicollinearity will make the confidence interval inappropriate, causing difficulties in drawing sharp inferences (Brooks, 2014).

In our correlation matrix testing for multicollinearity, no variable showed significantly high correlations. The strongest correlation was between leverage and firm risk of -0,46. Based on low conclusion of correlation no further test was needed. See in Appendix 2.

5.5 Summary of statistics

Our final sample included 19 companies, over an 8-year period from, 2006 to 2013, with total of 152 observations. Table 1 includes descriptive statistics for our sample, including maximum, minimum, median, mean and standard deviation for all of our variables both dependent and independent. By analysing the descriptive summary of statistics for our sample, it provides information regarding the range and scale of variables in our data. As shown in table 1 our largest company has total assets of 361 billions with total debt of 277 billions. The smallest company in our sample has total assets of 69 millions and total debt of 6,8 millions. The highest leverage company had a debt to equity ratio of 0,81 while the lowest was 0,069. The mean was 0,58. Highest risk measure was in total 0,86 but the lowest was -0,14.

Table 1 – Descriptive Statistics

(SEK)	Mean	Median	Maximum	Minimum	Std. Dev.
TOTAL COMPENSATION	12.987.319	12.313.384	41.185.204	1.168.000	8.186.557
FIXEDSALARY	7.369.759	7.582.500	15.981.000	1.133.000	3.797.359
BONUSES	3.477.684	2.740.067	14.600.000	-	2.774.049
TOTAL ASSETS	57.807.188.664	32.382.500.000	361.239.000.000	68.974.000	82.426.393.267
TOTAL DEBT	36.006.175.928	21.702.000.000	277.229.000.000	6.886.000	55.119.158.102
COMMONEQUITY	21.801.012.737	11.127.500.000	145.106.000.000	58.139.000	32.519.558.441
LEVERAGE	0,5823	0,6082	0,8102	0,0691	0,1624
PORP.BONUSES	0,2040	0,2175	0,5309	0,0000	0,1428
PORP.FIXED SALARY	0,5573	0,5661	0,9902	0,0000	0,1941
RISK	0,2800	0,2456	0,8599	-0,1383	0,1482
STOCK_OPTION	0,5921	1,0000	1,0000	0,0000	0,4931
Observations	152				

Table 1 also provides statistics for structure of the CEO total compensation and how the compensation divides into fixed salaries and incentives/bonuses. The company with the highest total compensation paid its CEO 41 million in total compensation, thereof 15.9 millions in fixed

salary and 14.6 million in incentives/bonuses. The remainder included e.g.pension payments, that the CEO receives when he retires. The lowest compensation was 1.2 million, all paid as fixed salary. The mean of total compensation is 13 millions, fixed salaries is 7,4 millions and incentives/bonuses is 3,5 million.

Table 2 – Yearly average of compensation

	Proportion	Total comp	Stock option
2006	24,39%	13.542.472	47,37%
2007	22,96%	11.456.609	52,63%
2008	14,59%	11.493.316	52,63%
2009	18,26%	12.226.320	52,63%
2010	24,03%	13.412.246	63,16%
2011	20,78%	13.778.645	68,42%
2012	18,83%	13.522.348	68,42%
2013	19,39%	14.466.591	68,42%

We also analysed the yearly average of the CEO compensation, the proportion of incentives/bonuses and the use of stock options based on incentive programs, as shown in table 2. This analysis gives a clear picture how the compensation varied over the period. We expected to see a decrease in compensation, proportion of incentives/bonuses and in stock options in the years 2008 and 2009 due to the financial crises. But it seems that Swedish companies in our sample were not greatly affected by the crises. The average proportion of incentives/bonuses was the lowest in 2008, 14,6% of the total compensation. But it increased to 18,3% in 2009 and up to 24% in 2010. The proportion of companies providing stock options to their CEOs was the lowest in 2006, at 47.4%. It increased steadily towards 68,4% in 2011 and remained constant until 2013.

5.6 Regression analysis

We start by presenting our regression results. We have three different regressions to analyse and discuss. Our first regression has total compensation as dependent variable and then we have second regression as incentive bonus as the dependent variable and lastly we have regression which has stock options as the dependent variable.

5.6.1 Analysis relationship between the total compensation and independent variables

In table 3 we can see the regression result for the relationship between total compensation and firm risk, leverage and firm size.

Table 3 – Regression – CEO compensation as dependent variable

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12,85928	2,042442	6,296032	0
LEVERAGE	-1,101151	0,314382	-3,502592	0,0006
FIRM SIZE	0,160338	0,087254	1,837607	0,0686
FIRM RISK	0,254111	0,246265	1,031858	0,3042

Overall result from our regression based on the sample we have and our data, are that the firm risk and firm size is not significant in explaining changes in total compensation since the p-value is above 0,05. These two explanatory variables are not significantly independent from zero with p-value of 0,3042 for firm risk and 0,0686 for firm size, for all significance levels. With P-value of 0.0006, leverage is the only variable that has a significant relationship. However, the coefficient for leverage, based on our sample indicates a negative relationship between total compensation and leverage. If the leverage will increase by one percentage the total compensation will decrease by SEK 11.000. While creating the hypothesis for this analysis and reviewing other studies we expected a positive relationship between total compensation and firm risk, leverage and firm size.

This result clearly implies that the total compensation for our sample does not have a significant relationship with our explanatory variables; firm risk and firm size, and negative relationship with leverage, even though other studies have implied the contrary. Based on the assumption that high compensation of CEO might encourage them to take more risk and increase leverage of the company or that high compensation of CEO can be explained by firm size. The bigger the company, the higher the compensation. It can be implied that the principle of agency theory does not apply to our sample. Reasons for our result will be further discussed in our Discussion chapter.

5.6.2 Analysis relationship between the proportion of incentives/bonuses and independent variables

In table 4 we can see the regression result for the relationship between proportion of incentives/bonuses and firm risk, firm size and leverage.

Table 4 – Regression – Proportion of bonuses as dependent variable

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1,731015	0,915806	1,890154	0,061
LEVERAGE	-0,058424	0,173969	-0,33583	0,7376
FIRM SIZE	-0,061557	0,038933	-1,581122	0,1163
FIRM RISK	-0,096111	0,095613	-1,005204	0,3167

The result from our second regression is that our explanatory variables; firm risk, firm size and leverage, are not significant in explaining changes in the proportion of incentives/bonuses of total compensation based on p-value above 0,05. Firm risk has a p-value of 0,32, firm size has a p-value of 0,11, and leverage has a p-value of 0,73. Coefficient indicates a negative relationship between the proportion of incentives/bonuses and the explanatory variables. This result implies that paying out a proportion of the compensation as a bonus, based on our sample and data, is not influenced by firm size, increasing firm risk, or by leverage. Our expectation was that we would find a positive relationship between these variables. Having a large part of the CEO compensation paid out as bonus, or as part of a cash incentive plan, would have more influence on CEO risk behavior,

increasing his incentive to increase firm risk. This can be explained by the assumption that if bonuses and cash incentive plans are well structured and perhaps connected to financial measurements, then it becomes difficult for the CEO to influence these incentives or financial measurements for his personal gain. This will be further discussed in the discussion chapter.

5.6.3 Analysis relationship between providing CEO with a stock options and independent variables

In table 5 we can see the regression result for the relationship between providing CEO with stock options and firm risk, firm size and leverage.

Table 5 – Regression – Stock option as limited dependent variable

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Mean	Mean value of z	Predicted probability	Marginal effect
C	-3,87526	1,83524	-2,11159	0,03470				
LEVERAGE	-3,21978	0,92009	-3,49943	0,00050	0,56349	4,33682	0,01291	-0,04103
FIRM SIZE	0,26007	0,08214	3,16628	0,00150	23,99973			0,00331
FIRM RISK	-0,57471	0,87120	-0,65968	0,50950	0,27165			-0,00732

In this regression our dependent variable, stock option is a dummy variable that takes the value 0 if the CEO has no stock option and 1 if the CEO has a stock option. By making the stock option a limited dependent variable we need to treat it differently in the regression (Brooks, 2014). The P-value implies that leverage and firm size is statistically significant based on significance level of 5%. Leverage had p-value of 0,0005 and firm size 0,0015. However, the p-value for firm risk is 0,5095 and therefore making the variable insignificant. Coefficient for leverage is negative implying a negative relationship with stock option, but coefficient for firm size is positive. To be able to asses the magnitude of the relationship we need to calculate the marginal effect of the mean of independent variable. Because of high mean for firm size our predicted probability at means became only 0,013. Implying that 10% change in leverage will reduce stock option about 0,4% and one unit change in firm size will increase stock option about 0,033% which indicates very weak relationship.

Based on this result for our sample there is insignificant relationship between providing CEOs with a stock option and increase in risk adverse behavior of CEO. Our result shows negative relationship with leverage, which can also be considered a risk measure since high leverage companies have a higher likelihood of default risk (Cohen, 2002). Long term option plan of 3 years is common ground for all of the companies in our sample. This might be one explanation for insignificant relationship. Limiting the CEO ability to gain on short term increase of companies stock prices. This will be further discussed in the discussion chapter.

6. Discussion

In this chapter, we analyse and discuss our empirical findings more in depth. First, we discuss the linkages of compensation and its components with leverage, then we discuss the firm risk and the firm size. Later we analyse our results on compensation and its components, more with our theoretical framework.

We will discuss the results with each explanatory variable and analyze them in the context of empirical findings and the theoretical framework. We consider CEO compensation in general and incentive/bonus and stock options in particular in some of the contexts, as these are two components of the compensation taken in our study along with total compensation.

6.1 Leverage

The total compensation in our study sample gave a negative correlation with the leverage of the firm in our regression model. The incentive/bonus component of compensation also didn't have any correlation with leverage. However, stock options seem to have negative relationship with the leverage. Though the relationship here wasn't a stronger one. Cohen (2000) and Ortiz-Molina (2007), suggest a link between CEO compensation and firm leverage. Our findings are consistent with Cohen (2000) as he stresses the possible linkage between CEO stock options and leverage. Ortiz-Molina (2007) also suggests that stock options are most sensitive to firm's capital structure and leverage levels. However, studies highlight mainly the stock options when discussing leverage. Total compensation and variable, cash incentives aren't given much emphasis in the literature when discussing the linkage with firm leverage.

6.2 Firm risk

As mentioned in the earlier chapter, the regression shows insignificant results for our sample in analysing connections between CEO total compensation and firm risk. This contradicts Aggarwal

and Samwick (1999) who suggested that CEO of a riskier firm may require higher compensation packages. Also, we found no relation, for our sample, between CEO incentive/ bonus and total firm risk. It may be because the cash incentives or the bonuses are linked mostly to the previous year's financial performance and thus may not be connected to other aspects like risk. The reason may also be that since it's a small proportion of the CEO total compensation, it may not be aligned to firm risk. Furthermore, the presence of stock options in the CEO compensation didn't show any relationship with firm risk as well. It may be noted here that since we couldn't calculate the value of CEO stock options and could only take option as a dummy variable based on the information we could get from the data sources, there is a possibility that there is a relationship between value of stock option and firm risk. Because Armstrong and Vashishtha (2012) analyse total firm risk with the value of stock options and find the positive correlation between them. However, researchers like DeFusco et al (1990) find that the stock price volatility increases following the approval of stock options. Hence, we thought of considering the stock options as dummy variable and analyzing whether the presence of stock options is interlinked with firm risk. It may also be noted that our formula for firm risk incorporated market risk and firm specific risk by using measures like stock market price, market beta, volatility of the firm. It may have given different results when seen it from different risk measures separately bifurcating firm specific risk, market risk and other risk measures.

6.3 Firm size

In our study, we didn't find any relationship with firm size and CEO compensation. The total compensation as well as incentive/bonus and stock options didn't show any relationship with firm size. Even though,we considered the large cap firms in our study, the sample we had still varied in size, e.g n terms of no. of employees and total assets. We have considered total assets while analyzing firm size based on previous studies like Chen, Steiner and Whyte (2005). In analyzing the firm size, Frydman and Saks (2010), Bebchuk and Fried (2006) found connection between firm size and CEO compensation. In this context, Frydman and Saks (2010) see a positive relationship. Bebchuk and Fried (2006) mention that compensation practices for CEOs increase with increasing

firm size. The results from our sample, contradict these studies as we didn't see any significant relationship connecting size and compensation.

Further analysis of our contradicting results

We further discuss CEO compensation and its components based on the theoretical framework of this study. And analyze the deviations of the results in this regard.

6.4 CEO compensation

From the viewpoint of agency theory, as argued in studies like Haggard and Haggard (2008), agents (CEOs) are compensated for the risks taken on behalf of their principals (shareholders) which would lead to the possible interdependent relationship between compensation and firm risk. Therefore, CEOs are provided with incentives in the form of salary, incentives, bonus, options etc. Agency theory views uncertainty in organizational performance as a risk/reward trade off which tends to influence principal (shareholders) and agent (CEO) contracts (Eisenhardt, 1989). It is believed that by connecting incentives with risk elements can help align the different interests of CEOs (agent) with shareholders (principal) and thus provides for maximization of shareholder value. This could be the optimal contracting from the shareholders point of view. However as our results showed insignificant relation between compensation and our explanatory variables of firm risk, size and leverage, we further analysed the reason for this results. This could probably imply that compensation may not be explained by the only means optimal contracting (Bebchuk and Fried, 2003) as it could imply the role of influence of CEO managerial power. Additionally, the CEO demand and supply forces may also have played a role. In explaining the managerial power of CEOs, Filatotchev and Allock, (2012) mention about CEOs taking advantage of their managerial power to design their pay packages. In such cases, CEO compensation packages may not be aligned with firm size or the risk. Bebchuk et al (2002) suggest that CEOs with managerial power can

influence their compensation packages. This may give the explanation for our results as we find CEO compensation to be not connected with firm size and firm risk.

6.5 Incentive/bonus

The incentive/bonus taken are usually the short term variable compensation based on firm performance. They may have been linked to the short term performance and may not have been aligned with risk elements or the leverage. Furthermore, as stated in Murphy (1998) incentives/bonuses of CEOs are calculated on the basis of various financial performances. Hence, the analysis may not show the proper linkages as it incorporates multiple measures. According to Vallascas & Hagendorff (2013), cash based incentives are linked with the leverage levels. However, our results contradict this as our study didn't give any significant relationship in this regard.

6.6 Stock options

The stock options were taken as a dummy variable in our study, investigating on the basis of presence and absence of it as done in some studies based on approval. Even though, stock options showed a connection with leverage to some extent, our insignificant results in this context with the firm risk may have some influences from managerial power theory too.

Murphy (2002) cite that how managerial power is the reason for several puzzling features in options like the reload provisions, early exercisability of options etc. Murphy (2002) also argues that managerial power can explain the patterns and practices of executive compensation in a better way. Thus implicating that managerial power can have a good amount of influence on CEO compensation patterns.

7. Conclusion

The final chapter presents the concluding results of this study where we re-visit our research purpose and answer the research question. Also it includes some of the suggestions for further research.

We conclude our study by answering the research questions stated in the beginning. As our sample data didn't show any relationship, we find no evidence to say that there is any interdependent relationship between CEO compensation and firm risk. Furthermore, our results find no proof that CEO's incentive/bonus and stock options are interlinked with firm risk. The incentive/bonus seemed to have been aligned with Swedish corporate governance code which states about setting a limit on maximum cash incentives payable to CEO, which all our sample had in place (Swedish Corporate Governance Board, 2015). Also, we didn't find any significant differences in the compensation practices for our sample companies in the pre-crisis and post-crisis period included in our study. We didn't see the difference especially in terms of inclusion of risk elements in compensation as analyzed by our risk measures. Also we saw no evidence for the dependency of compensation with firm leverage and firm size. Though in connection with leverage, stock options in our sample data seemed to showed a negative correlation, which again wasn't particularly strong. Thus, the analysis of CEO compensation in the Swedish companies we studied didn't give us any proof of the linkages in firm risk as well as size and leverage.

Therefore, it seemed like our data from the three sectors of Swedish large cap companies seemed to have the CEO compensation contracts influenced more by managerial theory rather than agency theory. There may also be the influences of demand and supply force in the large cap companies of three sectors analyzed in this study. Because CEO supply and demand forces can have the influences on the compensation structure. Additionally, these forces may also have implications for the managerial power theory, defining the power of CEO in the pressure of these forces.

8. Suggestion for further research

Interesting insights for the future research would be to analyse the CEO compensation structure in more depth to see its connection with firm risk. As we realized during this study that qualitative factors have rarely been considered in these type of studies. For instance, what factors have been considered by remuneration committee while deciding on CEO stock options? During the course of this study we have understood there is enough scope for a mixed method of qualitative and quantitative approach to analyse the interplay between CEO compensation and firm risk.

Another suggestion would be to include a larger sample comprising of both mid cap and small cap companies. That would capture potential sector wise trends more clearly.

Lastly, it would be interesting to do a comparative study and analyse the interlinkage between CEO compensation and risk management across different countries.

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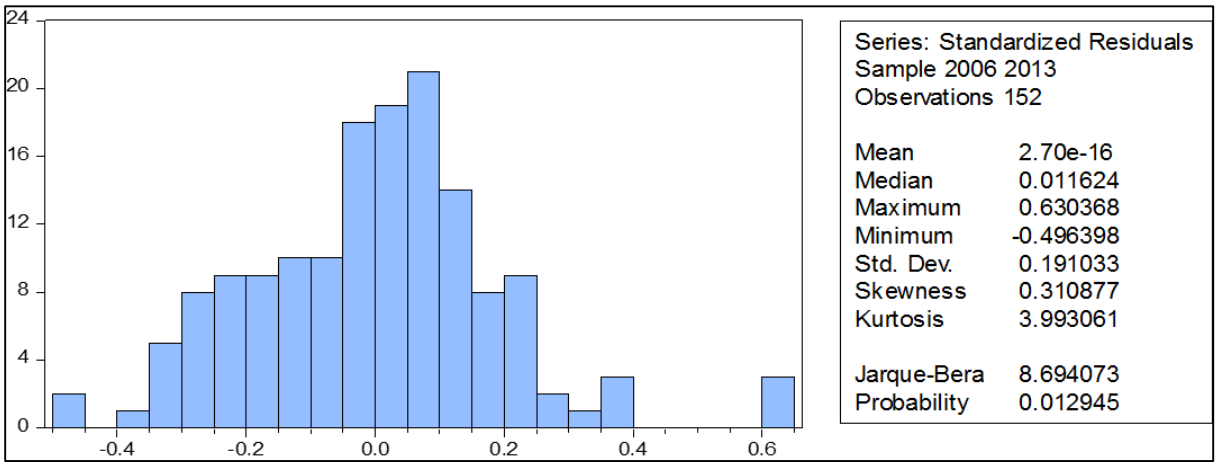
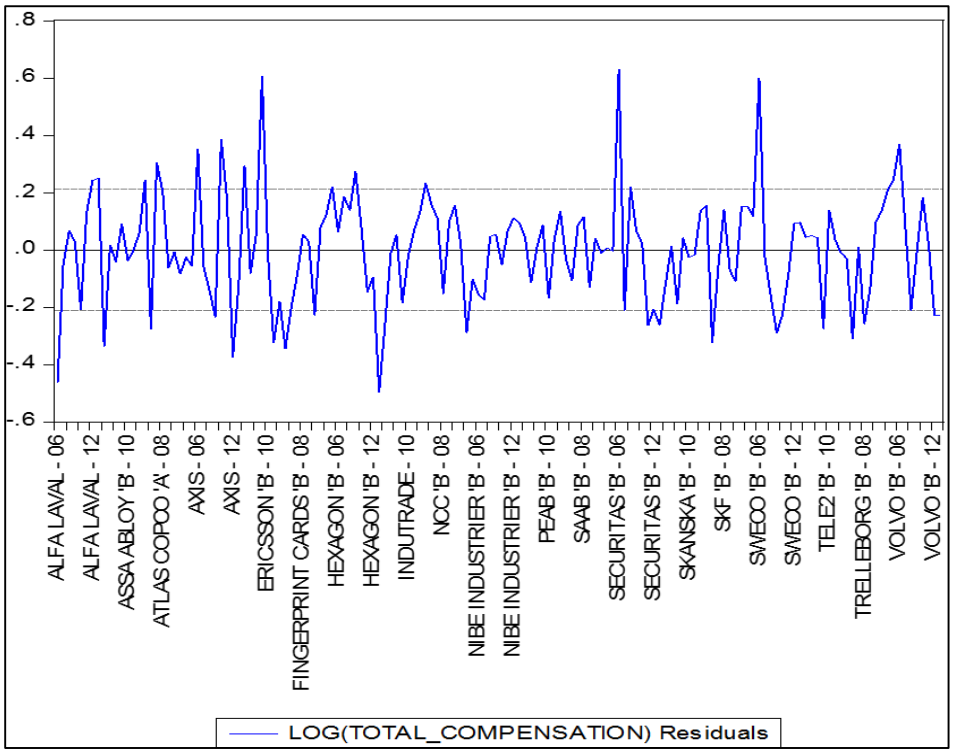
10. Appendix

Appendix 1 – Companies in our sample

Company
ALFA LAVAL
ASSA ABLOY 'B'
ATLAS COPCO 'A'
AXIS
ERICSSON 'B'
FINGERPRINT CARDS 'B'
HEXAGON 'B'
INDUTRADE
NCC 'B'
NIBE INDUSTRIER 'B'
PEAB 'B'
SAAB 'B'
SECURITAS 'B'
SKANSKA 'B'
SKF 'B'
SWECO 'B'
TELE2 'B'
TRELLEBORG 'B'
VOLVO 'B'

Appendix 2 – Bera-Jarque - Normality testing





Appendix 3 – Multicollinearity

	FIRM RISK	LEVERAGE	FIRM RISK	DUMMYOUTLINER	DUMMYOUTLINER2
FIRM RISK	1	-0,463473	-0,137017	0,082322	-0,046184
LEVERAGE	-0,463473	1	0,175513	0,066431	0,004768
FIRM RISK	-0,137017	0,175513	1	-0,023863	-0,055076
DUMMYOUTLINER	0,082322	0,066431	-0,023863	1	-0,006623
DUMMYOUTLINER2	-0,046184	0,004768	-0,055076	-0,006623	1

Appendix 4 – Regression – Total compensation

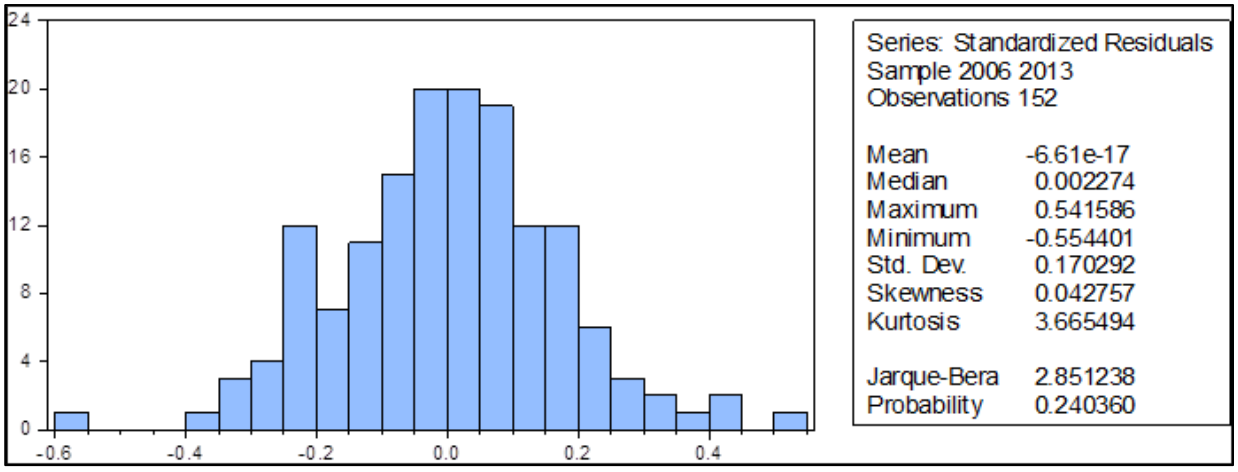
Dependent Variable: LOG(TOTAL_COMPENSATION)
Method: Panel Least Squares
Date: 05/23/16 Time: 17:19
Sample: 2006 2013
Periods included: 8
Cross-sections included: 19
Total panel (balanced) observations: 152

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.85928	2.042442	6.296032	0.0000
LEVERAGE___DEBT_TO_EQ...	-1.101151	0.314382	-3.502592	0.0006
LOG(TOTAL_ASSETS)	0.160338	0.087254	1.837607	0.0686
RISK	0.254111	0.246265	1.031858	0.3042
CEOCHANGE	0.108947	0.064826	1.680607	0.0954
DUMMYOUTLINER	0.914938	0.223015	4.102586	0.0001
DUMMYOUTLINER2	0.796146	0.211633	3.761922	0.0003

Effects Specification

Cross-section fixed (dummy variables)
Period fixed (dummy variables)

R-squared	0.955390	Mean dependent var	16.11964
Adjusted R-squared	0.943865	S.D. dependent var	0.806264
S.E. of regression	0.191026	Akaike info criterion	-0.288146
Sum squared resid	4.378930	Schwarz criterion	0.348460
Log likelihood	53.89913	Hannan-Quinn criter.	-0.029535
F-statistic	82.90179	Durbin-Watson stat	1.619914
Prob(F-statistic)	0.000000		



Appendix 5 – Regression – Proportion of incentive/bonuses

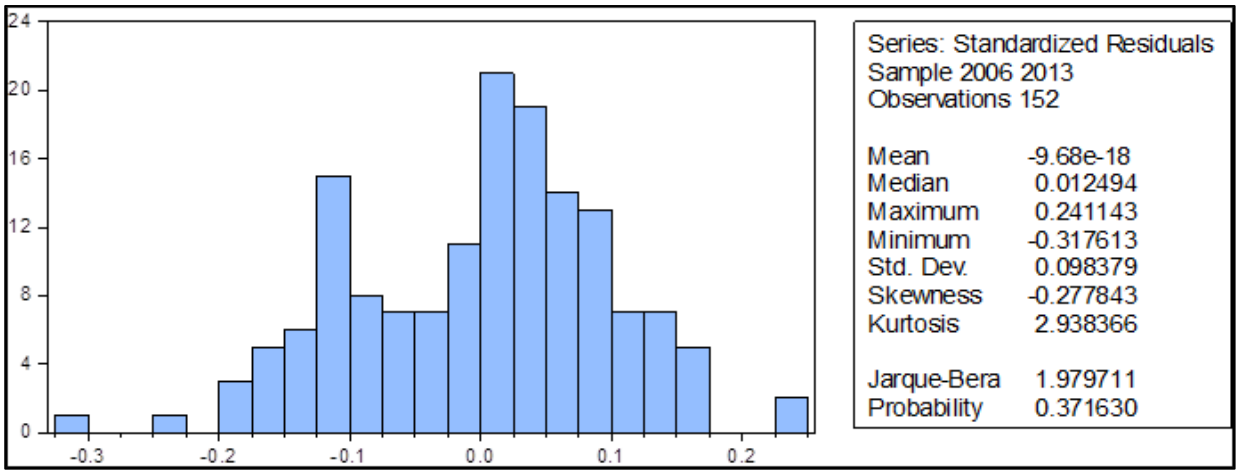
Dependent Variable: PORPORTION_BONUSES_OF_TO
Method: Panel Least Squares
Date: 05/23/16 Time: 17:46
Sample: 2006 2013
Periods included: 8
Cross-sections included: 19
Total panel (balanced) observations: 152

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.163073	1.268573	0.916836	0.3611
LEVERAGE___DEBT_TO_EQ...	-0.070553	0.182617	-0.386342	0.6999
LOG(NET_SALES__REVENUE)	0.006192	0.051541	0.120134	0.9046
RISK	0.179144	0.139523	1.283976	0.2016
CEOCHANGE	-0.051721	0.037592	-1.375869	0.1714
LOG(TOTAL_ASSETS)	-0.046769	0.057388	-0.814963	0.4167

Effects Specification

Cross-section fixed (dummy variables)
Period fixed (dummy variables)

R-squared	0.525504	Mean dependent var	0.204033
Adjusted R-squared	0.407860	S.D. dependent var	0.142819
S.E. of regression	0.109900	Akaike info criterion	-1.398690
Sum squared resid	1.461434	Schwarz criterion	-0.781978
Log likelihood	137.3005	Hannan-Quinn criter.	-1.148160
F-statistic	4.466911	Durbin-Watson stat	1.624412
Prob(F-statistic)	0.000000		



Appendix 6 – Regression – Stock options

Dependent Variable: STOCK_OPTION_0_NO__1_YES
Method: ML - Binary Probit (Quadratic hill climbing)
Date: 05/23/16 Time: 19:03
Sample: 2006 2013
Included observations: 152
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-3.875263	1.835236	-2.111588	0.0347
LEVERAGE___DEBT_TO_EQ...	-3.219778	0.920085	-3.499433	0.0005
RISK	-0.574709	0.871201	-0.659675	0.5095
LOG(TOTAL_ASSETS)	0.260072	0.082138	3.166279	0.0015

McFadden R-squared	0.084059	Mean dependent var	0.592105
S.D. dependent var	0.493068	S.E. of regression	0.472266
Akaike info criterion	1.291136	Sum squared resid	33.00923
Schwarz criterion	1.370712	Log likelihood	-94.12633
Hannan-Quinn criter.	1.323462	Deviance	188.2527
Restr. deviance	205.5293	Restr. log likelihood	-102.7646
LR statistic	17.27662	Avg. log likelihood	-0.619252
Prob(LR statistic)	0.000620		

Obs with Dep=0	62	Total obs	152
Obs with Dep=1	90