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# CEO Compensation Structure and Firm Risk Taking

- A case study of the CEO compensation practices in the Swedish financial industry

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# Abstract

**Title:** CEO Compensation Structure and Firm Risk Taking: *A case study of the CEO compensation practices in the Swedish financial industry.*

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**Background:** The CEO compensation structure is seen as one of the underlying causes of the recent financial crisis, and is a phenomenon that has been heavily debated lately both within the financial industry, by policymakers all over the world, and in business media. A very typical view nowadays appears to be that at least a partial cause underlying the recent financial crisis is the way the executive compensation systems, especially in the financial industry, have been structured. The popular opinion has proven itself to be that executive compensation systems have relied too heavily on variable compensation features (equity based compensation and annual bonuses), which in turn have induced CEOs to expose the companies they are managing to excessive risks. Policymakers all over the world have really taken this critique seriously and for instance the Swedish financial authority (Finansinspektionen) has been asked to present a proposal for new regulation regarding how the executive compensation systems in the Swedish financial industry should be structured in the future.

**Problem Formulation:** Are the CEO compensation systems in the Swedish financial sector structured to promote risk taking?

**Purpose:** The main purpose of this thesis is to investigate the relationship between how CEO compensation systems, in Swedish financial and industrial firms, have been structured during the last decade and the actual risk taking in those industries.

**Limitations:** The empirical analysis in this thesis is limited to include financial and industrial firms listed on the Swedish stock exchange. Furthermore, our study is limited to only consider publicly available information about the firms in our investigation sample.

**Methodology:** Brief presentation of the most important existing economic theory related to the topic of executive compensation. Collection of the data needed for our empirical analysis from the annual reports of each firm included in our investigation sample, for the relevant time period. The empirical analysis is performed in two separate steps; first measures of firm risk taking are generated through a one-factor index model and second a regression model for investigating the relation between CEO compensation structure and firm risk taking is defined. The obtained results are then analyzed and related to the findings of comparable earlier studies.

**Results:** First of all we can conclude there are structural differences in the CEO compensation structure between the investigated business sectors. Overall, our obtained results regarding the relationship between the relative proportion of total CEO compensation that is variable and firm risk taking suggest no significant influence. For the sample of financial firms we however find evidence in favor of the *contracting hypothesis,* when firm risk taking is approximated by total stock market risk. In general, our main conclusion is that there are no observable relationship between market-based measures of risk and the structure of CEO compensation, especially in the industrial sector. On the other hand our results suggest that the stock market risk measures appear to be highly dependent of the overall state of the Swedish economy, since several of the year dummies in or regression model are highly significant for explaining variation in the risk measures that serve as approximations for firm risk taking throughout this thesis.

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# 1 Introduction

*The main purpose of this chapter is to provide justification for this thesis by giving the reader a background of the debate in direct association with the recent financial crisis regarding the CEO compensation structure in the financial industry.*

## 1.1 Background

With background of the recent debate in Sweden concerning the consequences of the incentive based compensation systems and annual bonuses in banking and the other financial industry, as well as an exhaustive debate regarding the need for additional regulation of executive compensation practices, the question regarding how the financial industry as a whole is affected by the CEO compensation practices can rightfully be asked. Whether or not the actual CEO compensation practices induce excessive risk taking by financial firms is in our opinion one of the most interesting aspects to study related to the topic of executive compensation, since it can be directly related to one of the most severe financial crisis that the global economy ever experienced.

The relationship between the structure of CEO compensation and firm risk taking has been frequently studied by economists during the past decades and especially implications on risk taking from stock option based incentive programs have got a fair amount of attention. Empirical studies have for instance found evidence suggesting that the executive compensation structure has clear implications for both capital structure decisions and investment policies. More specifically it has been shown that executive compensation practices that increase the sensitivity of CEO wealth to stock price volatility are associated with relatively riskier policy choices (Coles, Naveen and Naveen, 2003). From this it seems reasonable to suspect that CEO compensation practices that is relatively more dependent on variable compensation features, annual bonus plans, stock options programs, and long term incentive programs, rather than fixed salary are likely to induce managers to execute riskier business strategies.

Incentives for increased risk taking can be expected to vary between different types of firms even within the same business sector. In the financial sector this is especially clear if one for instance compare commercial banks with other financial firms, since bank depositors are protected against losses through a fixed rate deposit insurance

system, guaranteed by the Swedish government. This fact makes bank depositors almost indifferent to what financing or investment decisions the bank executes. It also provides bank shareholders with strong incentives for increased risk taking, since the value of stock ownership increases with higher risk taking, at least until some threshold level for risk taking is reached. This way of reasoning is clearly not applicable to other financial firms than banks, which are not explicitly under governmental protection. Therefore it seems reasonable to believe that bank shareholders will vote for more variable CEO compensation practices relative to shareholders of other financial firms.

When analyzing the relationship between firm risk taking and CEO compensation structure, it is important to keep in mind that conventional management compensation schemes "*motivates risk taking by only looking at return, without regard for the risk(s) accepted in generating it*" (Segerström, 2008. p. 29). The same author then further argues that this incomplete approach regarding executive compensation can be seen as a reason for the "subprime lending binge", which in retrospect has been identified as one partial cause for the financial meltdown during the recent financial crisis. Since the recent economic crisis originated primarily from the financial industry, and then in later stages developed into a more widespread economic crisis, it is the executive compensation practices in the financial sector that have been the most criticized. For instance, in the article "The Looming Compensation Crisis" (Burnison, 2009) the author argues that the design of the compensation systems, especially in the financial industry, resulted in that; "*people were rewarded with large bonuses for gaming the system, creating artificial value, obfuscating, and taking on excessive levels of risk, all without sufficient skepticism or scrutiny"* (Burnison, 2009. p. 1). This statement naturally raises the question if there is any evidence supporting that compensation practices in the financial sector induce excessive risk taking behavior.

## 1.2 Problem Discussion

As discussed in the background, the recent financial crisis highlighted the possibility of a moral hazard problem in the design of the CEO compensation packages and policymakers all over the world have really taken this critique seriously. In January 2010, a new regulation regarding how the executive compensation systems in the Swedish financial industry should be structured in the future inured in Sweden. Therefore it is especially interesting to investigate the relationship between the CEO

compensation structure and the risk taking of Swedish financial firms during the past decade. The following question may therefore be rightfully asked:

*Are the CEO compensation systems in the Swedish financial sector structured to promote risk taking?*

## 1.3 Purpose

The purpose of this thesis is to investigate how firm risk taking is influenced by the relative dependence of variable CEO compensation and the existence of option based incentive program, in order to investigate if the recent critique against the CEO compensation practices is justified. Furthermore, we are also interested in studying if there have been any observable structural differences in the CEO compensation structure between different business sectors, and how the structure of the CEO compensation packages has changed during the last decade.

## 1.4 Limitations

The empirical analysis in this thesis is limited to include financial and industrial firms listed on the Swedish stock exchange. Furthermore, our study is limited to only consider publicly available information regarding the firms in our investigation sample, such as CEO compensation and balance sheet information.

# 2 Methodology

*This part mainly aims to describe the choice of firms included in the financial and industrial sample, as well as motivate the investigated time period used in the empirical analysis. Methods for testing the robustness of the regression results are discussed and some troubleshooting approaches for solving various problems that occurred during the working process of the thesis are presented.*

## 2.1 Preliminary study

After deciding to write our thesis on the topic of executive compensation the first step of the working process was to get more familiar with the topic in general, and this was done by reviewing the most important prior research related to the relationship between CEO compensation and firm risk taking in financial firms. This extensive review foremost provided us with a better understanding for what can be meaningfully analyzed empirically, but also gave some guidance in terms of what data that is needed for analyzing CEO compensation in the context of firm risk taking. For instance the papers by Houston and James (1990) and Chen, Steiner, and Whyte (2005) can be seen as key sources of inspiration to our final model specification. However, one important consideration was to adapt our regression model to the Swedish financial market conditions, data accessibility and the specific investigation time period that we have decided to study.

## 2.2 Investigation Time Period

The empirical investigation in this thesis is performed on a sample of Swedish listed firms operating in the financial and industrial business sectors, and the investigation time period was decided to be the time interval of years 2000-2008. There are two important reasons to why we finally settled for this investigation time period. Firstly, we think it is very interesting to include the years of the recent financial crisis (2007-2008), which in later stages spread from the financial industry and evolved into a global real-economic crisis. The relationship between firm risk taking and CEO compensation structure is especially interesting to study in direct association with the financial crisis since the CEO compensation practices, foremost in the financial industry, have been heavily criticized lately and by some even blamed as one important underlying cause of the crisis itself (Bebchuk and Spann, 2010; Segerström, 2009; Burnison, 2009). Secondly, when analyzing CEO compensation it is very

important to understand that it is very unlikely that a change in CEO compensation structure will render an instant effect on for instance firm risk taking, instead it is much more likely that such effects are possible to observe after some time because strategic decisions for altering the risk taking of a firm usually takes some time to implement in practice. Finally, in order to be able to perform a reasonable regression analysis the number of observations in the investigation sample cannot be too small, and therefore we decided to go back as far as to the starting year of the past decade. The main reason for why we did not go back even further in time is that the CEO compensation information disclosed in annual reports differs significantly for years earlier than 2000, by not separating fixed and variable CEO compensation.

Looking at the investigation time period as a whole one can argue that it is quite versatile since both bad and good economic times are included, if the overall development on the Swedish stock market is considered. In the beginning of this time period (2000) the Swedish stock market took a critical blow as the *IT-bubble* burst, but then really good times, characterized by a steady stock market appreciation, followed more or less until the recent financial crises hit the market drastically in the end of the investigation period.

## 2.3 Specification of Investigation Sample

As discussed in section 0 the main interest of this thesis is to analyze the relationship between CEO compensation structure and firm risk taking for listed Swedish firms operating in the financial business sector. Even though the Swedish finance sector on aggregate is relatively small we still felt it was necessary to exclude some of the firms that normally are categorized as financial firms from the investigation sample. The listed real estate firms are for instance excluded from the investigation sample because they are very different from other financial firms in terms of what asset types that underlie the value of the firm. The most important reason to why we think it makes more sense to only include financial firms that owns primarily financial assets is that this study aims to investigate the relationship between CEO compensation structure and firms risk taking in the context of the recent financial crisis, which clearly had much more serious consequences for the value of financial assets than for the value of real estate.

As mentioned in the background, the CEO compensation practices in the financial industry have been heavily criticized in the recent debate directly related to the financial crisis, and therefore we have decided to also include a sample of listed Swedish industrial firms in our investigation sample. This enables our analysis to control for structural differences in the CEO compensation practices, and also makes it possible to detect potential differences in the relationship between CEO compensation structure and firm risk taking between different business sectors. When deciding what firms to include in the sample of industrial firms an important consideration was to make the industrial sample comparable with the financial sample, and therefore we picked industrial firms so that the final two samples came to have roughly the same distribution with respect to firm size.

Since the regression analysis in this thesis will be performed on a panel data set we also decided to only include firms that were listed on the Swedish stock exchange during the whole investigation period in the investigation sample, and therefore our empirical analysis is performed on a so-called "full panel" dataset. Taking all these aspects into account result in a final investigation sample of 26 firms, out of which 15 originates from the Swedish finance sector.

## 2.4 Data Collection and Data Treatment Methodology

Since this primarily is an empirical study one of the most important aspect that we originally had to consider was what type of CEO compensation data that was available to us. After some initial research we came to realize that we could not get access to any data on CEO compensation for Swedish listed firms except from the information disclosed in the annual reports of each firm respectively. The information regarding CEO compensation that is published in an annual report also differ considerably both between firms and in rare cases also between different years for the same firm, in case the company have altered their reporting standards from one year to another during the investigation period. Such differences can depend on new legislation regarding disclosure policies in the annual reports and could for instance involve which type of information financial firms need to disclose regarding CEO compensation.

The data set needed for the regression analysis of this thesis is collected from four different sources. Data regarding CEO compensation were collected manually from

annual reports of each firm in the investigation sample and for each year included in the investigation period. Annual reports are publicly available and most of them were downloaded from the official websites of each firm included in the analysis. However, in some cases the annual reports, especially for the earliest years (2000-2002), could not be found directly on the company website, and in this case we instead found the annual reports needed from the database called "*Affärsdata"*. The historical stock market price data needed to generate our stock market based risk measures, which will serve as approximations of firm risk taking in this analysis, were directly downloaded from the official website of the Stockholm stock exchange (www.omxnordic.se). Finally, most of the data needed in order to generate the control factors in our final regression model are accounting data and has been collected from a database called "Datastream".

The data used in our study regarding both the CEO compensation variables and the number of outstanding shares is collected by hand from the annual reports of each firm for each year included in the investigation period. Due to lack of information in the annual report regarding the option based incentive programs we were unfortunately not able to perform a sensible valuation of the stock option based CEO compensation programs, since all the parameters needed where not explicitly disclosed in the corresponding annual reports. However, stock option based CEO compensation represents an important as well as frequently used compensation feature (Murphy, 1998) and we therefore decided to include a dummy variable for the presence of a stock option based compensation system, rather than excluding it totally from our empirical investigation. One might argue that it would have been possible to perform a richer empirical analysis if the stock option programs could have been accurately valued, but since this is not possible in our case we were forced to use a dummy variable for the stock option based CEO compensation instead. Therefore one clear limitation of this study is to only analyze the implications on risk taking for financial firms dependent upon if a stock option based incentive program is present or not, for each firm and each year respectively.

When reviewing the stock market price data for our investigation sample, downloaded from the official website of the Stockholm stock exchange, we realized that no closing price is reported if a stock has not been traded during a specific trading day. This presents a minor problem because when calculating the standard deviation of

each stock return one will overestimate the standard deviation by excluding the trading days when no trading took place. We dealt with this issue by inserting the latest reported closing price whenever a closing price for a trading day was not reported.

In a total of 12 occasions one of the firms in our investigation sample decided to perform a stock split at some point in time during our investigation time period, which naturally makes the stock price jump drastically in the trading day when the stock split is executed. Obviously it does not make any sense at all to treat this phenomenon as stock return since it is the change in the number of outstanding shares that is causing the jump in the stock price. All stock split trading days were therefore excluded when calculating stock returns, implicitly assuming that no stock price change took place during those specific trading days.

When using a single index model in order to generate the market based risk measures that will serve as approximations of firm risk taking, we quickly came to realize that over 200 similar regressions had to be performed. Naturally such a procedure could not be worked through manually, because of time constraints. To solve this problem we instead were forced to write a program in *"C#"* that performed all these regressions at once, and thereby generated measures of market risk and firm specific risk for each firm and year included in our empirical analysis.

## 2.5 Generalized Least Square Regression and Robustness Check

The empirical analysis in this thesis is performed by running generalized least square regression models with the three market based risk measures; total risk, firm specific risk and market risk, as the dependent regression variable separately against each of the CEO compensation variables respectively. The model also includes control factors that control for the effect of firm size, trading frequency of the common stock, capital ratio, and fluctuations in the economy. A more careful discussion of the model specification and each of the control factors can be found in chapter 4. The model controls for individual differences for each firm by using the Fixed Effects approach and robust standard errors.

For the Swedish financial sector a more careful investigation is executed in chapter 6, where also potential endogeneity issues are discussed and tested for through an instrumental variable approach. One of the assumptions used in the main-model is

that the relationship between the compensation variables and the firm risk taking is constant for all the years that are examined. This assumption is however relaxed in section 6.1 where the compensation variables instead are allowed to change during the investigated time period.

The empirical analysis in this study is mainly focused on the financial sector, which consists of only 126 observations; worth mentioned here is that the study is close to a total investigation of the Swedish financial market, which makes this investigation stand-alone even though it is a small sample size that is investigated. However, the small sample size makes it harder to sensibly generalize the obtained results to other financial markets, but still might be applicable to the Swedish financial market over time, and prospecting needs for purpose of additional regulation of the CEO compensation legislation.

## 2.6 Definitions

### 2.6.1 Proportion Compensation Variable

In this thesis two compensation variables are examined, where the main focus lies on the proportion compensation variable, which refers to the CEO's proportion of variable cash compensation in relation to the total CEO compensation for one specific year. In this case variable cash compensation includes cash bonuses and cash repayments to a CEO from a firm for subsidized stock options that the CEO originally bought. Variable compensation does however not include the value of managerial stock options or the value of company stocks given to CEOs as compensation. Total compensation includes the fixed salary, annual cash bonuses, and other benefits. No pensions are included in the variable or total compensation.

### 2.6.2 Option Compensation Variable

The second compensation variable that is examined in this study aims to capture and investigate the use of a stock option based incentive program for the CEO. Due to lack of information regarding the company's option incentive program this compensation variable is considered as a dummy variable in the empirical analysis, which states if a company has an option based incentive program or in rare cases performance based shares, for the specific year.

### 2.6.3 Stock return

Whenever stock return is mentioned in this thesis only the return on a stock from its price movements is regarded, and eventual divided payments are excluded from our stock return definition.

# 3 Framework of References

*In this chapter some of the most important economic theory related to executive compensation will be presented and briefly discussed. The structure of a conventional CEO compensation system will also be both discussed and justified from an economical point of view. The main findings of earlier similar studies will also be discussed in order to get a deeper understanding for what possible relationships that might exist between CEO compensation structure and firm risk taking.*

## 3.1 General Economic Theory related to Executive Compensation

### 3.1.1 Principal Agent Theory

A more widespread acceptance of the concept of *agency costs* and *principal agent theory*, formalized by Jensen and Meckling (1976) can be seen as the starting point for the modern executive compensation research. In short the agency theory identifies the separation between ownership (shareholders) and control (management) as the main reason to why executive compensation systems need to be designed such that they achieve an alignment of interests between the owners and the management of the firm. Related to this the following is argued; "The principal can limit divergences from his interest by establishing appropriate incentives for the agent" (Jensen and Meckling, 1976. p. 308). The principal agent theory has a strong focus on so-called agency costs, which can be seen as the driving factor for how the executive compensation system should be structured from a theoretical point of view. According to this theory the executive compensation system should be structured such that the agency costs that the shareholders have to bear, originating from differences in interests between the principal and the agent, are minimized.

### 3.1.2 Moral Hazard and Contracting Hypotheses

Aside from the *principle agent theory*, two additional economic theories, that contradict one another, claim to have implications for how executive compensation system structure affects managerial incentives for risk taking. The underlying theory this study relies on, aside from classical principal agent theory, is mainly developed by Chen, Steiner, and Whyte (2005) and contains two hypotheses regarding the relationship between risk taking and executive compensation, namely the *moral hazard hypothesis* and the *contracting hypothesis*. The classic moral hazard problem, in context of executive compensation theory, is related to the use of option based

executive compensation and predicts that usage of equity based compensation policies promotes managerial risk taking. In a study of how CEO compensation structure affects bank risk taking the following is stated; "The moral hazard hypothesis predicts that the compensation policies in banking are designed to encourage risk taking in order to maximize the value of the fixed rate deposit insurance" (Houston and James, 1995. p. 411). This is therefore an especially relevant aspect to consider for firms operating in the financial industry that is covered by a governmental deposit insurance system, since additional risk taking will render a value increase for the put option feature of the fixed rate deposit insurance. When equity based compensation increases, in relative terms, one can therefore expect managers to increase the risk taking of the firm because managerial incentives become more closely aligned with the stockholders' interest, according to the moral hazard hypothesis.

As mentioned earlier the *moral hazard hypothesis* may be especially applicable to certain industries and in an analysis of the US banking industry, Saunders, Strock, and Travlos (1990) argue that stockholder incentives do not work in the same direction as bank depositors since stockholders can increase their value by taking on additional bank risk. In our empirical investigation we will analyze two things related to variable compensation; 1, what implications the existence of option based incentive program do have on firm risk taking and 2, how the proportion of variable CEO compensation, as a fraction of total compensation, does affect the risk taking of a firm. Since the proportion of variable compensation relies on a target-based performance with respect to accounting measures, such as earnings per share or artificial options, it seems reasonable that the moral hazard hypothesis may have implications for this type of compensation as well. If the moral hazard hypothesis is directly applicable for the sample of firms we are going to investigate empirically in this thesis, one might suspect that it will be possible to state the following:

*CEO compensation practices in the Swedish financial and industrial sectors promote risk taking.*

The contracting hypothesis on the other hand, predicts that increased option based or target based compensation may have a decreasing effect on the risk taking of a firm due to the resulting increase in the a CEO's personal risk exposure, resulting from increased usage of such compensation policies (Chen, Steiner, and Whyte, 2005).

When the CEO becomes less diversified and more exposed to the risk associated with the firm's activities, he/she naturally becomes more risk averse. In order to obtain a reasonable level of risk in managers' "personal portfolios" the contracting hypothesis predicts that the risk taking of the firm is likely to decrease, as a result of an increase in a CEO's variable compensation proportion. If the implications of the contracting hypothesis dominate over the implications of the moral hazard hypothesis, it seems reasonable to argue that the following statement should be at least partially true:

*CEO compensation practices in the Swedish financial and industrial sectors do not promote risk taking.*

### 3.1.3 The Conflict of Interests between Owners and Managers

In order to be able to conclude what compensation system that should be used in practice to achieve an alignment of interest between shareholders and managers, it is necessary to have a clear understanding of what differences in interests one might expect between the two parties.

Let us start by considering the shareholders as owners of a residual claim on the company's generated profits. In general, shareholders can be considered to be at least partly diversified, since they seldom have their entire wealth invested in one single firm. The fact that they only have a residual claim on firm profits, meaning that they are not entitled to get any return on their investment until the firm have fulfilled all its obligations to the debt holders, make shareholders favor relatively riskier business strategies with a large potential payoff.

The managers on the other hand have not only their entire human and physical capital invested in the actual firm that they are managing, but may also suffer both economical and reputational losses in event of bad firm performance. All this taken together are likely to result in that managers want to avoid more risky strategies or projects that may jeopardize the manager's present and future employment. Even though a manager in fact is hired primarily to maximize the shareholders' value this may not be the case because the manager might favor less risk taking then what would otherwise be optimal for maximizing firm value.

With background of the above discussion one can clearly identify a direct conflict of interests between shareholder and managerial preferences for risk taking, and since it

is the managers who foremost control the operations of a firm this is very likely to render so called *agency cost* for the shareholders. It is therefore in the best interests of the shareholders to provide the managers with strong incentives to strive for firm value maximization, primarily in order to minimize the size of the agency cost they are exposed to. The most common and effective way for the principal to induce managers to act in their best interest is to give economical incentives that favor behavior in line with maximizing the owners´ wealth, through the design of the executive compensation system.

## 3.2 Conventional CEO Compensation System Structure

There is a few different ways to define how CEOs in general are compensated, but throughout this thesis the following definition will be used; "A typical top executive receive compensation in three different ways; salary, bonuses and stock based incentives" (Tirole, 2006, p. 21). A CEO compensation program can be decomposed into finer parts, but we strongly believe that the above definition will serve the purposes of this thesis. The relative importance of each of these compensation components in the executive compensation system will directly affect a CEO's incentives and therefore also play an important role for the strategic decisions of a firm. It is therefore highly relevant to analyze each of these three compensation components separately, both in terms of how they usually are used in executive compensation systems and also in terms of their importance for influencing managerial incentives. In Figure 1 presented below a graphical representation of a conventional CEO compensation package is shown.

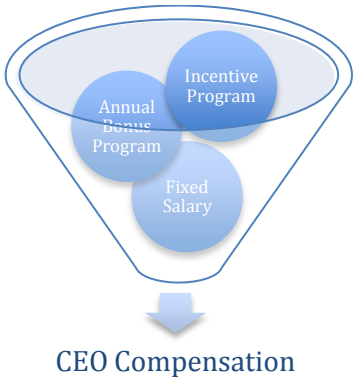


**Figure 1: Components of CEO Compensation**

Each of these CEO compensation components will now be discussed separately, both in terms of how they are used and how one might expect them to affect managerial incentives for firm risk taking.

### 3.2.1 Fixed Salary

Fixed salary represents a mandatory part in every CEO compensation system and is very likely to play an important role for a CEO's incentives in a few different aspects. First, "since base salaries represent the "fixed component" in executive contracts, risk-averse executives will naturally prefer a dollar increase in base salary to a dollar increase in "target" bonus or variable compensation" (Murphy, 1998. pp. 9-10). To what extent a CEO will prefer a fixed amount increase in base salary to and equal increase in target bonus or variable compensation directly depends upon a CEO's individual level of risk averseness.

With background of the discussion in section 3.1.3 we however think it is justified to argue that an "average" manager is relatively risk averse, at least before any incentive based or variable compensation is part of the executive compensation system. Another reason to why a CEO might be expected to favor a fixed amount increase in base salary to an equivalent increase in variable compensation is that both CEO pension and termination wage typically is determined as a multiple of a CEO's fixed salary.

Yet another aspect of the fixed salary component is that its size is often set through benchmarking against a sample of other similar firms. Similar firms in this case most often means that they operate in the same industry, but other things like firm size, CEO experience and past performance of course also plays an important role for the amount of fixed salary that a CEO is paid. The fact that the size of the fixed salary compensation component by convention is determined trough benchmarking is in our opinion likely to render a CEO that is paid above average a reputational utility increase aside from the economic gain over to the average salary, and *vice versa* for a CEO with a fixed salary below the benchmarking group average.

In a rather simplistic sense it is therefore reasonable to argue that an executive compensation system that makes the fixed salary feature represent a relatively high proportion of the CEO's total compensation, will give strong managerial incentives to favor relatively less risky business strategies over more risky ones.

### 3.2.2 Annual Bonus Plan

The annual bonus compensation feature aim to reward good performance on an annual basis and the bonus amount that an executive receives depends upon the actual performance relative a pre-specified target level of a specific or a couple of performance measures during one specific year. There is typically a quite significant heterogeneity regarding what performance measures that are used as underlying variables for the annual bonus plans between different business sectors. Since this thesis is limited to investigating firms operating in the Swedish financial and industrial sectors, it makes most sense to describe what underlying performance variables that are most commonly used in these industries. The most commonly used performance measures for both these industries are earnings and EBIT (i.e. Earnings before interest rate and taxes), according to Murphy (1998). One important thing to consider, related to what performance measures underlying annual bonus plans, is on what basis different performance measures are used. Say for instance that earnings is used as an underlying measure for the annual bonus, then the target level for this measure can be used both in absolute dollar terms, on a per-share basis or expressed as a margin. The basis in which the target level of the performance measure is defined can vary, depending on firm or industry type. However, for the industries that we analyze in this thesis the per-share basis (EPS, Earnings per share) appears to be most frequently used. Annual bonus plans can also depend on other parameters than accounting performance measures. For instance good individual performance by a CEO, measured in relation to pre-established standards or through a subjective assessment of the CEO performance by the board of directors, can also trigger an annual bonus payment.

With background of what has been said about annual bonus plans this far it is somewhat clear that a CEO comprised by a typical bonus plan structure is provided with strong incentives for maximizing the accounting profit of the firm that he/she is managing. This can be said since the actual yearly profit of a firm is directly related to the performance measures underlying the annual bonus plans. Despite this the annual bonus plans have also been criticized, for instance because; "a bonus based compensation package creates a strong incentive for a manager to privilege the short term over the long term" (Tirole, 2006, p. 22). As an example of this it has been possible to show that the presence of sizeable annual bonus plans have resulted in a

decrease in firms' R&D investments (Dechow and Sloan, 1991). Smaller R&D investments are just one example of what the result from a too short-sighted focus may be, but clearly illustrates that even though a CEO strives to maximize firm profits in the short term, this may not always be in the best interests of the shareholders who favor strategies in line with maximizing the firm value independent of time horizon. There are also other possible "side effects" when the CEO strongly favors short run profit maximization, among which an average increase in firm risk taking in the short term is one of the more likely. The main reason to why we think this can be argued relates to that a CEO have a limited downside (i.e. no bonus) but in the same time only the maximum annual bonus amount possible as a cap for the annual bonus. In this manner there are clear similarities to the payoff of an option contract, which is why the annual bonus plan can be seen as an artificial option that in similarity with other option contracts increases in value with increased risk of the asset the option is written on.

Another disadvantage with using annual bonus plans with accounting numbers as underlying performance measures is that accounting numbers is possible to manipulate for managers to some extent, by using creative accounting techniques. Earlier studies have among other things shown that; "Executives rewarded by earnings-based bonuses select accounting procedures that increase their compensation" (Healy, 1985. p.85). Earnings can for instance be moved between years to achieve a larger total annual bonus payoff. There are of course limitations to how much accounting numbers can be manipulated, but in general it is troublesome if managers can affect their own bonus by creating an artificial value in this manner.

In the cases where the annual bonus plan is dependent upon individual performance criterions of the CEO it is not hard to understand that the CEO is provided with strong incentives for creating a good relationship with the board of directors, since it is actually their subjective assessment of the CEO's performance that partly determines the size of the annual bonus. This can create a problematic situation from time to time since a too good relationship between the board of directors and the CEO of a firm potentially may harm the shareholders.

### 3.2.3 Stock Based Incentives

The third common feature of a usual executive compensation system can be called stock based incentives or alternatively equity based compensation. This executive compensation system component is used to give managers economic incentives to act in the best interest of the shareholders, by compensating the managers with financial instruments that increase in value as the share price for the managed firm increases. The most popular type of equity based compensation is stock options plans, and since other forms of equity based compensation will be excluded from the analysis in this thesis, we think it makes most sense to only discuss stock option based compensation from a theoretical viewpoint as well. By giving a CEO call options written on the company stock of the firm he/she is managing, the manager effectively share common interests with the shareholders. This can be said since the stock options only increase in value as the price of the underlying stock appreciates.

Managerial stock options are by convention issued at *par*, meaning that they have zero value at the time when they are given to a CEO, and then increase in value as the underlying share price appreciates. Letting the stock options be worth nothing when given to the manager gives strong incentives to work hard in order to achieve an increase in stock price, and in the same time it also ensures that the stockholders experience a value increase as the CEO gains from the managerial stock option contracts. If stock options is granted to a CEO certain restrictions typically also comes with this type of compensation. Options granted are for instance not allowed to be sold by the CEO to a third party. The risk exposure that a CEO obtains from the granted stock options is not allowed to be hedged by the CEO, since then the incentive effect would at least party disappear.

It is important to understand that stock options do not give exactly the same incentives as direct stock ownership for a couple of reasons. First, the value of an option is determined by the amount of stock price appreciation, rather than total return, where also dividends are included, as for regular stock ownership. Clearly this gives a manager, as an option owner, incentives to disfavor dividend payments to share holders in favor of for instance stock repurchases. Related to this earlier studies have found evidence for that expected dividend payments decreased following introductions of stock option programs for top executives (Lambert, Lanen and Larcker, 1989). Another important factor to consider is that the managerial incentive

effects from stock option ownership are different depending on what the underlying stock is worth in relative to the exercise price of the stock option. This is easiest illustrated by a couple of examples. If the option is very far out of the money (stock price much smaller than the option exercise price) the incentive effect is almost entirely lost, since it is very unlikely that the option will give any future payoff to the CEO. This is why option re-pricings typically can be justified following a drastic price fall in the underlying stock. An alternative situation can occur if the option is relatively close to maturity and in the same time is very deep in the money. In such a scenario a CEO is provided with strong incentives for "locking in" the profit, which may induce the CEO to decide upon strategies that are less then optimal in terms of firm value maximization.

Another really important difference between the position of a manager who owns stock options and a shareholder relates to preferences for stock price volatility. The way an option contract is designed makes the owner have limited downside, because the option cannot be worth less than zero, which it is for all stock prices smaller than or equal to the strike price of the option. In the same time an option holder has full upside potential. A shareholder, on the other hand, has both full downside and full upside potential which are very likely to result in a larger aversion to stock price volatility, relative to an option holder. The way a stock option contract is constructed therefore makes its value increase with increased volatility of the underlying asset that the option is written on, or expressed differently; stock options has a positive *Vega parameter*. The relationship between the presence of a managerial stock option program and stock price volatility has been carefully studied during the last decades and for instance DeFusco, Johnson and Zorn (1990) find that the stock price volatility increases following approval of executive stock option plans. The presence of a stock option program in the executive compensation system therefore appears to actually render a managerial "incentive effect" for additional risk taking, which in turn leads to a closer alignment of interests between shareholders and managers, and therefore also plays an important role for reducing the agency costs that the shareholders have to bear.

## 3.3 Earlier Studies on CEO Compensation and Firm Risk Taking

Earlier studies in the area of CEO compensation and the relationship with firm risk taking level have mainly been focused on the industrial sector. However, due to the regulation and the governmental protection in the banking industry, the results cannot be generalized to also hold for financial institutions. One study that show evidence of the differences in the compensation structure between the banking industry and other industries is the paper "*CEO compensation and bank risk: Is compensation in banking structured to promote risk taking?"* by Houston and James (1995) where the moral hazard hypothesis, predicting that the CEO compensation is structured to encourage risk taking, is examined. By using Forbes annual survey of executive compensation from 1980 to 1990, data from 134 commercial banks were obtained. Comparing the level of CEO compensation in the banking industry with the CEO compensation level in other industries, they find that on the average a bank CEO received less cash compensation, less compensation in option or stock plans, and a lower level of salary than CEOs in other industries. They also find that cash compensation in the banking industry is more sensitive to the overall performance of the firm. Finally they find no evidence that equity based compensation is used to promote risk taking in the US banking market. However, they find evidence for a positive and significant relationship between equity based incentives and the value of the bank's charter. They also use the CAMEL rating in order to identify weakly capitalized institutions but find no significant difference in their CEO compensation structure.

The article by Houston and James (1995) differs from other studies in the area, with respect to the regression model used for the empirical analysis. The authors use the CEO compensation as the dependent variable and the risk level of the company as one of the explanatory variables. They then specifically control for firm size, recent performance, the firm's investment opportunity set, and CEO experience. The main focus of their analysis is therefore the structure of the compensation packages in the US banking industry and in the same time testing structural differences between industries by comparing with the executive compensation structure used in other business sectors.

Another approach is used in the article *"Corporate control, bank risk taking, and the health of the banking industry"* by Andersson and Fraser (1999). They examine the impact of managerial shareholdings and other measures of option based compensation

for the firm risk taking in the banking industry. The model used for the empirical analysis by Andersson and Fraser (1999) is estimated in two separate stages, and in the first step measures of total, systematic, idiosyncratic and interest rate risk are generated. In the second stage each of the market based risk measure from the first stage is regressed against CEO compensation expressed either as proportion of option based compensation as a fraction of total compensation or as the accumulated value of option-based compensation. Several control factors are also included in the second stage regression model, those are; total asset, capital ratio, non-interest income, and a geographic diversification dummy. The data set used consists of 150 commercial banks in the US market for the years between 1987 and 1994. Relative to other industries, this article shows proof of an increase in the usage of option-based compensation in the banking industry. Contrary to the results presented by Houston and James (1995), the results from this study provide evidence that managerial shareholdings, and therefore also indirectly the use of option based compensation, affect the risk taking level of banks. With background of these findings Andersson and Fraser (1999) therefore conclude that regulatory oversight of the managerial compensation structure is needed in the banking industry.

A more recently performed study of the US banking market is done by Chen, Steiner, and Whyte (2005), they examine if stock option based executive compensation induce increased risk taking in 68 US banks between the years 1992 and 2000. In order to give insight regarding the impact of the deregulation during the 1990s, the time period analyzed by Chen, Steiner, and Whyte (2005) started after Securities and Exchange Commission (SEC) required all firms to disclose information regarding executive compensation in their financial reports. The results of the article show proof of an increase in the usage of option-based compensation in the banking industry, in a comparison with other industries. They also find that a larger proportion of stock options and larger stock option based managerial wealth, induced risk taking in the banking industry during the examined time period. The authors of the article points out that the positive relationship between risk level and the level of option based compensation is partly explained by the expansion in the investment opportunity set of banks arising from a more deregulated market. However, they found limited evidence supporting that increased option based managerial wealth increase the overall wealth of the shareholders.

The contradicting results in the previous literature have been widely discussed and several explanations for them have been given. Houston and James (1995) explain the contracting results in earlier studies by the differences in the methodology and differences in which type of CEO compensation that are measured. Mullins (1992) argues that some findings are largely attributable to their failure to adequately control for bank size. Finally, Garen (1994) states that the empirical literature on CEO compensation packages generally fails to specify a model on which hypotheses can be based and tested, with respect to its determinants. In the article by Garen (1994) a principal agent model is used in order to determine how well it is explains variations in executive compensation structure. Garen's results are therefore consistent with the principal agent model, but both the significance of the findings are weak and the explanatory power of the overall model is low. Related to this the author states that principal agent model has clear implications for executive compensation structure but that many issues related to the determination of CEO pay still remain unsolved.

# 4 Model Specification

*This chapter presents the main regression model that is used in the study and also aims to carefully discuss the model specification and the regression variables. This chapter also includes a discussion of descriptive statistics for our CEO compensation structure variables, risk measures, as well as the control factors used in our regression models.*

## 4.1 Independent Regression Variables

### 4.1.1 Compensation Variables

With background of the discussion in section 3.3 two different variables are used for reflecting the structure of CEO compensation. The first one is called proportion and is defined as the proportion of a CEO's total compensation that is variable. Variable bonus is the amount of annual cash bonus paid out to each CEO that is stated in the firms' annual reports, and could involve cash received from reaching target performance goals, annual bonus plans or cash repayments to CEOs for purchased company stock options subsidized by the firm. The second compensation variable is a dummy variable that takes the value of 1 in presence of a stock option based incentive program for the top executives of the firm, and takes the value of 0 otherwise. Expressed mathematically, the option dummy variable is defined as follows:

$$Option_{ij} = \begin{cases} 1 \; if \; firm \; i \; uses \; an \; option \; based \; CEO \; compensation \; in \; year \; j \\ 0 \; otherwise \end{cases}$$

Our study differs from the previous study by Chen, Steiner, and Whyte (2005) regarding the treatment of option-based CEO compensation. Due to the lack of information regarding the option-based compensation in Sweden, the value of the option based CEO compensation could not be calculated through the Black Scholes option pricing model. Instead of using the value of the option based incentive programs we use a dummy variable for the case of an option based incentive program. This way of analyzing option based compensation limits possible conclusions to some extent, but has an advantage regarding the problem that previous studies often analyzes the relationship between CEO compensation packages and ex post measures of bank performance such as the fluctuations in the stock return, discussed by Houston and James (1995). However, the ex post measures of the firm risk taking

may not reflect the ex ante situation in which strategies regarding risk taking is decided upon by managers.

### 4.1.2 Trading Frequency

How quickly new information, relevant for the value of a stock, is reflected in the market price is likely to matter for the stock's market based risk measures. For instance Demsetz and Strahan (1997) argue that a stock's trading frequency should be correlated with the variances of a bank's assets, liabilities, and off-balance sheet portfolio. If the stock market does any good at all in valuing the firm, the correlation between trading frequency and variances of both on- and off-balance sheet activities should play a direct role for explaining at least some of the variation in different market measures of the risk for a stock. To capture this in our analysis, we include trading frequency as one of the independent variables in our regression model and we follow Anderson and Fraser (1999) who defines their trading frequency variable as the average daily trading volume divided by the total number of outstanding shares:

$$Trading\ Frequency_{ij} = \frac{avg.daily\ trading\ vol_{ij}}{number\ of\ outstanding\ shares_{ij}}$$

This variable can be used as an approximation for how fast new information is reflected in the stock market price and is calculated for both each year (j) during our investigation period, as well as for each and every firm (i) in our investigation sample.

### 4.1.3 Size

In similarity with Chen, Steiner and Whyte (2005), the natural logarithm of the value of total assets serves as a measure of the firm size in our regression model.

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

Firm size is expected to be negatively correlated with the risk taking of the firm and therefore larger firms have a greater potential to diversify their business activities through both geographic and asset diversification (Chen, Steiner, and Whyte, 2005). All types of diversification are expected to partially reduce the riskiness of a firm's operational activities. Another important reason to control for size is expressed by Saunders, Strock, and Travlos (1990) who points out that regulators would not let larger banks and financial institutions fail, and that the value of implicit failure guarantees increases with firm size. This is however mostly a relevant aspect to

consider for the commercial banks included in our investigation sample. Bank depositors are protected by the deposit insurance, up to a certain maximum level, provided by the Swedish government. Banks will also almost certainly be provided with emergency loans from the government in event of serious financial difficulties. This is not only true for banks that can be categorized as "too big to fail", since there also have been examples of both Swedish and other international non-banking firms that have been provided with emergency loans or other types of help from the governments in different countries, both before and in direct association with the financial crisis. The common feature of firms that are likely to receive governmental aid is that they are big and therefore play an economically important role for some geographical area within a country or the country as a whole.

### 4.1.4 Capital Ratio

As a measure of the financial leverage in our regression analysis *capital ratio* is used. This variable is defined as the total book value of assets minus the total book value of debt, divided by the total book value of assets. According to Saunders, Strock, and Travlos (1990) the year-end book value of capital asset ratio should be used since this measure of financial leverage is the most common measure that is monitored by regulators.

$$Capital\ Ratio_{ij} = \frac{Book\ Value\ of\ Assets_{ij} - Book\ Value\ of\ Debt_{ij}}{Book\ Value\ of\ Assets_{ij}}$$

The larger the proportion of equity capital used in a firm's capital structure, the lower the risk of default (Chen, Steiner, and Whyte, 2005). Therefore one would expect the independent regression variable reflecting capital ratio to be negatively related to the dependent risk level regression variables.

### 4.1.5 Controlling for Fluctuations in the Overall Economy

In order to control for fluctuations in the Swedish business cycles during our investigation period a dummy variable for each year is included in the regression model, where year 2000 serves as a benchmark and is therefore not included explicitly in the regression model. During the years examined, the overall economic development had a dramatic slowdown at the beginning of 2000 that continued until the end of 2002, (see Figure 2). From 2003 the return of the index increased until the recession started to show in the end of 2007, which was even further deepened in

2008. In the years 2000 and 2008 the Swedish general stock market index (OMXSPI) therefore dropped substantial in value. This implies that all the year dummies included in the regression analysis except from the 2008 dummy are expected to have a negative influence on the risk taking when focusing on the total and firm specific risk. Except from dramatic price declines in 2000 and 2008 the index value steadily increased with relatively low volatility during the years in between.

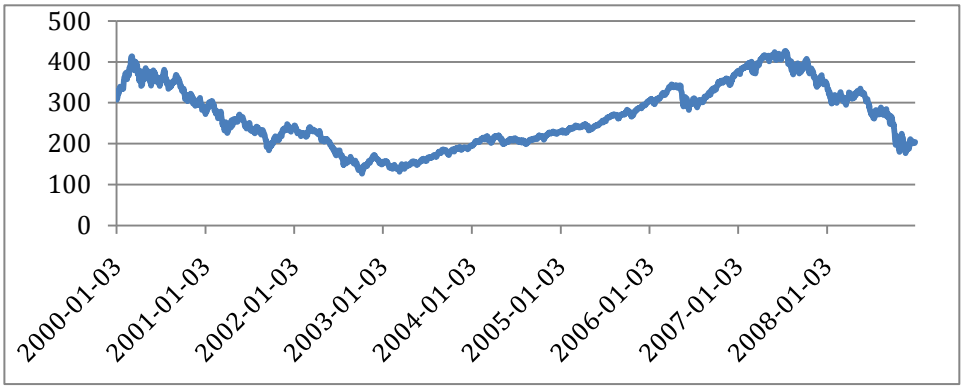


**Figure 2: Development of the OMXSPI index between 2000 and 2008**

## 4.2 Dependent Regression Variables

### 4.2.1 Choice of Risk Measures

One crucial decision when evaluating the relationship between the structure of CEO compensation packages and firm risk taking is the choice of risk measure. In earlier studies performed on this topic, different market based risk measures such as total risk, firm specific risk, interest rate risk, and market risk are most frequently used. However there are also other types of risk measures that can be used to approximate a firm's risk taking. Nier and Bauermann (2006) use the fluctuations in banks' capital reserves as their measure of bank risk. However, this risk measure has its limitations when the investigation sample also include other financial institutions than banks as well as industrial firms, as in our case, since it only can be used when investigating the banking industry. Another approach suggests that the fluctuations in accounting measures such as earnings or cash flow can be used to capture the risk taking of the firm. Worth mentioning regarding accounting measures is that they can possibly be partially manipulated by the management of the firm, by changing the accounting procedures of the firm (Healy, 1985). One reason for using such methods can for instance be to even out fluctuations in accounting performance measures between different years. All this being said, the main reason for not using fluctuations in

capital reserves or some other accounting measure, as our approximation of firm risk taking, are the limitation when collecting data as well as the difficulties to find continuous reliable information regarding these accounting measures.

The reasoning for using market based risk measures is not only that they are easily collected and publicly available, it is also impossible for a manager to manipulate through creative accounting methods as discussed earlier. Instead in accordance with the efficient market hypothesis, we argue that stock market information and performances of the firm are efficiently reflected in the stock price, and therefore also should work well to reflect the risk taking of the firm. By using market based risk measures, it is also possible to separate between market risk and firm specific risk, which allows us to separate the impact for fluctuations in the overall Swedish business cycles and make a deeper analysis of the firms that we are interested in. Furthermore, one can also argue that a CEO compensation system, at least according to theory, should be structured to achieve an alignment of preferences for risk taking between shareholders and managers. Because of this it makes a lot of sense to look upon firm risk taking from the perspective of a shareholder, namely through stock market based risk measures. With background of the above discussion we have decided to follow the main stream in previous similar studies and use market based risk measures generated from daily stock market return data in our empirical investigation.

### 4.2.2 Generating of Stock Market Based Risk Measures

In accordance with Andersson and Fraser (1999) and Chen, Steiner, and Whyte, (2005) three different stock market based measures of risk are used as dependent variables in the empirical analysis of this thesis, namely; total, market and firm specific risk. In order to generate measures of the market risk and the firm specific risk we use of the following factor model:

$$R_{ij} = \alpha + \beta_{ij}^{M} R_{j}^{M} + \varepsilon_{ij}$$

where $R_{ij}$ is the daily stock return for firm $i$. The market beta coefficient ($\beta_{ij}^{M}$) in the equation above represents the market risk. The market return for year $j$ ($R_{j}^{M}$) in the model above is given by return data for the Swedish general stock market index, OMXSPI, which constitutes from all the shares listed on the Swedish stock exchange.

The standard deviation of the residuals ($\varepsilon_{ij}$) in the above model ($\sigma_{ij}^{u}$) will be used as an approximation of the firm specific risk and the total risk of the firm stock is approximated by the standard deviation of daily stock return ($\sigma_{ij}$), calculated directly from stock market return data for the stocks included in our empirical investigation.

## 4.3 Summary Statistics

### 4.3.1 Summary Statistics for Control Factors

In tables 1 and 2 descriptive summary statistics for the 15 financial institutions and the industrial sample of 11 firms used in the study are presented. By comparing the two sectors it can easily be seen that they differ in terms of both the amount of total assets as well as in total debts. By looking at the year-end book values of total assets, it can be seen that the mean and median value in the finance sector is larger than in the industry sector, but also that the range in total assets in the finance sector is wider than in the industrial sector. This can be explained by the variation of firm type in the financial sample, since the four large commercial banks in Sweden have larger total assets than the other financial firms included in this sample. The same similarity can be seen when looking at total debts. Hence, banks are more highly leveraged and therefore the financial sector on average has higher total debt than the industry sector. The total debt in the finance sector offers a larger variation than in the industrial sector. In addition the industry sector has a slightly higher trading frequency variable both when looking at mean and median values.

### 4.3.2 Summary Statistics for the Executive Compensation Variables

Tables 1 and 2 also provide summary statistics for the structure of executive compensation and reveal several interesting differences between the samples of firms from the different business sectors. A comparison in the total compensation shows both a higher minimum and higher maximum level for the CEOs' in the industrial sector, which also have higher total CEO compensation on average. However, there is a relatively large difference between the median value (4 504 000 SEK) and the mean value (6 178 392 SEK) for the industrial sample, which indicates that some CEOs have a relatively large total cash compensation. It can also be seen that the industrial sector appears to be using option based incentive compensation programs more frequently than what is the case in the finance sector. This can be said since the mean value of the option dummy variable is relatively higher for the industrial sample.

| Financial Sector | Median | Mean | Min | Max | Standard deviation |
|---|---|---|---|---|---|
| Total Assets (MSEK) | 11 900 | 529 000 | 533 | 5 140 000 | 937 000 |
| Total Debt (MSEK) | 3 547 | 209 000 | 0 | 1 480 000 | 357 000 |
| Trading Frequency | 0.00123 | 0.00238 | 0.00003 | 0.392 | 0.004 |
| Size | 16.293 | 17.190 | 13.187 | 22.360 | 2.897 |
| Capital Ratio | 0.733 | 0.733 | 0.345 | 1 | 0.184 |
| Total Compensation (SEK) | 5 300 000 | 5 448 922 | 400 000 | 23 200 000 | 4 129 236 |
| Variable Compensation (SEK) | 300 000 | 1 298 774 | 0 | 17 600 000 | 2 658 892 |
| Proportion | 0.0893 | 0.152 | 0 | 0.762 | 0.182 |
| Option | 0 | 0.437 | 0 | 1 | 0.437 |
| Total Risk | 0.0199 | 0.0214 | 0.0097 | 0.0601 | 0.0090 |
| Firm Specific Risk | 0.0161 | 0.0177 | 0.0071 | 0.0597 | 0.0082 |
| Market Risk | 0.7020 | 0.6779 | -0.0570 | 1.5420 | 0.3910 |
| Observations | 126 | | | | |

**Table 1: Descriptive statistics for the financial sector**

| Industrial Sector | Median | Mean | Min | Max | Standard deviation |
|---|---|---|---|---|---|
| Total Assets (MSEK) | 5 986 | 21 500 | 948 | 109 000 | 26 600 |
| Total Debt (MSEK) | 1 356 | 6 510 | 71 | 53 200 | 10 400 |
| Trading Frequency | 0.00277 | 0.0364 | 0.000084 | 0.0152 | 0,003 |
| Size | 15.605 | 16.048 | 13.762 | 18.510 | 1.352 |
| Capital Ratio | 0.762 | 0.751 | 0.505 | 0.967 | 0.122 |
| Total Compensation (SEK) | 4 504 000 | 6 178 392 | 1 222 000 | 24 400 000 | 4 321 201 |
| Variable Compensation (SEK) | 764 000 | 1 875 833 | 0 | 16 900 000 | 2 939 847 |
| Proportion | 0.181 | 0.203 | 0 | 0.920 | 0.199 |
| Option | 1 | 0.566 | 0 | 1 | 0.498 |
| Total Risk | 0.0198 | 0.0207 | 0.0110 | 0.0406 | 0.0065 |
| Firm Specific Risk | 0.0173 | 0.0175 | 0.0039 | 0.0357 | 0.0054 |
| Market Risk | 0.6460 | 0.6730 | 0.1150 | 1.4590 | 0.3612 |
| Observations | 99 | | | | |

**Table 2: Descriptive statistics for the industrial sector**

### 4.3.3 Summary Statistics for Yearly Averages on Executive Compensation

In table 3 the individual components of executive compensation in the financial sector are expressed in average terms over the investigation period of this study. In this way it can be seen that except from 2008 the proportion of variable compensation increased between 2000 and 2008 in the finance sector. The use of option based incentive program has decreased during the time period between 2002 and 2005, but has the same number of users in 2001 and 2008.

| Year | Proportion | Variable | Option |
|---|---|---|---|
| 2000 | 0.1296 | 810 815.4 | 0.4667 |
| 2001 | 0.1241 | 665 742.9 | 0.5333 |
| 2002 | 0.1029 | 565 661.3 | 0.4667 |
| 2003 | 0.1203 | 778 598.5 | 0.4000 |
| 2004 | 0.1844 | 1 414 730 | 0.3333 |
| 2005 | 0.1847 | 1 481 787 | 0.3333 |
| 2006 | 0.1976 | 1 993 064 | 0.4000 |
| 2007 | 0.2024 | 2 322 330 | 0.4667 |
| 2008 | 0.1189 | 1 656 238 | 0.5333 |

**Table 3: Yearly average in the financial sector**

In Table 4 4 yearly average executive compensation statistics for the industrial sample is presented. In similarity with the observations from the financial sector, the magnitude of variable compensation as a proportion of total compensation has increased during the last years in the industrial sector. The proportion of variable compensation was on average 17.8% in year 2000, and then increased to an average level of 29.6 % reported for 2007. When looking at the presence of option based incentive program during the examined years, the reverse development is found. In 2000 approximately 72.7% of the industrial firms in used some form of stock option based incentive program, while in 2007 and 2008 the corresponding numbers are only 45.5%.

| Year | Proportion | Variable | Option |
|---|---|---|---|
| 2000 | 0.1777 | 1 213 578 | 0.7273 |
| 2001 | 0.1416 | 918 818,2 | 0.7273 |
| 2002 | 0.1843 | 1 430 545 | 0.7273 |
| 2003 | 0.0945 | 765 272,7 | 0.5455 |
| 2004 | 0.1741 | 1 758 091 | 0.5455 |
| 2005 | 0.2233 | 1 962 909 | 0.5455 |
| 2006 | 0.2788 | 2 886 311 | 0.3636 |
| 2007 | 0.2959 | 3 667 212 | 0.4545 |
| 2008 | 0.2556 | 2 279 764 | 0.4545 |

**Table 4: Yearly average in the industrial sector**

## 4.4 General Regression Model

The main model used in this study aims to investigate the relationship between executive compensation structure and market based risk measures, and is inspired by the model specification used by Chen, Steiner, and Whyte (2005). The regression model is estimated in two steps. In the first step we generate three different market based risk measures for each firm and year. The market risk and the idiosyncratic firm risk measures are generated using the one factor model presented and discussed above in section 4.2.2.

The second step in the analysis is performed by running regressions with each stock market based measure of risk as dependent variables and using control variables for size, capital ratio, trading frequency, and dummy variables for each year examined as independent regression variables as motivated above. The model is specified in a way such that the compensation variable is either the proportion of variable compensation from total compensation, or the dummy variable measuring existence of an option based incentive program.

$$Risk_{ij} = \alpha_i + \beta_1 Compensation_{ij} + \beta_2 Size_{ij} + \beta_3 Capital\ Ratio_{ij}$$

$$+\beta_4 Trading\ Frequency_{ij} + \beta_5 year01 + \beta_6 year02 + \beta_7 year03 + \beta_8 year04$$

$$+\beta_9 year05 + \beta_{10} year06 + \beta_{11} year07 + \beta_{12} year08 + \varepsilon_{ij}$$

where:

$$Risk_{ij} \in \left[\sigma_{ij}, \sigma_{ij}^{u}, \beta_{ij}^{M}\right] and\ Compensation_{ij} \in \left[Proportion_{ij}, Option_{ij}\right]$$

The regression analysis is run by a generalized least square method that control for fixed effects among the firm in each sample. The fixed effect method allows for individual differences between the firms in our investigation sample by estimating an individual intercept for each firm. An alternative method to fixed effects is random effects, which allows for differences in the intercept that are random among the sample. In our case it is more reasonable that differences in the estimated intercept might arise due to individual firm factors, and not totally random, which makes a fixed effects approach superior in this type of regression analysis. The fixed effect approach always gives consistent results when working with panel data, but may not always be the most efficient (Stock and Watson, 2003).

The Hausman test can be used for choosing between fixed and random effects in the regression. The Hausman test examines the null hypothesis that the coefficients estimated by the random effects estimator are equal to the ones estimated by the fixed effects estimator. When performing a Hausman test on our data set, the result suggests that the null hypothesis can be rejected, at a significance level of 10 percent, which indicates that the fixed effect approach is superior compared to the random effect approach for our panel data set.

The regression model is also estimated by using robust standard errors, which makes the standard errors of the estimated model parameters robust against potential heteroskedasticity as well as potential serial correlation that otherwise might be issues for the underlying data series.

# 5 Regression Results for Main Model

*In this chapter the regression results for the financial sector as well as the industrial sector will be presented and discussed. Our main focus is on the two compensation structure variables; proportion of variable compensation and the dummy variable for the usage of option based incentive programs, which is regressed against the three different market based risk measures; total risk, firm specific risk and market risk.*

## 5.1 Proportion of Variable Compensation in the Financial Sector

In table 5 the regression results for the total risk, firm specific, and market risk in the financial sector is showed, when analyzing the impact of the proportion of variable compensation on each of the risk measures. As can be seen, the F-test that tests if all model coefficients are jointly different from zero are significant at a 5 percent significance level in all three models. In the regression results for the model when total risk is used as risk measure, the proportion variable is close to significant at a 10 percent significance level, and suggests a slightly negative relationship. In fact, if the proportion variable increases with one unit then the risk level is expected to decrease with 0.7 units. The elasticity for the proportion variable is -0.052, which indicates that if the proportion variable would increase with one percent the risk taking will decrease with 0.052 percent. This elasticity effect is significantly different from zero at a 5 percent significance level. However, in our opinion this should be treated as a rather small effect on firm risk taking behavior. In the results for the firm specific and market risk, the proportion coefficient is insignificant at a 10 percent significance level.

The size and capital ratio coefficient is significant at a 5 percent significance level and shows a negative influence as expected in the case of total and firm specific risk. Regarding the control variables for size and capital ratio the regression coefficients are insignificant, in the regression model with market risk as dependent variable. The trading frequency variable is not significant in any of the regressions. When looking at the year dummy variables for 2004 to 2008, one can see that they are significant at a 1 percent significance level, except for year 2008 in the regression model with firm specific risk in which case it is highly insignificant. Worth noting regarding the significant year dummies is that they have a negative effect on the total risk as well as on the firm specific risk, while having a positive effect on the market risk measures.

This observation is perfectly in line with the expectation since it directly implies that market risk in fact has increased during the peak of the crisis (2008) relative to the benchmark year (2000).

| Finance Sector | Total Risk | | Firm Specific Risk | | Market Risk | |
|---|---|---|---|---|---|---|
| | Coef. | P> I t I | Coef. | P> I t I | Coef. | P> I t I |
| Proportion | - .0074 | 0.108 | -.00394 | 0.261 | -.23092 | 0.278 |
| Size | -.00128 | 0.022 | -.00126 | 0.003 | .00232 | 0.904 |
| Trading Frequency | -.10665 | 0.611 | -.18253 | 0.227 | 1.56406 | 0.810 |
| Capital Ratio | -.01631 | 0.050 | -.01656 | 0.034 | -.12415 | 0.567 |
| Year 2001 | -.00052 | 0.706 | -.00207 | 0.075 | .19454 | 0.051 |
| Year 2002 | .00233 | 0.178 | -.00137 | 0.348 | .42751 | 0.000 |
| Year 2003 | -.00319 | 0.239 | -.00402 | 0.119 | .25510 | 0.019 |
| Year 2004 | -.01122 | 0.000 | -.01103 | 0.000 | .16460 | 0.119 |
| Year 2005 | -.01176 | 0.000 | -.01178 | 0.000 | .35056 | 0.001 |
| Year 2006 | -.00719 | 0.000 | -.00907 | 0.000 | .39960 | 0.000 |
| Year 2007 | -.00609 | 0.001 | -.00869 | 0.000 | .44917 | 0.000 |
| Year 2008 | .00853 | 0.001 | -.00002 | 0.993 | .53342 | 0.000 |
| Constant | .05995 | 0.000 | .05780 | 0.000 | .45204 | 0.000 |
| F(12, 108) | 37.21 | | 25.20 | | 6.68 | |
| Prob > F | 0.000 | | 0.000 | | 0.000 | |
| Number of Observations | 126 | | | | | |

**Table 5: Generalized least square regression on the proportion compensation variable in the financial sector**

## 5.2 Existence of Option Based Incentive Program in the Financial Sector

The regression results for the existence of option-based compensation program dummy variable in the financial sector are showed in table 6 below. The overall regression models are significant for all of the three market based risk measures. The regression coefficients for size and capital ratio are both significant at a 5 percent significance level and has a negative influence on the risk taking as expected in the case of total risk and firm specific risk. However, in the case of market risk the coefficients for size and capital ratio are both insignificant.

When looking at the option dummy regression models with total risk and firm specific risk as dependent regression variables, the results are rather similar. The coefficients for the option dummy variables are insignificant for any of the market based risk measures. We can therefore not see any trends that support neither the moral hazard hypothesis, which predicts an increased risk taking, nor the contradicting contracting hypothesis when using option based incentive program in the financial sector based on these regression results.

By analyzing the year dummies in the three regressions the results show similarities with the regression results for proportion compensation variable. In the case of total and firm specific risk, the year coefficients following 2004 are significant at 5 percent significance level, except for 2008 in the regression results for firm specific risk. The effect of the years 2004 to 2007 all show a negative influence on firm risk taking, while 2008 shows a positive influence on the risk taking in the total risk model, as expected in the discussion in section 4.1.5. The year dummies impact on the market risk are all close to significant for all years except from 2004, and they all show a positive impact on the risk taking. That is the market risk for all years from 2001 to 2008 where all larger than the benchmark in 2000, the year dummies therefore show a positive relationship on the market risk.

| Finance Sector | Total Risk | | Firm Specific Risk | | Market Risk | |
|---|---|---|---|---|---|---|
| | Coef. | P> I t I | Coef. | P> I t I | Coef. | P> I t I |
| Option | -.00274 | 0.200 | -.00235 | 0.197 | -.06156 | 0.350 |
| Size | -.00128 | 0.019 | -.00125 | 0.002 | .00212 | 0.909 |
| Trading Frequency | -.10567 | 0.623 | -.17915 | 0.244 | 1.51459 | 0.821 |
| Capital Ratio | -.01555 | 0.056 | -.01588 | 0.034 | -.10743 | 0.632 |
| Year 2001 | -.00028 | 0.848 | -.00188 | 0.115 | .20017 | 0.051 |
| Year 2002 | .00255 | 0.159 | -.00123 | 0.389 | .43416 | 0.000 |
| Year 2003 | -.00327 | 0.210 | -.00411 | 0.095 | .25386 | 0.023 |
| Year 2004 | -.01197 | 0.000 | -.01154 | 0.000 | .14410 | 0.162 |
| Year 2005 | -.01254 | 0.000 | -.01232 | 0.000 | .32950 | 0.002 |
| Year 2006 | -.00787 | 0.000 | -.00951 | 0.000 | .38000 | 0.000 |
| Year 2007 | -.00660 | 0.000 | -.00897 | 0.000 | .43291 | 0.000 |
| Year 2008 | .00883 | 0.002 | .00021 | 0.922 | .54114 | 0.000 |
| Constant | .05972 | 0.000 | .05779 | 0.000 | .44167 | 0.280 |
| F(12,108) | 32.96 | | 24.58 | | 6.46 | |
| Prob > F | 0.000 | | 0.000 | | 0.000 | |
| Number of Observations | 126 | | | | | |

**Table 6: Generalized least square on the option variable in the financial sector**

## 5.3 Proportion of Variable Compensation in the Industrial Sector

The following section examines the impact of proportion of variable compensation in the industry on the three different risk measures. As can be seen from the F-test in table 7, the overall models are significant in all three regressions. The size coefficient is significant and positive for all three risk measures, in accordance with the theoretical argumentation in section 4.1.3, the effect of the size variable is supposed to have a negative effect of the risk taking due to larger potential of diversification in larger firms. Similar to the results presented for the financial sample, the dummy coefficients for many of the years are significant at a 5 percent significance level. However, the proportion coefficient for the industrial sample is insignificant, and the trading frequency coefficient as well as the capital ratio coefficient turns out to be insignificant for all three risk measures. Since the year dummy coefficients are

significant, it can be concluded that this overall model significance can be attributed to the large explanatory power of fluctuations in the overall economy, captured by the year dummies. The results from this regression analysis do not provide any evidence for how CEO compensation structure influence firm risk taking.

| Industrial Sector | Total Risk | | Firm Specific Risk | | Market Risk | |
|---|---|---|---|---|---|---|
| | Coef. | P> I t I | Coef. | P> I t I | Coef. | P> I t I |
| Proportion | .00299 | 0.320 | .00015 | 0.958 | .18727 | 0.240 |
| Size | .00566 | 0.001 | .00506 | 0.001 | .19454 | 0.022 |
| Trading Frequency | .25986 | 0.261 | .24609 | 0.282 | .64150 | 0.975 |
| Capital Ratio | -.00642 | 0.231 | -.00707 | 0.151 | -.16271 | 0.664 |
| Year 2001 | -.00204 | 0.155 | -.00197 | 0.254 | .10964 | 0.268 |
| Year 2002 | -.00110 | 0.414 | -.00205 | 0.212 | .23478 | 0.019 |
| Year 2003 | -.00526 | 0.001 | -.00520 | 0.002 | .24798 | 0.015 |
| Year 2004 | -.00966 | 0.000 | -.00913 | 0.000 | .32702 | 0.003 |
| Year 2005 | -.01074 | 0.000 | -.00969 | 0.000 | .38826 | 0.001 |
| Year 2006 | -.00369 | 0.051 | -.00497 | 0.018 | .60238 | 0.000 |
| Year 2007 | -.00488 | 0.010 | -.00641 | 0.001 | .56601 | 0.000 |
| Year 2008 | .00507 | 0.021 | -.00106 | 0.600 | .44018 | 0.002 |
| Constant | -.06337 | 0.015 | -.05483 | 0.020 | -2.69125 | 0.049 |
| F(12,76) | 33.25 | | 25.69 | | 16.56 | |
| Prob > F | 0.000 | | 0.000 | | 0.000 | |
| Number of Observations | 99 | | | | | |

**Table 7: Generalized least square on the proportion compensation variable in the industrial sector**

## 5.4 Existence of Option Based Incentive Program in the Industrial Sector

In table 8 the regression results for the use of option based incentive programs within the industrial sample is presented and in the case of significant option coefficients it is possible to show proof of trends that suggest that the use of an option based incentive program affects the level of firm risk taking. However, by looking at the results for these regressions for the industrial sample, the option coefficients are insignificant for

all three of the market based risk measures. In similarity with the regression results for the proportion variable in section 5.3, the coefficients for size and the dummy coefficients reflecting yearly fluctuations are significant for all risk measures.

| **Industrial Sector** | **Total Risk** | | **Firm Specific Risk** | | **Market Risk** | |
|---|---|---|---|---|---|---|
| | **Coef.** | **P> I t I** | **Coef.** | **P> I t I** | **Coef.** | **P> I t I** |
| Option | -.00041 | 0.733 | -.00016 | 0.891 | .01932 | 0.764 |
| Size | .00600 | 0.000 | .00509 | 0.001 | .21148 | 0.012 |
| Trading Frequency | .25380 | 0.310 | .23843 | 0.324 | 2.68453 | 0.897 |
| Capital Ratio | -.00430 | 0.409 | -.00702 | 0.200 | -.00995 | 0.979 |
| Year 2001 | -.00213 | 0.161 | -.00198 | 0.261 | .10565 | 0.308 |
| Year 2002 | -.00108 | 0.441 | -.00205 | 0.210 | .23732 | 0.020 |
| Year 2003 | -.00554 | 0.000 | -.00525 | 0.003 | .23979 | 0.024 |
| Year 2004 | -.00976 | 0.000 | -.00916 | 0.000 | .32702 | 0.004 |
| Year 2005 | -.01076 | 0.000 | -.00972 | 0.000 | .39514 | 0.001 |
| Year 2006 | -.00363 | 0.060 | -.00502 | 0.019 | .62088 | 0.000 |
| Year 2007 | -.00468 | 0.013 | -.00643 | 0.001 | .59129 | 0.000 |
| Year 2008 | .00518 | 0.022 | -.00109 | 0.585 | .46006 | 0.002 |
| Constant | -.06944 | 0.004 | -.05516 | 0.018 | -3.06495 | 0.023 |
| F (12, 76) | 32.5 | | 25.55 | | 17.22 | |
| Prob > F | 0.000 | | 0.0000 | | 0.0000 | |
| Number of Observations | 99 | | | | | |

**Table 8: Generalized least square on the option variable in the industrial sector**

# 6 Deeper Analysis of the Regression Results for the Financial Sector

*This chapter includes a deeper analysis of the financial firms in our investigation sample, since analyzing the Swedish financial industry is the main purpose of this thesis. The results from chapter 5 for our financial sample is analyzed further and potential endogeneity issues for our regression model are discussed and analyzed as well as potential serial correlation.*

## 6.1 Allowing the Proportion Variable to Change over Time in the Financial Sector

In the previous chapter, the effect of the proportion variable component is assumed to be stable over the entire investigation time period. This may seem like a strong assumption and in order to relax that underlying assumption a new variable is defined as the original proportion variable times a year variable. Hence, the proportion variable might be affected by the fluctuations in the economy and including the time-proportion variable in the regression models therefore allows the proportion to change between different years. Worth mentioning, before looking at the regression results, is that the small sample size that are examined might potentially be a problem for using this strategy. The results from this analysis should be compared with the results in chapter 5, where a generalized least square regression with fixed effects is used. If the new time-proportion coefficient is significant there is evidence for an unstable proportion variable over time.

When looking at the regression results (table 9), the overall model is significant, but neither the proportion coefficients nor the time-proportion coefficients are significant, at a significance level of 10 percent, in any of the regression models**.** In section 5.1 the proportion coefficient was significant at a 10 percent significance level, whereas in the updated results both the proportion and the time-proportion coefficients are insignificant. From these results we cannot conclude that the proportion variable is unstable over time.

| Finance Sector | Total Risk | | Firm Specific Risk | | Market Risk | |
|---|---|---|---|---|---|---|
| | Coef. | P> I t I | Coef. | P> I t I | Coef. | P> I t I |
| Proportion | .79874 | 0.728 | 2.3345 | 0.183 | -182.9353 | 0.133 |
| Time-proportion | -.00040 | 0.726 | -.00117 | 0.183 | .09113 | 0.133 |
| Size | -.00127 | 0.026 | -.00123 | 0.004 | .00044 | 0.981 |
| Trading Frequency | -.09639 | 0.658 | -.15276 | 0.319 | -.76176 | 0.914 |
| Capital Ratio | -.01654 | 0.054 | -.01722 | 0.032 | -.07261 | 0.736 |
| Year 2001 | -.000456 | 0.740 | -.00190 | 0.111 | .18117 | 0.054 |
| Year 2002 | .00246 | 0.154 | -.00099 | 0.506 | .39781 | 0.000 |
| Year 2003 | -.00304 | 0.271 | -.00358 | 0.179 | .22087 | 0.035 |
| Year 2004 | -.01104 | 0.000 | -.01051 | 0.000 | .12455 | 0.217 |
| Year 2005 | -.01151 | 0.000 | -.01103 | 0.000 | .29210 | 0.005 |
| Year 2006 | -.00688 | 0.000 | -.00818 | 0.000 | .32983 | 0.002 |
| Year 2007 | -.00569 | 0.001 | -.00753 | 0.000 | .35882 | 0.001 |
| Year 2008 | .00890 | 0.001 | .00105 | 0.630 | .44967 | 0.000 |
| Constant | .05971 | 0.000 | .05711 | 0.000 | .50615 | 0.222 |
| F(13, 107) | 35.30 | | 23.86 | | 6.89 | |
| P > F | 0.0000 | | 0.0000 | | 0.0000 | |
| Number of Observations | 135 | | | | | |

**Table 9: Generalized least square regression on the financial sector, including time proportion variable**

## 6.2 CEO Compensation Structure and Commercial Bank Risk Taking

In section 3.3 earlier empirical studies regarding the relationship of CEO compensation and firm risk taking were discussed, and most of these studies share two common features; first they analyze the impact of CEO compensation and bank risk taking for commercial banks, and second the studies are performed on the US banking market, which ensures a huge population of commercial banks. When performing a similar analysis on the Swedish financial market, we are limited to 15 financial firms listed on the OMX during the investigated time period 2000 to 2008, and if only focusing on the commercial banks on the Swedish market, we end up with four commercial banks and as little as 36 observations. Since the banks are different

in the underlying structure compared to other financial institutions in terms of the amount of total assets, asset mix and capital structure, the impact of the CEO compensation structure on the firm risk taking might differ compared to other financial institutions. In this section, we aim to analyze the CEO compensations impact of the firm risk taking of the four Swedish banks separately. Worth remembering before presenting the regression results is that this analysis should be considered as a total investigation of the Swedish commercial banks, and these results can hardly be generalized into other markets or other types of financial institutions, because of the tiny sample size.

### 6.2.1 Proportion Variable Implications

In table 10 the regression results of the implications of the proportion variable for our three different market-based risk measures are presented. In all three risk measures the proportion variable appears to have a negative impact on the risk taking of the banks. However, in the case when the banks risk taking is approximated by firm specific risk the result is considered insignificant in this study, while the market risk is significant at a significance level of 10 percent and the total risk is significant at a 5 percent significance level. From this table it is also possible to observe that the overall model is significant for all three regression models.

When looking at the significance of the coefficients for the other control factors it can be seen that the trading frequency, contrary to earlier, is significant at a 5 percent significance level in all three regression models. Similar to our earlier regression results, it can also be seen that some of the coefficients for the year dummy variables also appears to be significant in most of the cases. Worth noting though is that the control variable for size in this case is insignificant, contrary to our earlier regression results. This might partly be explained by failure to control for the influence of bank size accurately, which according to Houston and James (1990) would render biased results. The insignificance of the size factor might also be explained by both the fact that our investigation sample is really small and also that these four banks are similar in terms of size, since all of them are listed as large cap firms on the Stockholm stock exchange.

| Banks | Total Risk | | Firm Specific Risk | | Market Risk | |
|---|---|---|---|---|---|---|
| | Coef. | P> I t I | Coef. | P> I t I | Coef. | P> I t I |
| Proportion | -.01456 | 0.017 | -.00570 | 0.204 | -.59995 | 0.089 |
| Size | .00116 | 0.875 | -.00333 | 0.565 | .43721 | 0.374 |
| Trading Frequency | .93743 | 0.003 | .88709 | 0.010 | 28.6323 | 0.007 |
| Capital Ratio | .01011 | 0.243 | .01045 | 0.213 | .05611 | 0.920 |
| Year 2001 | .00155 | 0.336 | -.00217 | 0.148 | .54223 | 0.000 |
| Year 2002 | .00291 | 0.197 | -.00458 | 0.011 | .81699 | 0.000 |
| Year 2003 | -.00526 | 0.018 | -.00806 | 0.000 | .70554 | 0.000 |
| Year 2004 | -.01274 | 0.000 | -.01256 | 0.000 | .34922 | 0.028 |
| Year 2005 | -.01315 | 0.001 | -.01296 | 0.000 | .59429 | 0.013 |
| Year 2006 | -.00810 | 0.057 | -.01064 | 0.003 | .59073 | 0.035 |
| Year 2007 | -.00667 | 0.207 | -.00887 | 0.048 | .57301 | 0.098 |
| Year 2008 | .01174 | 0.060 | .00077 | 0.884 | .66313 | 0.109 |
| Constant | -.00769 | 0.961 | .08408 | 0.489 | -8.98338 | 0.383 |
| F(12,20) | 73.52 | | 70.89 | | 27.15 | |
| Prop > F | 0.0000 | | 0.0000 | | 0.0000 | |
| Number of Observations | 36 | | | | | |

**Table 10: Generalized least square regression on proportion variable for the commercial banks**

### 6.2.2 Implications of Stock option based CEO compensation.

In table 11 the regression results are presented for when the presence of option based incentive schemes is regressed against the three market-based risk measures. The overall models are significant in all three cases. However, the coefficients for the option dummy variable are insignificant in all three regressions. Compared to the results for the proportion variable, the results for the option dummy are rather weak, and therefore we are not able to make any interesting conclusions from these results.

| Banks | Total Risk | | Firm Specific Risk | | Market Risk | |
|---|---|---|---|---|---|---|
| | Coef. | P> I t I | Coef. | P> I t I | Coef. | P> I t I |
| Option | -.00138 | 0.316 | -.00094 | 0.379 | -.11238 | 0.119 |
| Size | .00129 | 0.881 | -.00226 | 0.711 | .58246 | 0.276 |
| Trading Frequency | .88157 | 0.015 | .85901 | 0.019 | 25.4776 | 0.040 |
| Capital Ratio | .02192 | 0.027 | .01436 | 0.057 | .44448 | 0.402 |
| Year 2001 | .00289 | 0.064 | -.00163 | 0.227 | .59954 | 0.000 |
| Year 2002 | .00393 | 0.080 | -.00429 | 0.010 | .84492 | 0.000 |
| Year 2003 | -.00393 | 0.084 | -.00770 | 0.000 | .73806 | 0.000 |
| Year 2004 | -.01200 | 0.001 | -.01261 | 0.000 | .33288 | 0.102 |
| Year 2005 | -.01293 | 0.006 | -.01350 | 0.000 | .51720 | 0.058 |
| Year 2006 | -.00797 | 0.113 | -.01129 | 0.004 | .50059 | 0.107 |
| Year 2007 | -.00606 | 0.327 | -.00937 | 0.047 | .496344 | 0.183 |
| Year 2008 | .01412 | 0.082 | .00090 | 0.873 | .65111 | 0.144 |
| Constant | -.01875 | 0.917 | .05921 | 0.642 | -12.2626 | 0.269 |
| F(12,20) | 74.25 | | 66.66 | | 32.07 | |
| Prop > F | 0.0000 | | 0.0000 | | 0.0000 | |
| Number of Observations | 36 | | | | | |

**Table 11: Generalized least square regression on option variable for the commercial banks**

## 6.3 CEO Compensation Structure and Firm Risk Taking for Financial Firms

In section 6.2 the Swedish commercial banks were analyzed separately due to differences in the underlying structure and potential differences in regulations and government protection. It is therefore reasonable also to analyze the financial institutions from the financial sector separately, e.g. the financial sector while excluding the four Swedish commercial banks in the sample, in order to see if the regression results in this model would change compared to the regression results from the "main model" presented in chapter 5.

### 6.3.1 Proportion Variable Implications

In this section a separate analysis is performed on the financial firms (11 firms) included in the financial sample. As can be seen in tables 12 and 13 the overall models are significant for both the option dummy variable and the proportion variable, in the case of total, firm specific, and market risk. However, in table 12 it can be seen that the proportion coefficient is insignificant for all three risk measures at a 10 percent significance level. In the regression model for total and market risk it can seen from table 12 that the size, trading frequency, and the capital ratio, as well as the year dummy coefficients are all significant on a 10 percent significance level, with a negative influence of the risk taking of the firm. It could therefore be concluded that the control variables have the explanatory power in these two regression models.

| **Financial Firms** | **Total Risk** | | **Firm Specific Risk** | | **Market Risk** | |
|---|---|---|---|---|---|---|
| | **Coef.** | **P> I t I** | **Coef.** | **P> I t I** | **Coef.** | **P> I t I** |
| Proportion | -.00149 | 0.755 | -.00043 | 0.915 | .05919 | 0.790 |
| Size | -.00133 | 0.008 | -.0012 | 0.005 | -.01336 | 0.383 |
| Trading Frequency | -.25634 | 0.093 | -.31678 | 0.006 | -1.8860 | 0.758 |
| Capital Ratio | -.01889 | 0.024 | -.01755 | 0.029 | -.24226 | 0.216 |
| Year 2001 | -.00178 | 0.320 | -.00215 | 0.157 | .02583 | 0.774 |
| Year 2002 | .001152 | 0.601 | -.000624 | 0.739 | .23006 | 0.026 |
| Year 2003 | -.00293 | 0.426 | -.00246 | 0.484 | .03315 | 0.747 |
| Year 2004 | -.01231 | 0.000 | -.01133 | 0.000 | -.00649 | 0.948 |
| Year 2005 | -.01247 | 0.000 | -.01164 | 0.000 | .15445 | 0.120 |
| Year 2006 | -.00786 | 0.001 | -.00846 | 0.000 | .21772 | 0.032 |
| Year 2007 | -.00745 | 0.001 | -.00883 | 0.000 | .25551 | 0.020 |
| Year 2008 | .00507 | 0.073 | -.00090 | 0.711 | .30499 | 0.004 |
| Constant | .06275 | 0.000 | .05747 | 0.000 | .86388 | 0.009 |
| F(12,108) | 24.96 | | 19.18 | | 3.48 | |
| Prob > F | 0.0000 | | 0.0000 | | 0.0004 | |
| Observations | 99 | | | | | |

**Table 12: Generalized least square regression on proportion variable for the financial firms**

### 6.3.2 Option Variable Implications

In table 13 it can be seen that the option coefficients are insignificant in all three regression models, and with similarities to the results for the proportion variable regression models it is the control variables that have significant coefficients in most of the cases. We therefore do not find any evidence for neither the moral hazard nor the contracting hypothesis, when running the regression results for the financial sector while excluding the commercial banks in the sample.

| **Financial Firms** | **Total Risk** | | **Firm Specific Risk** | | **Market Risk** | |
|---|---|---|---|---|---|---|
| | **Coef.** | **P> I t I** | **Coef.** | **P> I t I** | **Coef.** | **P> I t I** |
| Option | -.00261 | 0.465 | -.00199 | 0.525 | .0111 | 0.907 |
| Size | -.00134 | 0.007 | -.00121 | 0.005 | -.01307 | 0.405 |
| Trading Frequency | -.24669 | 0.125 | -.30810 | 0.010 | -1.8297 | 0.768 |
| Capital Ratio | -.01826 | 0.025 | -.01703 | 0.025 | -.24248 | 0.236 |
| Year 2001 | -.00179 | 0.318 | -.00215 | 0.159 | .02691 | 0.762 |
| Year 2002 | .00118 | 0.597 | -.00060 | 0.749 | .23006 | 0.024 |
| Year 2003 | -.00317 | 0.362 | -.00263 | 0.428 | .03517 | 0.727 |
| Year 2004 | -.01269 | 0.000 | -.01154 | 0.000 | .00022 | 0.998 |
| Year 2005 | -.01263 | 0.000 | -.01170 | 0.000 | .15979 | 0.092 |
| Year 2006 | -.00782 | 0.001 | -.00837 | 0.000 | .22284 | 0.018 |
| Year 2007 | -.00740 | 0.000 | -.00870 | 0.000 | .26123 | 0.013 |
| Year 2008 | .00530 | 0.085 | -.00071 | 0.787 | .30591 | 0.005 |
| Constant | .06322 | 0.000 | .05784 | 0.000 | .86173 | 0.009 |
| F(12,108) | 26.01 | | 19.59 | | | |
| Prob > F | 0.0000 | | 0.0000 | | | |
| Number of Observations | 99 | | | | | |

**Table 13: Generalized least square regression on option variable for financial firms**

## 6.4 Endogeneity Problem in the Compensation Variable

In the earlier regression results, the stock market based risk measures are used as dependent variables and the compensation variables as explanatory variables. However, the relationship between risk and CEO compensation structure might be endogenously determined. In fact Chen, Steiner, and Whyte (2005) state that the principal agent theory suggests that the risk level of the firm itself influences the executive compensation structure. Hence, a CEO of a risk loving company would naturally prefer fixed compensation to variable compensation in such a case. The compensation packages are also affected implicitly by the risk taking of the firm, since variable compensation might be based on the performance target measures of the firm. An additional approach suggests that a riskier company has more information asymmetry and therefore a better possibility for a CEO to gain from inside information, which results in that risk taking will have a positive effect on the magnitude of equity-based compensation usage (Chen, Steiner, and Whyte, 2005). Indifferent of what underlying factors this endogeneity problem originates from it violates one of the underlying assumptions of the ordinary least square regression model, namely that the error term of the regression model is uncorrelated with the explanatory variables.

In order to control for this potential endogeneity problem, simultaneous equations of risk and compensation can be used, where the risk measure and the compensation variable is simultaneously determined through an instrumental variable approach. The instrumental variable approach, i.e. two stages least squares is performed in two separate steps. In the first step the instrument estimates the compensation variable and in the second step the original model is estimated using the predicted compensation variable, from the first step, as an explanatory variable. One crucial decision in the instrumental variable approach is the choice of instruments and in order to serve as a valid instrument, two requirements needs to be fulfilled. The instrument needs to be correlated with the endogenous variable, but is not allowed to be correlated with the error term of the original model. In addition it is also important to control for that the correlation between the endogenous variable and the instrument variable is not weak. In our study we want to see if the risk measures are correlated with the compensation variable, and if they can be used as a valid instrument. In the first step in the two stages instrumented variable approach is performed, the following model is used:

$$Compensation_{ij} = \alpha + \beta_1 Risk_{ij} + \beta_2 Size_{ij} + \beta_3 Capital\ Ratio_{ij} +$$

$$\beta_4 Trading\ Frequency_{ij} + \beta_5 year01 + \cdots + \beta_{12} year08 + \varepsilon_{ij}$$

where:

$$Risk_{ij} \in \sigma_{ij}, \sigma_{ij}^{u}, \beta_{ij}^{M}\ and\ Compensation_{ij} \in Proportion_{ij}, Option_{ij}.$$

### 6.4.1 Valid Instrument Check for the Proportion Variable in the Financial Sector

In tables 14 and 15 the regression results are presented when testing if the three risk measures separately could be used as instruments in order to solve the potential endogeneity problem in the compensation variables. For the financial investigation sample, it can be seen that the overall model is significant at a 10 percent significance level in the when looking at total and firm specific risk, while insignificant in the case of market risk. However, it can be seen that for the proportion coefficient is insignificant at a 10 percent significant level for all three risk measures. Hence, no valid instruments can be identified.

| Financial Sector | Proportion | | Proportion | | Proportion | |
|---|---|---|---|---|---|---|
| | Coef. | P> I t I | Coef. | P> I t I | Coef. | P> I t I |
| Total Risk | -2.97305 | 0.133 | - | - | - | - |
| Firm Specific Risk | - | - | -1.91803 | 0.258 | - | - |
| Market Risk | - | - | - | - | -.06096 | 0.268 |
| Size | -.00139 | 0.901 | .00004 | 0.997 | .00258 | 0.809 |
| Trading Frequency | .73925 | 0.811 | .72163 | 0.814 | 1.16004 | 0.716 |
| Capital Ratio | -.04104 | 0.748 | -.02419 | 0.852 | -.00005 | 1.000 |
| Year 2001 | -.00579 | 0.899 | -.00830 | 0.858 | .00757 | 0.875 |
| Year 2002 | -.01771 | 0.726 | -.02761 | 0.595 | .00124 | 0.982 |
| Year 2003 | -.01762 | 0.658 | -.01596 | 0.689 | .00735 | 0.868 |
| Year 2004 | .02019 | 0.634 | .03318 | 0.422 | .06401 | 0.098 |
| Year 2005 | .01790 | 0.669 | .03105 | 0.446 | .07466 | 0.095 |
| Year 2006 | .04109 | 0.329 | .04597 | 0.289 | .08732 | 0.066 |
| Year 2007 | .05037 | 0.236 | .05280 | 0.226 | .09639 | 0.052 |
| Year 2008 | .01222 | 0.825 | -.01336 | 0.788 | .01929 | 0.745 |
| Constant | .25629 | 0.316 | .19006 | 0.440 | .10623 | 0.642 |
| F(12,108) | 1.77 | | 1.80 | | 1.56 | |
| P > F | 0.0614 | | 0.0575 | | 0.1139 | |
| Number of Observations | 126 | | | | | |

**Table 14: Generalied least square regression over proportion variable in the financial sector**

### 6.4.2 Valid Instrument Check for Option Variable in the Financial Sector

In table 15 the results from analyzing the impact of risk taking on option-based compensation are presented. Worth noting here is the firm specific, total, and market risk coefficients are insignificant at a 10 percent significance level. In fact the overall model in all three cases is insignificant.

| Financial Sector | Option | | Option | | Option | |
|---|---|---|---|---|---|---|
| | Coef. | P> I t I | Coef. | P> I t I | Coef. | P> I t I |
| Total Risk | -10.1477 | 0.166 | - | - | - | - |
| Firm Specific Risk | - | - | -10.4530 | 0.10 | - | - |
| Market Risk | - | - | - | - | -.14837 | 0.372 |
| Size | -.00708 | 0.790 | -.00714 | 0.770 | .00634 | 0.763 |
| Trading Frequency | 2.08471 | 0.856 | 1.29495 | 0.909 | 3.44248 | 0.753 |
| Capital Ratio | .13416 | 0.658 | .12690 | 0.682 | .28159 | 0.403 |
| Year 2001 | .07026 | 0.503 | .05367 | 0.611 | .10417 | 0.304 |
| Year 2002 | .03907 | 0.701 | .00036 | 0.997 | .07790 | 0.460 |
| Year 2003 | -.08314 | 0.390 | -.09305 | 0.336 | -.01326 | 0.901 |
| Year 2004 | -.24546 | 0.042 | -.24503 | 0.025 | -.10498 | 0.257 |
| Year 2005 | -.26275 | 0.040 | -.26472 | 0.025 | -.08920 | 0.383 |
| Year 2006 | -.15659 | 0.181 | -.17634 | 0.135 | -.02179 | 0.863 |
| Year 2007 | -.06853 | 0.642 | -.09524 | 0.528 | .06268 | 0.696 |
| Year 2008 | .16261 | 0.395 | .07545 | 0.616 | .15468 | 0.401 |
| Constant | .73320 | 0.304 | .73171 | 0.262 | .19512 | 0.725 |
| F(12, 108) | 1.07 | | 1.16 | | 0.81 | |
| P > F | 0.3884 | | 0.3208 | | 0.6434 | |
| Number of Observations | 126 | | | | | |

**Table 15: Generalized least square regression over option variable in the financial sector**

The regression results when testing for valid instruments in the industrial sector are presented in appendix II, and similar to the results for the financial sector, the model coefficients are insignificant at a 10 percent significance level. These results indicate that the variables used in our data cannot be used as valid instruments in the two stage least square regression. Hence, we are not able to control for a potential endogeneity problem using with the data we have access to. Finding valid instruments are in many cases both difficult and time-consuming, and due to limited data access we consider this as beyond the scope of this thesis. However, worth noting is that there still might

exist an endogeneity problem between the risk measures and the compensation variables that we are not able to control for since we do not have any valid instrument in our data sample.

# 7 Discussion

*In this chapter the structural differences between the two sectors will be discussed and related to earlier studies within the area of CEO compensation. The obtained results will be summarized, discussed and possible explanations as well as weaknesses of some of the obtained results are also stated.*

## 7.1 Discussion of Descriptive Statistics

In section 4.3 the descriptive statistic where presented for the financial as well as the industrial investigation samples. As discussed earlier, by looking at the descriptive statistics we can conclude that the proportion of total CEO compensation that is variable has steadily increased in both the investigated sectors during the years before the recent financial crisis. In section 4.3.2 we also concluded that the level of total CEO compensation is on average higher in the industrial sector than in the financial sector, and at the same time that stock option based compensation is more frequently used in the industrial sector than the financial sector when looking at the mean values. In tables 1 and 2 in section 4.3.2, it could also be seen that the mean value of the option dummy variable implicates that the use of option-based incentives is significantly more frequent in the industrial sector than in the financial sector, at a significance level of 5 percent. These results indicate that there exist structural differences in the design of the CEO compensation packages between the Swedish financial and industrial business sectors. These results are consistent with the obtained results regarding structural differences that Houston and James (1995) obtain in their study of the US market. By looking at descriptive statistics of 134 commercial banks and comparing it to 134 nonbanking firms during the same period, Houston and James (1995) are able to conclude that bank CEO receive less cash compensation and are less likely to participate in stock option plan than CEOs in other industries. The results in our analysis of the descriptive statistics also support the statement of Smith and Watts (1992) that firms operating in more heavily regulated industries have an overall lower total CEO compensation, and use stock option based incentive programs as well as cash bonuses for CEOs to a smaller extent. This statement holds for our study as well since the Swedish financial sector could be seen as more regulated than the industrial business sector.

The descriptive statistics also provide evidence for differences in some of the other control variables, where for instance the financial sector by nature shows a significantly larger amount of total assets and total debts. These differences in the descriptive statistics for the control variables suggest proof for differences in the underlying structure between the two different industries examined in this thesis. The regression model used in our study is mainly specified for supporting the financial sector, which is the main objective of this thesis, at clear expense of the regression results concerning the industrial sector. In other words the model specification used in our empirical analysis might not fit the industrial sector particularly well.

## 7.2 Discussion of the Regression Results

Our obtained results regarding the relationship between the relative proportion of total CEO compensation that is variable and firm risk taking suggest a weak relationship. However, in the regression with total risk as dependent variable the proportion coefficient was significant at a 10 percent significance level by influencing the risk variable slightly negatively in the financial sector. Although the findings from the financial sector are weak, they do provide support in favor the contracting hypothesis. When looking at the four Swedish commercial banks separately, the proportion variable coefficients are significant for both total and market risk, once again suggesting a negative influence on firm risk taking. The regression results from the analysis of the Swedish commercial banks are similar to the findings of Houston and James (1995). In their paper they conclude that their results are inconsistent with the moral hazard hypothesis, predicting that increased dependence on variable CEO compensation promotes firm risk taking. The authors also state that this implies that the moral hazard problem in the banking industry may not be that severe.

In the case when existence of option based incentive program for the financial sector is analyzed similar results to those for the proportion variable is found, a small negative effect. However, in the case when the presence of option based incentive programs are regressed, the option dummy coefficients are insignificant for all the examined measures of bank risk taking. This means that we cannot really conclude anything from these regression results. A graphical summary of the regression results obtained in the earlier chapters can be seen in figure 3 and this figure specifies both when a significant regression coefficient has been detected and also the sign of the compensation variable´s influence on firm risk taking.

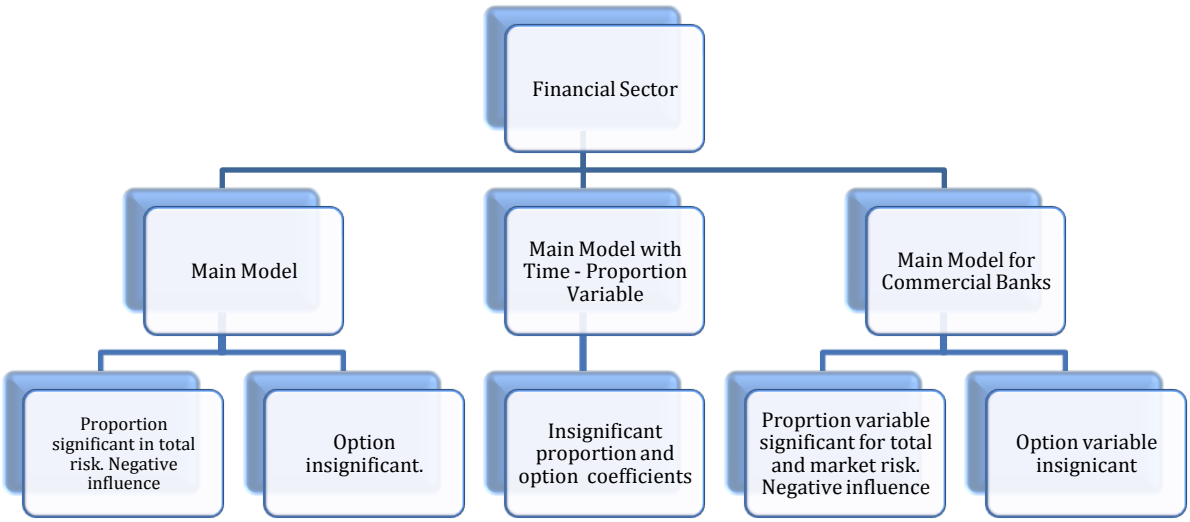


**Figure 3: Overview regression results for the financial sector**

When analyzing the results from the industrial sector, the coefficients are insignificant for all risk measures and CEO compensation structure variables examined. The reason for these results might be summarized by two reasons; firstly the sample used for the industrial sector contains only 99 observations which should be considered as rather small. Secondly, as we have mentioned earlier, the regression model used in this study is primarily constructed to enable an analysis the financial sector.

As discussed above, the regression results from the investigation of the existence of an option based incentive program, shows insignificant results for both the investigated business sectors. One strong reason for this is the difficulties in measuring stock option based CEO compensation accurately. Limited to only publicly available information reveled by company annual reports, we are not able perform a sensible valuation of the CEO option programs, and this deficiency becomes clear when looking at the obtained results. One possible way of improving the empirical analysis would therefore be to regress measures of firm risk taking against the value of the CEO option programs, given that sufficient data were available. When looking at earlier studies in the area of CEO compensation it can be concluded that stock option-based CEO compensation and managerial stock ownership have been the main focus of many earlier studies, for instance; Saunders, Strock, and Travlos (1990) and Chen, Steiner, and Whyte (2005). In the article by Chen, Steiner, and Whyte (2005) it is stated that managerial stock option based wealth induce risk taking, and as a result

the authors implicitly conclude that the CEO compensation practices are structured promote risk taking. The inability to value the option-based CEO compensation programs in this thesis makes it impossible for us to investigate whether or not this also holds for the usage of stock option based CEO compensation in the Swedish market.

Worth nothing is that the all the regression models used in our empirical analysis are significant, consistently trough all regression results regarding the financial sector as well as the industrial sector, which signals trustworthiness of our model specification. Another thing worth mentioning related to our regression models is that the year dummy variables capturing the overall state of the Swedish economy appear to be highly significant for several of the years included in all regression models. This strongly indicates that the fluctuations in the overall economy are the best explanatory variable for explaining the risk taking behavior of firms in the investigated industries, at least when firm risk taking is approximated by stock market based measures of risk.

The results do also rely heavily on how trusted the efficient market hypothesis can be, since one has to assume that all relevant company information is reflected in the market stock prices, otherwise stock market based measures of risk would not work particularly well for approximating firm risk taking. On the other hand, the efficient market hypothesis suggests that information regarding the company should be efficiently reflected in the market price of the stock. If the efficient market hypothesis is heavily trustworthy, we could not expect the CEO compensation structure to alter the stock market price, and therefore not the stock price volatility, unless it has direct implications for the fundamental value of the firm.

## 7.3 Discussion of Regression Model

In this paper different types of the regular factor model is used, worth remembering is that when using this kind of method it is always easy to fail on the factor that is not included in the model. Another important aspect when evaluating the model is the accuracy of the factors included; do they measure the thing you want to control for? Poorly measured control factors would lead to biased results. Garen (1994) argues that the empirical literature on executive compensation generally fails to specify a model on which hypotheses can be based and tested. In order to respond to potential critique regarding our regression model, we are clearly aware of that our model may

suffer from omitted variable bias. This can be argued since our regression model does not contain potentially important variables for explaining firm risk taking like for instance growth and investment opportunities, which according to earlier studies may play an important role for the compensation policies. (Demsetz and Lehn, 1985; Smith and Watts, 1992) The lack of suitability of the regression model for analyzing industrial firms is clearly also troublesome, but we still do not want to use two different model specifications for analyzing the different sectors, because in that case we believe it would be hard to compare the results between industries. In this case the lack of sufficient data has been the main reason for not being able to control fort the growth possibilities in an unbiased way.

# 8 Conclusions

Regarding the question stated in the beginning of the thesis if the CEO compensation structure in the Swedish financial sector has been structured to promote risk taking during the past decade, we find no evidence consistent with that the aggregate compensation structure in the Swedish financial sector is designed to encourage excessive risk taking. With background of this study we therefore find little or no evidence in favor of the sharp critique that recently has been posed against the CEO compensation practices used in the financial industry. It is however important to understand that this does not rule out the possibility that the critique still might be justified, but in that case for some other reason than what has been studied in this thesis.

By studying descriptive statistics we are able to conclude that the design of the compensation packages is different in the two sectors, the proportion of the total CEO compensation that is variable has increased during the examined years, and in the same time the use of option based incentive programs has decreased in both the investigated business sectors. Furthermore, we are also able to conclude that the total compensation is higher and option based incentive programs are significantly more frequently used in the Swedish industrial sector compared to the financial sector.

When the four Swedish commercial banks in our investigation sample are analyzed separately the results are similar to those of Houston and James (1995), namely that the CEO compensation practices in the banking industry are not structured to promote bank risk taking.

In general, our main conclusion is that there is no strong observable relationship between market-based measures of risk and the structure of CEO compensation, especially not in the industrial sector. Nevertheless, for the financial investigation sample we find weak evidence in support the contracting hypothesis, suggesting that an increase in the variable CEO compensation has a negative influence on the risk taking of the firm. Instead the fluctuations in the overall economy seem to play a more important role for explaining the actual firm risk taking behavior, when using market-based risk measures as approximations for firm risk taking.

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# Appendix I

List of firms used in the financial sector

| |
|---|
| Bure Equity |
| Swedbank A |
| Geveko B |
| Handelsbanken B |
| Havsfrun B |
| Industrivärden C |
| Investor B |
| Kinnevik B |
| Latour B |
| Nordea |
| Ratos B |
| SEB C |
| Svolder B |
| Säki |
| Öresund Investment |

List of firms used in the industrial sector

| |
|---|
| Cardo |
| Haldex |
| Hexagon B |
| Munters |
| Sandvik |
| Scania B |
| Seco tools B |
| SKF B |
| Trelleborg B |
| ÅF B |
| Nibe |

# Appendix II

Valid Instrument Check for Proportion Variable in the Industrial Sector:

| **Industry Sector** | | | | | | |
|---|---|---|---|---|---|---|
| **Proportion** | **Coef.** | **P> I t I** | **Coef.** | **P> I t I** | **Coef.** | **P> I t I** |
| Total Risk | 5.86520 | 0.379 | - | - | - | - |
| Firm Specific Risk | - | - | .32209 | 0.959 | - | - |
| Market Risk | - | - | - | - | .11049 | 0.268 |
| Size | .06440 | 0.346 | .09773 | 0.133 | .07581 | 0.185 |
| Trading Frequency | 3.70247 | 0.732 | 5.24055 | 0.638 | 5.13911 | 0.656 |
| Capital Ratio | .79370 | 0.003 | .77181 | 0.005 | .77162 | 0.004 |
| Year 2001 | -.01238 | 0.880 | -.02416 | 0.782 | -.03639 | 0.643 |
| Year 2002 | .01689 | 0.820 | .01130 | 0.888 | -.01552 | 0.816 |
| Year 2003 | -.03316 | 0.733 | -.06348 | 0.526 | -.09121 | 0.231 |
| Year 2004 | .04221 | 0.686 | -.01177 | 0.912 | -.05054 | 0.438 |
| Year 2005 | .08157 | 0.472 | .02202 | 0.844 | -.02439 | 0.727 |
| Year 2006 | .08473 | 0.312 | .06582 | 0.467 | -.00366 | 0.964 |
| Year 2007 | 0.13263 | 0.157 | .10790 | 0.301 | .04112 | 0.639 |
| Year 2008 | .04510 | 0.657 | .07654 | 0.493 | .02599 | 0.801 |
| Constant | -1.60123 | 0.111 | -1.99045 | 0.043 | -1.66930 | 0.073 |
| F(12, 76) | 3.79 | | 3.86 | | 4.02 | |
| P > F | 0.0002 | | 0.0001 | | 0.0001 | |
| Number of Observations | 99 | | | | | |

Valid Instrument Check for Option Variable in the Industrial Sector:

| **Industrial Sector** | | | | | | |
|---|---|---|---|---|---|---|
| **Option** | **Coef.** | **P> I t I** | **Coef.** | **P> I t I** | **Coef.** | **P> I t I** |
| Total Risk | -3.92134 | 0.740 | - | - | - | - |
| Firm Specific Risk | - | - | -1.62377 | 0.892 | - | - |
| Market Risk | - | - | - | - | .05624 | 0.758 |
| Size | .10987 | 0.467 | .09474 | 0.512 | .07451 | 0.563 |
| Trading Frequency | -53.0869 | 0.022 | -53.7675 | 0.020 | -54.2605 | 0.015 |
| Capital Ratio | -.46342 | 0.455 | -.45857 | 0.474 | -.44624 | 0.469 |
| Year 2001 | -.042239 | 0.679 | -.03714 | 0.717 | -.03985 | 0.674 |
| Year 2002 | -.03247 | 0.745 | -.03162 | 0.761 | -.04160 | 0.670 |
| Year 2003 | -.22893 | 0.190 | -.21600 | 0.224 | -.22080 | 0.130 |
| Year 2004 | -.18053 | 0.354 | -.15730 | 0.402 | -.16071 | 0.223 |
| Year 2005 | -.21441 | 0.250 | -.18824 | 0.289 | -.19454 | 0.128 |
| Year 2006 | -.34845 | 0.021 | -.34280 | 0.024 | -.36929 | 0.032 |
| Year 2007 | -.30021 | 0.117 | -.29267 | 0.152 | -.31524 | 0.079 |
| Year 2008 | -.26977 | 0.089 | -.29226 | 0.089 | -.31612 | 0.082 |
| Constant | -.39563 | 0.872 | -.21306 | 0.928 | .048980 | 0.983 |
| F(12, 76) | 2.27 | | 2.31 | | 2.50 | |
| P > F | 0.0159 | | 0.0140 | | 0.0080 | |
| Number of Observations | 99 | | | | | |