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The Swedish CEO pay premium

A comparison between Sweden and the U.S. 2006-2008

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Sammanfattning

Examensarbetets titel: The Swedish CEO pay premium -A comparison between Sweden and the U.S. 2006-2008

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Handledare: Assoc. Prof. Göran Anderson och Prof. Lars Oxelheim

Nyckelord: Vd-ersättning, ersättningssammansättning, internationell jämförelse

Syfte: Syftet med uppsatsen är att undersöka om Svenska vd:ar är underbetalda relativt de Amerikanska.

Metod: Metoderna som används i uppsatsen är regressionsanalys och statistiska tester.

Empiri: Data består av ersättnings och företagsspecifik information från företagen på S & P 500 listan och Svenska företag listade på Large och Mid-cap på Stockholm Nasdaq-OMX börsen.

Resultat: En rättfram jämförelse mellan ersättningsnivå i de Amerikanska och Svenska företagen visar att de Amerikanska vd:arna har en betydligt högre ersättningsnivå än den Svenska. Detta resultat består även om man justerar för olikheter mellan företagen i länderna så som storlek, prestanda, industrisammansättning och internationalisering. Om man även tar hänsyn till ersättningens sammansättning ändras resultatet och visar på en procent till förmån för Svenska vd:ar. Skillnaden är dock statistiskt insignifikant, varför ersättningsnivåerna skall betraktas som lika.

Abstract

Title: The Swedish CEO pay premium –A comparison between Sweden and the U.S. 2006-2008

Seminar date: 2010-06-07

Course: FEKP01, Master's Thesis project, 15 ECTS credits

Author: Carl-Johan Åke Rosenberg

Advisors: Assoc. Prof. Göran Anderson and Prof. Lars Oxelheim

Key words: CEO-compensation, pay structure, international comparison

Purpose: The purpose of the thesis is to examine if Swedish CEOs are under paid compared to the American.

Methodology: The methods used in this thesis are regression analysis and statistical tests.

Empirical foundation: The data consists of compensation and company specific data from the companies listed on the S&P 500 and Swedish companies listed on the Large and Mid-cap segments on the Stockholm Nasdaq-OMX stock exchange.

Result: A straightforward comparison between the compensation levels in the American and the Swedish companies shows that the American CEOs receive a considerably higher compensation compared to the Swedish. This result remains after adjusting for differences between the companies in the respective countries such as size, performance, industry composition and internationalization. But the difference in compensation between the countries disappears once controlled for pay composition and shows a one percent pay premium for Swedish CEOs in the period 2006-2008. The difference is statistically insignificant and the compensation levels should be considered equal.

Table of Contents

1. Introduction

In the following chapter the background and motive with the thesis are presented. Further the problematization and purpose with the thesis are discussed. The chapter also includes the delimitations that are made and ends with a thesis disposition.

1.1 Background

Due to the present financial crises the subject of Chief Executive Officer, CEO, compensation has been a hot topic in both media as well as the financial society. The debate in media and among ordinary people has also increased pressure on intervention by the authorities and legislation. In specific the compensation of Swedish CEOs has been a widely discussed topic in the media in recent years. It has been suggested in the media that Swedish CEOs are under paid when compared internationally [Lejsved 2008, Hallvarsson & Halvarsson 2009]. However these "studies" made by consultant agencies are typically based on small sample sizes with few references and little discussion of the models used.

Although the research literature on executive compensation is extensive, Murphy [1999] gives an excellent survey, few international studies have been made to compare compensation between countries. This is mainly due to the difficulties arising because of differences in regulations of disclosure. While the U.S. has required detailed disclosure on executive compensation since the 1930s, other countries have historically typically only required disclosure of cash compensation for the top-management team [Fernandes, Ferreira, Matos and Murphy 2009].

Statistical studies of CEO compensation between countries have historically been conducted by large private compensation consulting firms. But it is not until the work by Abowd and Bognanno [1995] that made a comparison between 12 OECD countries including Sweden which caused the research interest of the subject to rise. Their work using data taken from Tower Perrin during the time period 1984-92 establishes that American CEOs do earn more than CEOs of comparably sized companies in other countries. They also establish that pay composition differs between the countries. International comparisons of CEO compensation between the U.S. and U.K. has also been done by [Martin, Core and Guay 2009] which find that U.S. CEOs receive higher pay, but also bear much higher stock and option incentives. A broader account of differences in pay-structure for 36 non-U.S. countries using data in the period 1996-2004 can be found in [Bryan, Nash and Patel 2006]. Their study further establishes the fact that equity-based compensation is a large part of compensation in the Anglo Saxon countries, Australia 43%, England 37%, U.S. 54 % and low in the Nordics whereof Sweden 4% (Denmark has only 8 observations and Norway 7 and Finland only 27 but they have about the same level as Sweden).

The disclosure situation has improved in recent years and in 2004 the European Union (EU) Commission recommended that all listed companies in the report details on individual compensation packages, including equity and option grants. Similar disclosure requirements were adopted in a variety of other countries in Asia and Africa Ibid.

In 2009 Fernandes et al. makes a significant contribution to the research literature using a large dataset and comparing the compensation between 27 countries in the year 2006. This work shows that adjusting for differences between countries such as size, industry and performance U.S. CEOs receive a statistically significant pay premium. However in addition to the other factors adjusting for differences in pay structure between countries reduces/eliminates the pay premium. Specifically without adjusting for differences in pay structure the U.S. CEOs receive a pay premium of 150% compared to Swedish CEOs whereas adjusting for those differences eliminates this pay premium. Because the differences in pay structure between Sweden and the U.S. are very large it is interesting to know what results would be obtained using a similar model for a more recent time period and another sample.

1.2 Problem formulation

The field of international comparison of executive compensation is a relatively new and unexplored field of study within the research society and there is much work to be done. The work done by [Fernandes et al.] indicates that except for differences in company size, industry composition, performance, the pay structure, i.e. the proportions of different components of pay, is a very important factor for explaining differences in pay level.

Earlier research [Ibid.] has considered different variables to explain the pay gap, but their work leaves several questions that need to be addressed unanswered:

> *Are the results for Sweden and the U.S. consistent over the most recent time period 2006-2008?*
>
> *To what extent is the comparison affected by the sample choice, i.e. will similar results be obtained for a different sample?*
>
> *How does the model specification affect the results of the comparison?*

Further being a preprint from a statistical point of view their work [Fernandes et al.] contains limitations in that their sample is very uneven with very few observations in for example Israel with only 10, Denmark 8, Finland 24 and a lot in U.S. 1285 and the U.K 1077 . Another issue that is not addressed is the potential endogeneity in Tobin's Q.

1.4 Delimitations

The current work is unfunded and has a rather strict time-schedule which implies that the often time consuming process of data gathering must be considered carefully. On the one hand it is important to have as much data as possible to allow for both generality and depth and on the other there is the cost of data gathering. With access to databases like ExecuComp and or Boardex the data gathering process could be made much more efficient and allow for longer time series. As this was not readily available at the time of the writing of the thesis the data had to be collected manually from publicly available sources. A work that proved both tedious and time consuming as the data reported was not standardized.

The constraints in terms of data access limits the period to the years 2006-2008. The model used is intentionally kept simple in that the focus is on providing an intuitive description with a minimum of variables and degrees of freedom.

1.5 Purpose

The purpose of this thesis is to examine differences in the level of CEO compensation in Sweden and the U.S. A similar comparison involving more countries can be found in [Fernandes et al.]. However this work differs from the formerly mentioned in that a different sample is examined for a different time period. Further this work uses fewer variables and focuses more on the functional form than on including as many variables as possible.

1.6 Disposition

The thesis is divided into seven chapters followed by references and an appendix (containing detailed sample information, variable definitions and regression results). The chapters are divided accordingly to:

1. **Introduction:** Containing problematization and purpose.

2. **Method:** Description and arguments for the selected method from the problematization and purpose.

3. **Theory:** Presentation of theoretical frame of reference to be used in order to analyze the data and to draw conclusions.

4. **Empirics:** Presentation of the collected data.

5. **Analysis:** Examination of the theory using the theoretical frame of reference.

6. **Results discussion:** Synthesis between analysis and problem formulation as presented in the introductory chapter.

7. **Conclusion:** What can be learnt from the current work and suggestions for future research are presented.

2. Methodology

In this chapter the method of answering the questions in the problematization will be discussed. Further the selection of the study object and empirics will be elaborated upon.

2.1 Selection of study object

In making comparisons it is very important to carefully select and make adjustments in order to avoid ending up drawing conclusions from a comparison between apples and oranges. In the current work the purpose demands a careful selection of the study objects i.e. companies in the countries. There are two opposing forces in the data collecting process: First it is good to have as much data as possible in order to draw general conclusions and second there is a cost incurred, in terms of time, for every data point collected. The two opposing forces present imply that there exists an optimum.

There are several imaginable approaches for constructing comparable selections of companies: We could use a random sample from the American and Swedish listed companies which would have the advantage that the results could be generalized. But two important drawbacks exist with this approach. When taking a random sample the results can be biased i.e. not representative for the sample, and also this approach does not have an intuitive interpretation compared to a known sample. Another alternative would be to take the Swedish companies as a starting point and then matching them with comparable American companies in terms of characteristics such as industry and sales. But this approach has the disadvantage of not being representative for the American market and it would also create practical difficulties in the process and what criteria should be used? Sales, industry, performance, all or what?

Also taking into consideration that this is a thesis with limited resources in terms of time and money, the choice was made to take the largest well known listed companies. In the U.S. the companies listed on the S&P 500 were chosen as representative for large American corporations. The Swedish equivalent to the S&P 500 was taken as the corporations listed in the Large and Mid-cap segments on the Nasdaq-OMX Stockholm stock exchange. The companies listed on the small cap list were excluded since these companies are very small compared to the American. This approach has the benefit of being intuitive and fairly simple, but has the main drawback of not allowing for as general conclusions to be drawn.

2.2 Data collection

The listings of the companies on the S&P 500 where obtained from Standard and Poor. The compensation data for each executive was then obtained by matching the stock-ticker with the companies registered in the SEC's (Securities and Exchange Commission) database EDGAR[1]. In cases when the stock-ticker didn't match any company the name of the company was used and if still no match was obtained the company was excluded. The main data source is the summary compensation table that can be found in the definitive proxy statement 14.

For the Swedish companies there is no central free to use database containing detailed compensation data so the data had to be collected from annual reports. Sometimes there were a corresponding summary compensation table, but in some cases rather tedious detective work was necessary.

The company specific data was obtained from Datastream using lists of ISIN numbers in Datastream and then matched to each company. After the automatic matching procedure the data was manually checked and in some cases supplemented where errors ("missing data") had occurred.

Before the analysis the data was checked for consistency and outliers. The data has also been filtered in several stages in Excel to remove error codes such as "missing data".

2.3 Model

The method of regression analysis is the main method used. This method allows for convenient analysis as the methods have been highly developed and allows for the machinery of applied statistics to be utilized. However as the method asserts quite a few assumptions, a

[1] http://www.sec.gov/edgar.shtml

special section is devoted to examine if these are fulfilled. The chosen method ordinary least square, OLS, regression analysis is performed in EViews 7.0. Earlier studies by [Fernandes, Oxelheim, Wihlborg and Zhang 2009] have also used the method of regression. For testing hypotheses and making statistical inference t-tests which are suitable when the hypotheses only have one coefficient are used.

As the model/theory developed in this thesis has evolved rather than being static a short outline of the scientific method, as stated by one of the greatest minds and Nobel laureate in the 2000-century Richard P. Feynman on how to look for a new law is included:

1) First we guess it
2) Then we compute the consequences to see what it would imply
3) Then we compare the computation results with nature, experiment and or experience

If it disagrees with experiment, it is wrong, that simple statement is the key to science.[2]

The method or approach is listed here because the reasoning will be utilized in developing a new law. It is my sincere belief that it is more valuable to the reader to show the process on how to look for a new law rather than to display some "sleek moves".

2.4 Validity, Reliability and Replicability

2.4.1 Validity

Validity can be defined as the strength of the conclusions, inferences and propositions made. It is common to divide validity into internal validity and external validity. Internal validity is about causality i.e. if we say that x causes y, can we be sure that it is really x that causes y and that it is not some other factor that gives a false cause and effect relationship [Bryman and Bell 2003]. In order to have internal validity it is thus important how the independent variables are chosen. The independent variables used in this thesis are carefully selected based on prior research and underlying economic theory, which should give high internal validity.

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[2] Feynman R. P. "*The key to science*" available on YouTube.

With external validity is meant to what degree the results from this study can be generalized. In quantitative research it is common to construct a representative sample to examine and then generalize the results on the whole population [Bryman et al. 2003]. In this thesis the purpose is to measure something rather specific, for a fixed sample and the results cannot be generalized as a rather specific sample is used rather than a representative sample.

2.4.2 Reliability

In order for this study to be reliable, i.e. if repeated in the same way it should give the same result, the study must have been conducted in a serious way. To insure correctness and consistency in the data collecting process the data has been thoroughly examined by taking samples.

2.4.2 Replicability

The difference between replicability and reliability is that the same result should be obtained even if the study is performed by another researcher/research group. To ensure replicability the method used is documented in sufficient detail to allow for the study to be repeated, moreover the data is available upon contact with the author.

As research in this area has been conducted by other researchers a discussion of findings relative to others will also be included. If there should be any significant deviations it is important to understand, why, for it to be considered serious.

2.5 Source critique

A statistical analysis never becomes better than its sources. The compensation data has been gathered through the use of the EDGAR-database which is hosted by SEC and is considered to be accurate. The Swedish compensation data has been gathered from annual reports which sometimes contain inconsistencies between different years. In that case the numbers reported in the latest annual report have been used. Company specific data has been obtained from Datastream, which also is used throughout by other researchers.

The articles referenced to are unless indicated otherwise collected from peers reviewed journals and should therefore be correct. Also pre-published articles from SSRN have been used as references. The idea with pre-publishing is to get more ideas and input from other researchers before a final publication is made. Although not peers reviewed pre-published work can be used to show interest in a field, and also considering that no serious researcher would put their reputation on the line by publishing something that is wrong the sources used in this thesis can be considered quality issue.

3. Theory

In this chapter earlier research is reviewed and relevant theories that will be used in the analysis section will be presented. The purpose of the chapter is to build a framework to understand and build first hypotheses that can be tested and if needed revised.

3.1 Agent theory

The principal –agent problem or agency dilemma treats the difficulties that arise under conditions of incomplete and asymmetric information when someone, the principal, hires another, the agent, to pursue the interests of the former [Berle and Means 1932 – Jensen and Meckling 1976]. A classical example of the principal-agent problem is aligning the interest between shareholders, the principal, of a publicly owned corporation and the corporation's CEO, the agent. Shareholders want CEOs to take particular actions that maximize shareholder value, for example deciding which projects to pursue and which to drop. But the shareholders do not have complete information regarding the firm's activities and opportunities implying that they cannot design and enforce a contract specifying the managerial action to be taken in each situation. Assuming that both parties are utility maximizers it is likely that the agent will not always act in the best interest of the principal [Jensen et al. 1976]. Agent theory then suggests that by providing incentives i.e., compensation, CEOs interest can be aligned with the interest of the shareholders.

When designing incentive systems it is important to recognize that the CEO only compares his private gain and cost from pursuing a particular activity. Optimal compensation contracts must reflect the trade-off between the goals of providing efficient risk sharing and providing the CEO with incentives to take appropriate actions [Murphy 1999].

3.2 Compensation systems

To increase the probability that the organization will achieve its goals management control systems that influence employee behavior in desirable ways are constructed [Merchant and Van der Stede 2007].

Designing satisfactory incentive/compensation systems is a rather complex task involving several components of fixed and variable pay. The field of CEO compensation components have been extensively covered [Murphy 1999 and Jensen 2004]. But there is still much debate on how to design a good system. Bruno Frey [Frey and Osterloh 2005] argues that it is best to pay managers a fixed salary to avoid dysfunctional behavior. Further Dittmann and Maug [2007] argue that it is possible to reduce compensation costs while providing the same incentives and same utility for the CEO by optimizing the compensation contract.

Compensation systems often involve different components each having its advantages and drawbacks and these will be discussed briefly below. The material is mostly collected from Murphy 1999 as this paper contains a broad survey of the area.

3.2.1 Salary

Base salary is a key component of executive compensation. It is independent of performance and typically increases each year. This implies that a risk averse executive will prefer a dollar increase in base salary to a dollar increase in variable compensation [Murphy 1999]. Other components of compensation such as target bonuses, option grants, are also typically measured relative to base salary levels.

Base salaries are generally determined through competitive benchmarking based on general industry salary surveys. The results are typically adjusted for company size, by grouping companies or by regression with respect to company revenues. The process of setting base salary reinforces the relation between compensation and company size [Ibid.].

3.2.2 Bonus

Bonus is cash compensation paid annually to top executives based on a single year's performance [Ibid.]. Bonus schemes appear both as formula based and discretionary. Formula based bonus is sometimes based directly on profit, tantiem, or some other indirect measure based on accounting or stock price. Discretionary bonus also exists and is based on a subjective appraisal of the CEO’s performance.

Executive bonus systems are typically designed so that no bonus is paid until a performance hurdle is reached, commonly 80% of a budgeted target i.e. profits, sales, outputs etc. If the manager's performance exceeds this hurdle, a bonus is received. The bonus increases with performance until the bonus is capped at some maximum level 120% of target is commonly used [Jensen 2001].

An important drawback with the kinks in the bonus payout line is that it encourages game play, and manipulation of the accounting measures to increase the bonus payout [Ibid.].

3.2.3 Stock options

Stock options are contracts which give the recipient the right to buy a share of stock at a pre-specified exercise price for a pre-specified term. Stock options unlike salary and bonus provide a direct link between managerial rewards and share-price appreciation. Executive option grants are typically surrounded with conditions regarding non-transferability and vesting [Murphy 1999].

Applications of executive stock options require placing a value on the options as of the grant date. Murphy argues that it is important to distinguish between the cost to the company granting the option and the value to an executive from receiving the option.

The company's opportunity cost of an option grant is appropriately measured as the amount and outside investor would pay for the option. The outside investor is generally free to trade or sell the option, and can also take actions to hedge away the risk of the option [Ibid.]. Under these conditions risk-neutrality which forms the basis for the modern option pricing theory can be assumed and a value obtained.

In contrast to outside investors stock options granted to company executives are restricted in that they cannot be sold, traded, and executives are also forbidden from hedging the risks by short-selling company stock. For these reason, company executives will generally place a much lower value on company stock options than would an outside investors [Ibid.].

3.2.4 Restricted stock

Restricted stock grants is a grant valued in terms of a company stock, but company stock is not issued at the time of the grant but when the recipient satisfies the vesting requirement. This implies that under certain conditions the shares are forfeited [Murphy 1999].

3.2.5 Long-term incentive plans

Many companies in addition to bonus plans offer Long-Term Incentive Plans, LTIPs, based on rolling-averages of performance. The structure of the typical long-term incentive plans is similar to that of annual bonus plans [Ibid.]. The LTIPs have the advantage of being somewhat harder to manipulate than the annual bonus plans.

3.2.6 Retirement plans and other benefits

In addition to salary, bonus, and equity based incentives top executives routinely participate in supplemental retirement plans for which it is hard to determine the value from the outside [Murphy 1999]. Most compensation packages also include benefits/perquisites, such as health insurance, country club memberships and private use of company jets.

3.2.7 The value of compensation as perceived by CEOs

It is important when discussing executive compensation to distinguish the cost for the shareholders giving compensation and the value of the compensation as perceived by the CEO. The reason for the discrepancy is that most people including CEOs are risk averse, i.e. they are willing to pay for reducing their risk exposure. Specifically this means that there exists a hierarchy between the values of the different pay components as perceived by the CEO. Typically base salary, retirement plans and benefits are unaffected by performance and the cost to the shareholders is equal to the value of the CEO. For the other components i.e.

bonus, LTIP, restricted stock and stock options the value as perceived by a risk averse CEO is lower than the cost to the shareholder. Thus the pay structure is significant for the value to the CEO of the compensation package.

The discrepancy between cost and value especially for stock options has been studied by several researchers [Lambert, Larcker and Verrecchia 1991, Meulbroek 2001, Hall and Murphy 2002] and alternative models have been suggested. These models demonstrates that the value as perceived by the CEOs drops by an increasing risk aversion coefficient and the more of his wealth that is to tied to the firm's stock price.

Abowd and Kaplan (1999) discuss the difference between the company cost and the value as perceived by the executives. One measure that has been used to quantify this risk measure of the compensating differential is the elasticity of total compensation with respect to the stock price. Using data from the 1980s shows that for every 1 percent increase in the compensation risk measure, expected total compensation is 1,8% larger. Hall [1998] has a more updated data material and argues that the elasticity has tripled from 1,2 to 3,9 from 1980 to 1994 due to an increase in the use of incentives in terms of stocks and options.

3.3 Regression model

The research literature on executive compensation is extensive and there exist a number of different models and approaches that share some common characteristics [Faulkender and Yang 2010, Oxelheim et al., Fernandes et al.]. Fernandes considers a general model for comparing compensation levels in different countries

$$\text{Log}(\textit{Total compensation}_t) = \alpha + \boldsymbol{\beta}_{0t}\,(\textit{Country dummies}_t) + \boldsymbol{\beta}_{1t}\,(\textit{Firm Characteristics}) + \boldsymbol{\beta}_{2t}\,(\textit{Industry dummies}) + \boldsymbol{\beta}_{3t}\,(\textit{Pay Structure}_t) + \boldsymbol{\beta}_{4t}\,(\textit{CEO characteristics}) + \varepsilon_t$$

The idea is to regress the logarithm of total compensation on the variable categories firm characteristics, industry dummies, pay structure and CEO characteristics. The pay gap is measured with the coefficient of the intercept $\boldsymbol{\beta}_{0t}$. Including only two countries the country dummy vector is reduced to a U.S. dummy that measures U.S. compensation relative to Sweden. Fernandes examined several variables in each category in order to find the most important ones. Their paper shows that the variable category having the least explanatory power is the CEO characteristics and this will thus be dropped in the current work. Taking the starting point in the general model as displayed above the selected explanatory variables and functional form will be explored in the subsections below.

3.3.1 Variable categories

In this section the choice of relevant variables to include in the model will be discussed.

3.3.1.1Firm characteristics

When comparing differences in executive compensation between Sweden and the U.S. It is reasonable to expect that differences in size between the Swedish and U.S. companies should explain some of the differences in compensation levels. An important reason is that larger firms can hire more qualified and competent managers [Murphy 1999]. This is also reinforced by how basic salaries have been set i.e. by surveys adjusting for size.

With the discussion above on agent theory and the goal with compensation systems it would also be natural to control for differences in performance. There are several choices possible for a variable that measures performance such as return on assets, return on equity and Tobin's Q (measured as market value relative to book value). The idea with using Tobin's Q as a performance variable is that a good CEO should be able to increase the market value of the company's stock relative to the book value.

In the current work Tobin's Q will be used as a performance variable. This choice although for a somewhat different sample has also been made in [Oxelheim 2009]. Introducing an explanatory variable to measure performance such as Tobin's Q introduces a potential simultaneity problem as it is difficult to say whether performance causes high compensation or if it is the other way around. The potential simultaneity problem will be addressed below.

To capture possible affects of international firms having higher compensations, as suggested in Oxelheim and Fernandes, an international sales variable defined as foreign sales over total sales is included. This is motivated by that international can recruit their managers from a different labor pool and also by the more complex operations of international firms.

3.3.1.2 Industry classification

Differences in industry structure could also be expected to be significant as CEO compensation differs between industries. There are a number of different industry classifications being used, with SIC codes, GICS and others [Fernandes 2009]. In the current work a simplified version of the GICS classification will be used. The industry categories are: 1) consumer goods, 2) energy, 3) financials, 4) health care, 5) industrials, 6) information technology and telecommunication services and 7) materials. This classification has previously been used by [Oxelheim 2009] and the conversion is described in the appendix. The reason for using the simplified industry classification is to allow for sufficient generality while ensuring that there are a sufficient number of companies in each category.

3.3.1.3 Pay structure

The last variable category in the model is the pay structure which has been demonstrated [Fernandes] to be a very significant group of variables in explaining differences in executive compensation levels between countries. The main motive for including these variables is that a CEO in the U.S. is paid differently than a CEO in Sweden. These differences are characterized below. The functional form of the pay structure is not known, but a linear is assumed in Ibid. The functional form of the pay structure component will be analyzed more thoroughly in the analysis section.

3.3.2 Macro variables

In addition to firm specific variables like the ones used by Fernandes also country specific variables should have influence. This variable category could be based on the MUST-analysis including the affect of interest level, exchange rate, consumer price index on compensation [Oxelheim and Wihlborg 2008]. Filtering out these effects one would obtain an intrinsic performance based compensation level like the one done in Oxelheim 2009.

The original idea with this thesis was to control for the affects of macro variables, however this tack while initially seeming promising turned out to be impossible with the data available. The reason is that new accounting rules started to apply in the U.S. and Europe 2006 which put a lower limit on data access and an upper limit was the most recent annual reports from 2008. This implied that only three years of data was available and the theoretical minimum for doing this type of study is three years. For a shorter time period the macro variables are perfectly correlated (or a constant). Unfortunately for this short specific time period the macro variables where strongly correlated, it was therefore hard to separate the affects and this approach had to be abandoned for the time being.

3.3.3 Functional form

When constructing an economic model it is always necessary to make assumptions about the functional form [Wooldridge 2002]. Implicit assumptions of linearity in the parameters (coefficients) must be made in order for OLS to be used.

Using the variables in logarithmic form has several appealing properties such as invariance under scaling and change of units. Moreover taking the logarithm narrows the range of the variable, which makes the analysis less sensitive to outlying observations and heteroskedasticity [Wooldridge]. Table 1 one provides the different alternatives when considering using level or log in the economic model.

Model	Dependent variable	Independent variable	Interpretation of β_1
Level-level	y	x	$\Delta y= \beta_1 \Delta x$
Level-log	y	log(x)	$\Delta y= (\beta_1/100)\% \ \Delta x$
log-level	log(y)	x	$\% \ \Delta y=(100\ \beta_1)\ \Delta x$
log-log	log(y)	log(x)	$\% \ \Delta y= \beta_1 \% \Delta x$

Table 1 Summary of functional forms involving logarithms.

Considering the alternatives provided in Table 1, which should we choose? What is reasonable?

We follow the approach suggested by Feynman and referred to above.

The dependent variable in this model is “Total compensation” and one of the key independent variables is size, measured by sales. So let us consider “Total compensation” as a function of sales, should it appear in level-level, level-log, log-level or log-log form? If we assume that level-level is the correct functional form, it would mean that the model given an increase in sales would imply total compensation to increase with β_1 times the change in sales, independent of the level of sales. This clearly disagrees with experience as we would expect say 10 million USD in increased revenue to be more valuable to the shareholders and hence to compensation of the CEO for a company with 5 million USD in sales than a company with 100 billion USD in sales. Thus we may conclude that this functional specification is clearly wrong.

Next assuming that the level-log is the correct functional form which would imply that a given percentage change in sales would imply a proportional change in total compensation. This also would by the same reasoning contradict common sense, experience. Assuming the log-level form which implies a proportional increase in total compensation for a given increase in sales, can also be ruled out. By the exclusion principle and or by repeating the above reasoning it can be concluded that the most relevant model is the log-log model.

The next variable Tobin’s Q also appears in logarithmic form, however here the choice of functional form is not as important since the Tobin’s Q is already a proportion number.

The international sales variable is defined as a proportion number and appears in level form because many companies have zero international sales, which prevents the logarithm being used.

The proportion of incentive pay is used in level form as this is a proportion number, and also contains many zeros. The functional form of incentive pay is unknown but for now it assumed to be linear. This assumption will be scrutinized in the analysis section. Combining the general model with the chosen variables results in the main regression model used

$$Log(Total\ compensation_t) =$$
$$\alpha + \beta_{01t} U.S.dummy_t + \beta_{11t} Log(Sales_t) + \beta_{12_t} Log(Tobin's\ Q_t) +$$
$$\beta_{13_t} International\ sales_t + \sum_{i=1}^{7} \beta_{2it}\ Industry\ dummies_{it} + \beta_{31t} \frac{Incentives}{Total\ \ compensation}$$

where subscript t indicates years.

This model and its implications and modifications will be explored below.

4. Empirics

In this chapter the data is presented. The presentation is divided into compensation data and firm characteristics. The main analysis using the theoretical framework as outlined in chapter three will be presented in chapter five.

4.1 Compensation data

4.1.1 The U.S.

The sample of American companies consists of the companies listed on the S&P 500 market index in the period 2006-2008. Of the potential 1500 observations 1210 had complete compensation data after excluding CEOs serving their first year and disregarding defaults. Matching these 1210 companies with the company specific data in Datastream 1009 remained. In order to avoid data anomalies, outliers, such as Apple and Google which only have a symbolic compensation of 1$ where removed. Likewise one percent of the companies having the highest payouts were removed, as extreme payouts typically resulted from extremely beneficial stock option program payments.

In Figure 1 the average total compensation is displayed over the three year period. It is seen that the compensation levels remain roughly constant with a small decline in 2008, which is due the financial crises. The fixed pay, salary and other pay together is the smallest component compared to incentive pay of which the largest is equity incentive pay. In 2008 the compensation is reduced and it is seen that the fixed pay component remains roughly constant while the non-equity incentive pay is reduced.

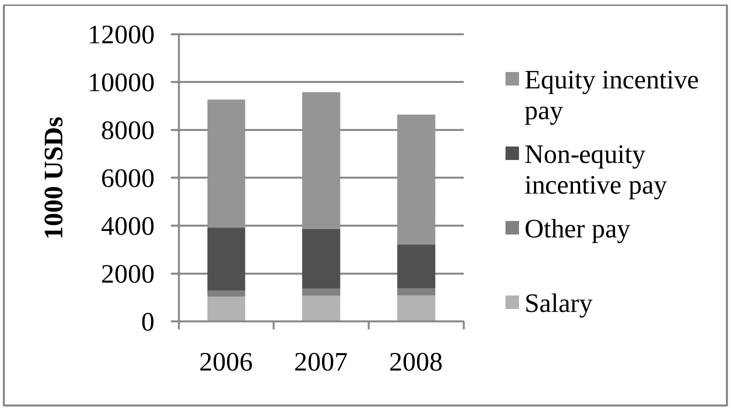

Figure 1 Components of the average annual total compensation in the U.S.

4.1.2 Swedish data

The Swedish compensation data consists of the companies listed on the Nasdaq-OMX Stockholm Large and Mid-cap indexes. The sample has been kept fixed by taking a snapshot of the index in 2007. In the period 2006-2008 there were 318 companies with complete compensation data excluding CEOs serving in the first year. 285 of these companies could be matched with company specific data using Datastream. To make the sample comparable with the American the data was winorized i.e. one percent of the data points in the bottom and top where removed. Figure 2 displays the sample averages of total compensation divided on the pay components. It is seen that the compensation levels are significantly lower than the American, which is as expected. But looking more closely reveals that the pay composition is very different as compared to that in the U.S. The Swedish CEOs receive the largest part of their compensation in fixed pay, salary plus other pay. Then comes the non-equity incentive pay and last the equity incentive pay. It is actually very interesting that the reverse order in terms of pay components holds in Sweden compared to the U.S. A fact that has been established in earlier studies [Abowd et al. 1995, Fernandes]. The pattern that the remuneration increases in 2007 and decreases in 2008 is similar in the countries.

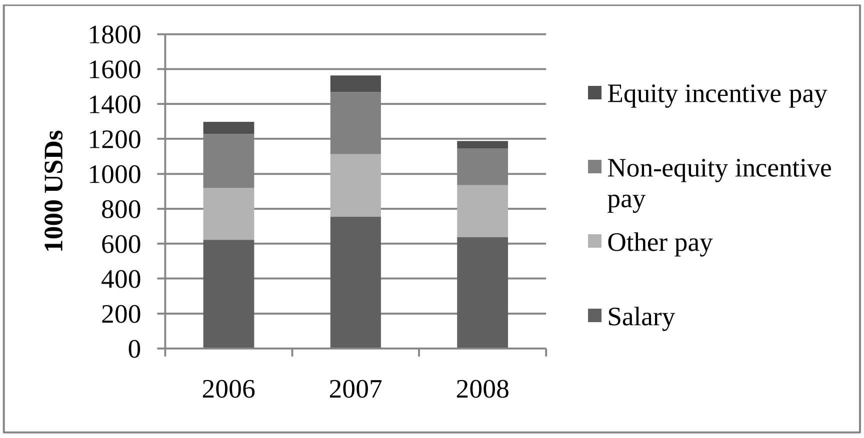

Figure 2 Components of the annual average compensation in Sweden.

A more detailed exposition of the remuneration and the proportion of different pay components can be found in the appendix. The reader should also be aware that that as the results is measured in USD the currency affect is also important. The currency conversion is done the last day of the year independent of the end of the fiscal year for simplicity.

4.2 Company specific data

The company specific data was collected using Datastream. The companies were matched with the company specific data using ISIN-codes. For some companies the names were used to manually match company with the database. The automatic matching was examined and for some especially Swedish companies edited for international sales. The results are displayed in Table 2 below.

It is seen that the American companies are roughly five times as large as the Swedish on the average. The Swedish companies are to a larger extent, roughly a factor of two, more dependent on international sales than the American. It is also interesting to note that the value of Tobin’s Q is more volatile in Sweden compared to the U.S.

Company specific variables	Sales billion $	Tobin' s Q	International sales		Sales billion $	Tobin's Q	International sales
Sweden					**Sample**		
2006	3,418	2,10	0,44		13,8	2,06	0,309
2007	3,63	1,82	0,48		15,8	1,98	0,344
2008	3,90	1,1	0,5		17,3	1,43	0,352
2006-2008	3,64	1,68	0,47		15,7	1,83	0,336
U.S.							
2006	16,974	2,054	0,268				
2007	19,082	2,026	0,307				
2008	20,98	1,53	0,312				
2006-2008	19,06	1,87	0,297				

Table 2 Company specific variables for Sweden the U.S. and the joint sample.

To the right of Table 2 the joint sample averages are displayed. It is seen that including more American than Swedish companies give sample averages that are closer to the American than the Swedish. One possibility would then be to have an equal number of Swedish and American companies but this would require using another sample or taking a random sample. This possibility is explored in the robustness section.

5. Analysis

In this chapter the data material will be analyzed. Before any conclusions can be drawn however it is important to see if the assumptions that form the basis for the regression analysis are fulfilled. After the model, with potential modifications, passes the validity tests the data is analyzed and the chapter ends with a robustness test section.

5.1 Validity tests

5.1.1Linearity

In order to use OLS regression the model must be linear in the parameters. This assumption is fulfilled because of the economic model in equation that is specified.

Model specification errors in terms of omitting a key variable can cause correlation between the error term and some of the explanatory variables, which generally leads to bias and inconsistency in the OLS estimators [Wooldridge]. If the omitted variable is a function of an explanatory variable appearing in the model, the model suffers from functional form misspecification. In the sense that data is already available this problem is not as serious as the case of omitting a variable not appearing in the equation.

To test for functional form misspecification of the included variables Ramsey's regression specification error test RESET is used [Ramsey 1969]. The power of the highest order residuals is somewhat arbitrary but we will use terms up to the third order.

5.1.1.1 Regression model excluding pay structure

First the model excluding pay structure is tested for functional misspecification. The null hypothesis is that the model specification is linear in the regressors and the results are shown in Table 3 **Ramsey's RESET test for functional form misspecification.**

Period	p-value second order	p-value 2-3 orders
2006	0,89	0,7235
2007	0,43	0,11
2008	0,89	0,7585
2006-2008	0,65	0,06

Table 3 Ramsey's RESET test for functional form misspecification.

Given the p-values the null hypothesis cannot be discarded at the 5% level and the relationship is assumed to be linear.

5.1.1.2 Regression model including pay structure

Next the model including pay structure is tested for functional misspecification. Assuming pay structure as incentives over total compensation gives the results presented in Table 4 .

Period	p-value second order	p-value 2-3 orders
2006	0,000	0,000
2007	0,000	0,000
2008	0,000	0,000
2006-2008	0,000	0,000

Table 4 Results of Ramsey's RESET test including pay structure.

Because the p-values are very low the null hypotheses are discarded and this implies that the model suffers from functional misspecification. One drawback with the RESET test is that it doesn't tell what is causing the misspecification. A possible remedy is to change the model by adding powers of the explanatory variables too see if this could solve the misspecification issue. As the model without adding the pay structure variables was correctly specified, one could suspect that misspecification is due to the pay structure term.

Introducing the abbreviations Incentives/Total compensation as IOT; Equity incentives/Total as EIOT Non-equity incentives/Total compensation as NEIOT different functional forms can be tested to try and get around the misspecification issue.

The tests are performed by substituting the different functional forms suggested in Table 4 for the pay structure variable category. The data used is for the period 2006-2008 (similar results are obtained for the individual years).

Pay structure functional form specification	Adjusted R^2	Ramsey's F-test 2-3
β_{31a} IOT	0,847	0
β_{31b} IOT+ β_{32b} IOT^2	0,867	0,063
β_{31c} EIOT+ β_{32c} NEIOT	0,849	0
β_{31d} EIOT+ β_{32d} EIOT^2+ β_{33d} NEIOT	0,848	0
β_{31e} EIOT+ β_{32e} EIOT^2+ β_{33e} NEIOT +β_{34e} NEIOT^2	0,849	0
β_{31f} EIOT β_{32f} EIOT^2+ β_{33f} NEIOT β_{34f} NEIOT^2+ β_{35f} EIOT*NEIOT	0,868	0,064

Table 5 Regression results with different functional forms of the pay structure component 2006-2008.

The results displayed in Table 5 provide evidence that there are some nonlinear effects in the explanatory variables. Only model b and model f passes Ramsey's test of misspecification of the independent variables. If model b passes the misspecification test model f should also pass because of the identity

$$IOT \stackrel{\text{def}}{=} EIOT + NEIOT.$$

Although model b and f passes Ramsey's test at the 5% level the results are too close for comfort and we try adding more powers of IOT. The results shown in Table 6 indicate that there is an optimum when adding powers of incentive pay over total compensation i.e. it is larger than one and smaller than four.

Pay structure functional form specification	Adjusted R^2	Ramsey's F-test powers 2-3 [2-4]
β_{31a} IOT	0,85	0 [0]
β_{31b} IOT+ β_{32b} IOT^2	0,87	0,063 [0,11]
β_{31c} IOT+ β_{32c} IOT^2+ β_{33c} IOT^3	0,87	0,1613 [0,12]
β_{31d} IOT+ β_{32d} IOT^2+ β_{33d} IOT^3 +β_{34d} IOT^4	0,87	0,021 [0,033]
β_{31e} IOT+ β_{32e} IOT^2+ β_{33e} IOT^3 +β_{34e} IOT^4+ β_{35e} IOT^5	0,87	0,0046 [0,0104]
β_{31f}IOT+ β_{32f} IOT^2+ β_{33f} IOT^3 +β_{34f} IOT^4 β_{35f} IOT^5+ β_{36f} IOT^6	0,88	0,0177 [0,013]

Table 6 Regressions with different functional forms of the pay structure component 2006-2008.

From a robustness point of view model c is to be preferred. The reader might recognize that adding more powers does not increase the adjusted R-squared, and this is due to that they are strongly correlated. The multicollinearity “issue” will be further addressed below. An alternative tack to addressing the model misspecification is to use a test for omitted variables. EViews has a built in function for testing omitted variables that will be used [EViews 7.0 manual].

The null hypothesis is that the correct functional form doesn’t include the powers IOT^2 and IOT^3. Performing the operation gives p-value of 0 which means that the null hypothesis is discarded in favor for adding these to the model. The next step would then be to use the pay structure with powers up to three and perform the test again with powers four and five. The result is that these hypotheses are rejected at the 5% level.

Using these statistical tests it is suggested that the correct functional specification should include higher order powers of IOT than the first.

The question that then arises is what does this mean, is this some kind of mathematical tricks used to manipulate the results somehow?

When discussing the different pay-components above we have discussed how CEOs are risk averse i.e. they value different types of compensation differently depending on uncertainty or risk exposure. But how is this captured in the model?

We assume that pay structure= β_{31}IOT + β_{32}IOT^2 + β_{33}IOT^3 for simplicity omitting possible higher order terms as suggested by the statistical tests conducted using Ramsey’s and the omitted variable tests. It is simpler to interpret the results by differencing the regression equation leaving out other variables than pay structure we obtain

$$\frac{\Delta Tot.comp.}{Tot.comp.} = [\beta_{31} + 2\,\beta_{32} IOT + 3\beta_{33} IOT\string^2]\Delta IOT$$

What does this model mean? The first term says that a percentage increase in total compensation is proportional to β_{31}. Then we might ask well how does this relate the fact suggested by agency theory that CEOs are risk averse how is this captured by a model including only one term? It means that a CEO receiving more incentive pay over total compensation gets a proportional increase in compensation, but it is independent of the level of compensation. It says that a one percent increase in incentive pay/total equals β_{31} percent increase in compensation. But this is not reasonable from an agent theory perspective, because this theory as outlined above, implies that an increase at a higher level of incentive over total compensation should imply a larger increase in total compensation. From this perspective a one term specification of the pay structure is inadequate. What about the quadratic term is that model specification satisfactory from a risk aversion perspective? This model with a positive β_{32} correctly captures that the increases should become larger as IOT becomes closer to one. But what about the rate of increase given by the derivative of expression within the brackets:

$$\frac{d}{dIOT}[\beta_{31} + 2\,\beta_{32}IOT + 3\beta_{33}IOT\hat{}2] = 2\,\beta_{32} + 6\beta_{33}IOT$$

Is it reasonable that the rate of increase is constant, possibly yes? But it seems more reasonable for it to depend on the level of compensation, so that for higher values of IOT the risk aversity makes the increases in compensation increase rapidly, a nonlinear response. A few examples where the actual betas are calculated in the regression analysis will illustrate the mechanisms in a real example.

Performing the RESET-test with the quadratic and cubical model as suggested above gives the results in Table 7.

Period	p-value second order		p-value 2-3 orders	
	Quadratic	Cubical	Quadratic	Cubical
2006	0,58	0,08	0,23	0,2
2007	0,34	0,94	0,19	0,98
2008	0,98	0,51	0,89	0,15
2006-2008	0,76	0,18	0,06	0,16

Table 7 Results from Ramsey's RESET test including pay structure the right sub columns correspond to the cubical model.

The tests indicate that including higher order terms, the model passes the RESET test for misspecification. As a further test omitted variable tests are performed in EViews [EViews 7.0 manual]. The null hypothesis is that the functional form is correct. The results are displayed in Table 8 and the low p-values means that the null hypotheses should be discarded and that the quadratic and cubical terms should be included.

Period	p-value quadratic	p-value cubical	p-value quadruple
2006	0,000	0,000	0,07
2007	0,000	0,000	0,13
2008	0,000	0,002	0,5
2006-2008	0,000	0,000	0,08

Table 8 P-values for test of omitted variables performed in EViews.

The tests are performed by first including the linear term in the pay-structure and then testing for the correct specification with respect to the quadratic term. The procedure is then repeated by including the quadratic term in the regression equation and testing for an omitted cubical term etc.

Combining the results of the omitted variable test with Ramsey's RESET test the cubical-model is the only one that produces unbiased estimators.

5.1.2 Homoskedasticity

Homoskedasticity means that the variance of the residuals is constant. Homoskedasticity fails whenever the variance of the un-observables changes across the population. Homoskedasticity is needed to justify the usual t-tests, F-tests, and confidence intervals for the OLS estimation [Wooldridge]. Since statistical inference relies on the homoskedasticity assumption this must be checked. This is done by using White's test [Wooldridge]. The null hypothesis is that no heteroskedasticity is present.

5.1.2.1 Regression model excluding pay structure

A separation between the models including firm specific factors and pay structure is made. In Table 9 the results of White's test are displayed. The low p-values indicate that the null hypotheses should be discarded and thus heteroskedasticity is present.

Period	P-values of F-test.
2006	0,003
2007	0,0071
2008	0,32
2006-2008	0,000

Table 9 For p-values under 5% the null hypotheses of homoskedasticity should be discarded.

5.1.2.2 Regression model including pay structure

After the model excluding pay-structure the affects of including this variable category is examined for the linear, quadratic and cubical model as shown in Table 10.

Period	Linear	Quadratic	Cubical
2006	0,0502	0,1305	0,3
2007	0,0000	0,000	0,000
2008	0,0154	0,000	0,000
2006-2008	0,000	0,000	0,000

Table 10 Probability of F-test values for White's test of heteroskedasticity.

P-values below the 5% significance level imply that the hypotheses should be discarded and thus that heteroskedasticity is present.

Heteroskedasticity does not cause the estimators to be biased but it does interfere with statistical inference. One possible remedy is to use White's heteroskedasticity consistent estimators when making the statistical inference [Wooldridge, Gujarati 2004]. This approach is asymptotically correct and can be used for large samples. As our samples are quite large, in the pooled regression 1266 observations, this shouldn't cause too much problems.

That heteroskedasticity is present is not very surprising considering the very wide span of compensation between small Swedish companies compared with large American.

5.1.3 Normality of residuals

The normality condition is used for using statistical inference. For small sample sizes this assumption is crucial in that allows for the use of t, F and Chi-squared test [Gujarati]. As this assumption is imposed it is necessary to check the validity of it. The normality assumption is tested using the Jarque-Bera test [Ibid.], with the null hypothesis being that of a normal distribution.

5.1.3.1 Regression model excluding pay structure

Plotting the residuals from the regression equation excluding pay structure for the pooled data produces the results in Figure 3. It is seen that the distribution is not normal. It is more flat topped, Kurtosis parameter above three, and slightly skewed to the left, minus sign on the skewness parameter.

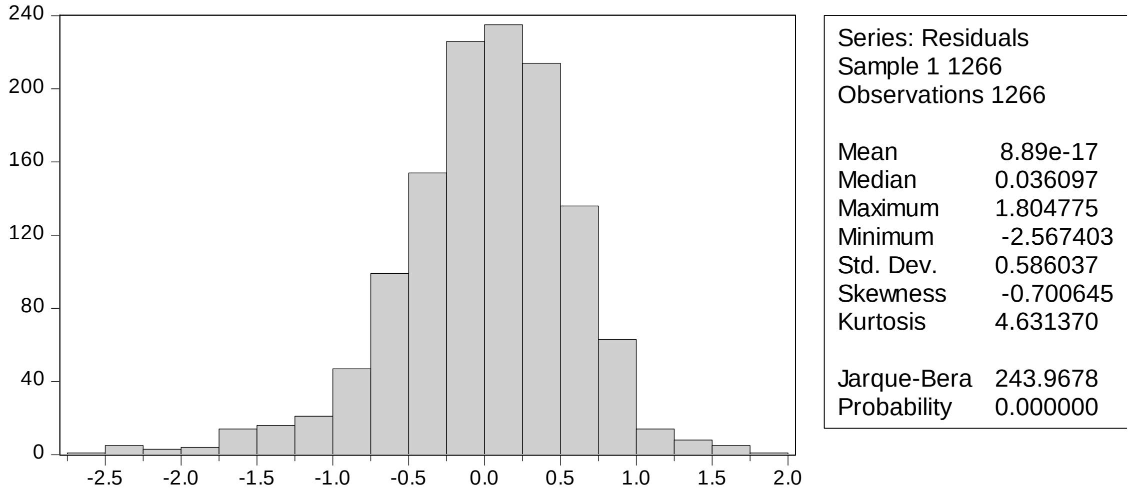

Figure 3 Residual distribution excluding pay structure 2006-2008.

The results for the individual year and pooled regression are displayed in Table 11. It is seen that the pooled data and individual years share the same characteristics.

Period	Jarque-Bera normality p-value	Skewness	Kurtosis
2006	0,000	-0,68	4,2
2007	0,000	-0,76	4,7
2008	0,000	-0,67	4,8
2006-2008	0,000	-0,7	4,6

Table 11 Jarque-Bera test results for the normality assumption.

5.1.3.2 Regression model including pay structure

Including the pay-structure in the regression equation gives the results displayed in Table 12. It is seen that residual distributions are not normally distributed, (except the linear pay structure model in 2006), but increasingly peaked and less skewed compared to the model excluding pay structure.

	Jarque-Bera normality p-value			Skewness			Kurtosis parameter		
2006	0,08	0,00	0,00	-0,2	-0,26	-0,12	3,4	5,0	4,9
2007	0,00	0,00	0,00	0,02	0,17	0,22	4,3	6	5,9
2008	0,00	0,00	0,00	0,05	0,21	0,1	4,6	6,1	5,9
2006-2008	0,00	0,00	0,00	-0,04	0,03	0,06	4,2	5,9	5,8

Table 12 Jarque-Bera test of the normality assumption of residuals including pay-structure. Each main column is divided into three sub-columns corresponding to the three proposed pay-structure models (the linear, the quadratic and the cubical).

In Figure 4 **Residual distribution including firm specific, industry and pay structure using the cubical model.**the residual distribution for the cubical pay structure is shown. The distribution is fairly symmetrical i.e. low skewness, but more peaked than the normal distribution.

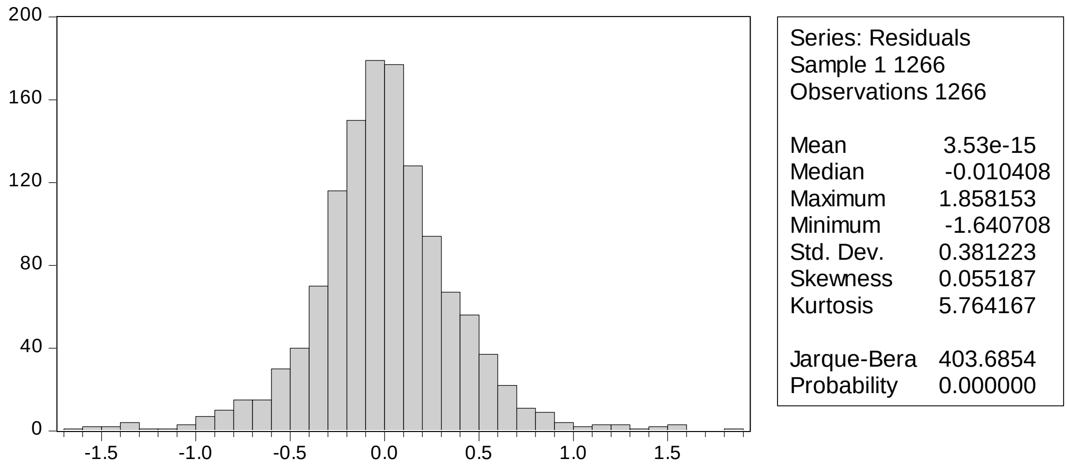

Figure 4 Residual distribution including firm specific, industry and pay structure using the cubical model.

The null hypothesis of normality is discarded on the 5% level. Although the statistical tests indicate that the residual distribution is non-normal using the central limit theorem the distribution should be asymptotically normal and given that our sample size is large the normality assumption can be used as a proxy [Gujarati].

5.1.4 Autocorrelation

Autocorrelation means that the series affect from different time periods. This is only of interest in time series analysis using panel data. In the current work the data is pooled i.e. cross sectional so this is not very important. However a model in the robustness section actually uses time series data, and this has a Durbin-Watson value of 1.5 so there shouldn't be much concern regarding this issue.

5.1.5 Multicollinearity

Multicollinearity means that the explanatory variables are correlated. This causes the variance to increase. Multicollinearity often appears in small sample sizes and can be an indication that more data is necessary [Wooldridge]. To determine if multicollinearity is a "problem" the correlation matrix is computed and displayed in Table 13. The industry dummies are not included in the correlation matrix because they are not relevant due to low correlations.

	LOG(TOTCOMP)	USDUMMY	LOG(SALES)	LOG(TQ)	INT.	IOT	IOT^2	IOT^3
LOG(TOTCOMP)	1,00	0,75	0,73	0,16	-0,07	0,87	0,89	0,88
USDUMMY	0,75	1,00	0,58	0,16	-0,26	0,87	0,84	0,79
LOG(SALES)	0,73	0,58	1,00	0,01	-0,06	0,58	0,57	0,56
LOG(TQ)	0,16	0,16	0,01	1,00	0,20	0,21	0,21	0,21
INT.	-0,07	-0,26	-0,06	0,20	1,00	-0,17	-0,17	-0,15
IOT	0,87	0,87	0,58	0,21	-0,17	1,00	0,98	0,94
IOT^2	0,89	0,84	0,57	0,21	-0,17	0,98	1,00	0,99
IOT^3	0,88	0,79	0,56	0,21	-0,15	0,94	0,99	1,00

Table 13 Correlation coefficients for the powers incentive pay over total IOT (pooled sample 2006-2008). INT. refers to proportion of international sales.

It is seen that correlation between the firm specific variables, U.S. dummy, log(sales) and log (Tobin's Q) doesn't cause any concern. The potential trouble lies in the strong correlation between the dummy variable and the pay structure and its powers. As multicollinearity is key in the current work it can be worthwhile to discuss a few aspects of this common phenomenon.

There are several aspects of multicollinearity. First an important aspect is if the multicollinearity is so severe that it will cause numerical breakdown. In our case this is not so. Second there are the mathematical/statistical properties of introducing collinear regressors. Multicollinearity does not violate any assumptions used in the regression analysis [Wooldridge]. What can be difficult is to determine the contribution of the individual regressors. This is due to the fact that multicollinearity increases the variances of the coefficients, which means that coefficients that are indicated to be, statistically insignificant coefficients can in fact be significant. Multicollinearity can also distort results by reinforcing trends due to some other underlying factor which is a potential danger.

Due to the very high correlation between U.S. dummy which is used to measure the difference between the countries and the key variable IOT, one need to be very careful in order not to draw the wrong conclusions. The logic based on adding powers of IOT is based on that it is not known exactly how IOT influences total compensation, i.e. the functional relationship f(IOT) is unknown. But what is known is that the different powers of IOT have the highest correlation with log(Total Comp.). Moreover IOT is bounded in the interval [0, 1]. It is therefore reasonable to try and capture the influence pay structure, f(IOT), in this interval as closely as possible.

This can be done by a Taylor series expansion, which applied to f(IOT) would include the lowest powers of IOT i.e. IOT, IOT^2 and IOT^3. The coefficients are determined in the regression analysis. The reason that it is very crucial to try and capture the influence of IOT as good as possible, is that the high correlation with U.S. dummy variable gives leverage to small deviations in the expression for IOT. Even if IOT, IOT^2 and IOT^3 are highly correlated, the sum of the variables are a better proxy of how IOT interacts with log(Total Comp.) then any individual term.

Another reason is that the dummy variable is only there to capture effects that cannot be explained by the other variables and it is known that omitting important variables creates potentially severe bias.

5.2 Endogeneity problem

Using Tobin´s Q as a measure of the CEOs performance introduces a potential endogeneity problem i.e. does an increase in Tobin's Q cause a higher compensation or the opposite.

It is suggested by Oxelheim et al. 2009 that macro-variables can be used to address the potential endogeneity problem by using them as instrumental variables. Although they argue that there is no endogeneity problem, using the Hausman test, they have not demonstrated that the macro variables are viable instrumental variables with respect to the over-identification criteria [Wooldridge].

An effort has been made to solve this issue using interest level in the U.S. and the consumer price index with similar definitions as in Oxelheim [2009]. But these variables do not pass the over-identification criteria at the 5% level following the procedure as outlined in Wooldridge. An extensive discussion of the endogeneity problem is given by Larcker and Rusticus [2009]. They argue that it is common for researchers to report the classic Hausman test for endogeneity, but it is very uncommon for these studies to report the over-identifying restriction test that should be conducted before implementing the Hausman test. This implies that it is extremely difficult to assess the validity of instrumental variable applications.

A possible way of addressing the endogeneity issues with CEO compensation is suggested in Palia [2001], using instrumental variables. Unfortunately the variable categories that he uses were not easily available and new data had to be collected to try the suggested procedure.

As the efforts to find an instrumental variable that passes the over-identification criteria has failed instead we have to rely on good faith.

5.3 Analysis results

5.3.1 Regression results excluding pay structure

Before any regression analysis is performed it is necessary to investigate the sample in a straightforward comparison. The details can be found in the appendix. The raw pay premium is computed for the individual years as well as for the whole period. The pay premium is defined as the mean compensation in the U.S. divided by the Swedish minus one. The U.S. compensation is higher for all years and comparing the mean level of compensation U.S. CEOs receive a premium of 614% 2006, 569% year 2007, 627% year 2008 and in the period 2006-2008, 578%.

First we analyze how much can be explained by firm specific and industry variables. The log(Total comp.) is regressed on log(sales), log(Tobin's Q), international sales and industry dummies giving the results in Table 21. It is seen that the U.S. dummy which is used to measure the differences in pay level is reduced to, 2006 1,26, 2007 1,2, 2008 1,51 and on the average 1,32. The pay premium is then obtained in percentage by the relation, pay premium [%]=100*(EXP(U.S. dummy)-1). This would imply the pay premiums displayed in Table 14.

Period	Raw pay premium [%]	Pay premium excluding pay structure [%]
2006	614	252
2007	569	232
2008	627	348
2006-2008	578	274

Table 14 U.S. pay premiums for different years, using regression year wise as well as pooled regression.

It is seen that the raw pay premiums are decreased by more than half. But there are still very significant pay premiums as indicated by the highly significant U.S. dummy variables. The statistically significant variables are: The sales variable, with a positive sign which seems reasonable as a larger company should pay its CEO more, for reasons discussed above. The performance variable Tobin's Q is not significant in any of the individual year regressions but in the pooled regression. The international sales variable is also highly significant in all the years as well as in the pooled regression indicating a statistically significant pay premium to the firms with higher international sales.

5.3.2 Regression results including pay structure

As discussed above the pay structure is a very important variable in comparing countries. The functional form of the pay structure is not known and three models, a linear, a quadratic, and a cubical, will be analyzed and discussed. It is seen in Table 22, Table 23 that including pay structure as a regressor the U.S dummy goes negative in all models. The linear and the quadratic indicate a statistically significant U.S. pay premium, whereas the cubical indicates a small statistically insignificant Swedish pay premium. From the pooled regression it seen in Table 22 that on the average there is no pay premium in the period 2006-2008, but the same pay is received in the countries respectively. In Table 15 the U.S. dummy results are converted to percentage numbers. All models predict a Swedish pay-premium while the cubical model gives the lowest (in absolute numbers). The large sensitivity with respect to the cubical term is explained by multicollinearity being present.

Period	Pay-premium excluding pay-structure [%]	Linear [%]	Quadratic [%]	Cubical [%]
2006	252	-34	-31	-7,6
2007	232	-25	-22	-2
2008	348	-25	-16	4,1
2006-2008	274	-28	-24	-1

Table 15 Pay premiums measured as the U.S. dummy variable, relative to Sweden. A minus sign means that American CEOs are paid less than the Swedish CEOs.

The results obtained are similar to that of Fernandes et al. 2009 but a somewhat larger pay-premium for the Swedish in 2006. This small discrepancy can be understood considering that the method although similar is not exactly the same and the sample is different.

It is worthwhile to investigate the different significant coefficients, log(sales), log(Tobin's Q) and international sales somewhat more closely. This is done to gain intuition and help the reader (and author) to understand what the model actually implies. One way to illustrate this is to consider each factor in the regression equation on its own. First considering the sales variables impact on the total compensation defining the sales factor as

$$Total\ comp. \propto Sales\ factor = sales^{\beta_{11}}$$

Plotting the sales factor as function of sales produces the result in Figure 5.

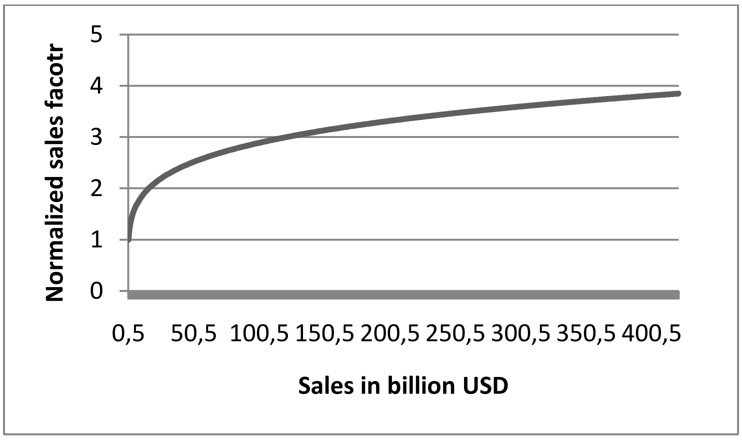

Figure 5: Sales factor as function of sales 2006-2008, normalized so that it begins with one.

It is seen that with β_{11}=0,2 from the regression output using the cubical model, in the beginning the increase in pay is steep but it flattens out. This agrees with intuition as the smallest Swedish companies do not pay as much as the larger Swedish and American firms. For the larger companies the rate of increase declines.

Repeating the procedure for Tobin's Q defining a Tobin's Q factor as

$$Total\ comp. \propto Tobin's\ Q\ factor = e^{\beta_{12}\ Tobin's\ Q}$$

Subtracting one from the Tobin's Q factor the premium is obtained. It is very interesting to note that the sign of the Tobin's Q pay premium depends on if pay structure is included in the model. In the model excluding pay structure the interpretation is increasing Tobin's Q increases compensation, which seems reasonable. When including pay-structure in the regression equation the sign of the coefficient becomes negative. Also the statistical significance of the variable increases once accounted for pay structure. As the sign differs between years and the significance is not as clear as with the others the results are inconclusive regarding this variable. The result for the pooled regression 2006-2008 is displayed in Figure 6 Tobin's Q pay premium as a function of Tobin's Q.

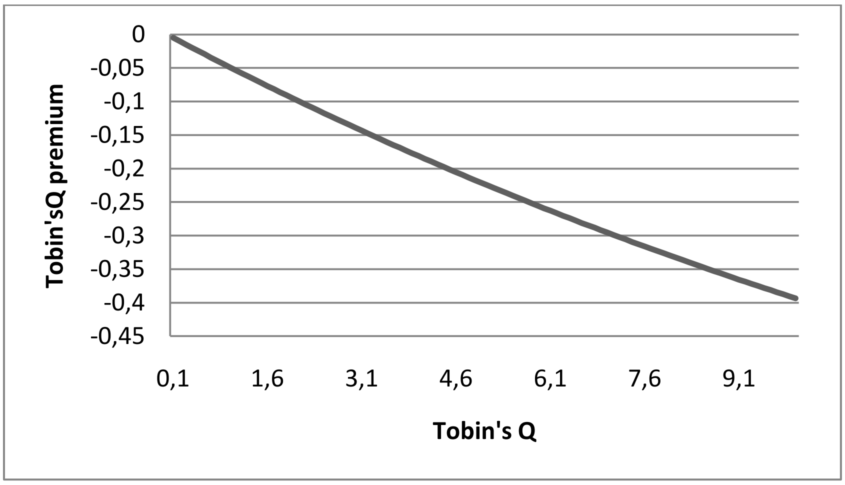

Figure 6 Tobin’s Q pay premium as a function of Tobin’s Q.

The results are not as drastic as it seems considering that only 15% of the companies in the sample have a larger Tobin’s Q than 2,5 implying a decrease in pay of 11%.

For international sales defining a international sales factor as

$$Total\ comp. \propto international\ sales\ factor = e^{\beta_{13}\ international\ \ sales}$$

and further defining a premium by subtracting one from the international sales factor the result in Figure 7 is obtained.

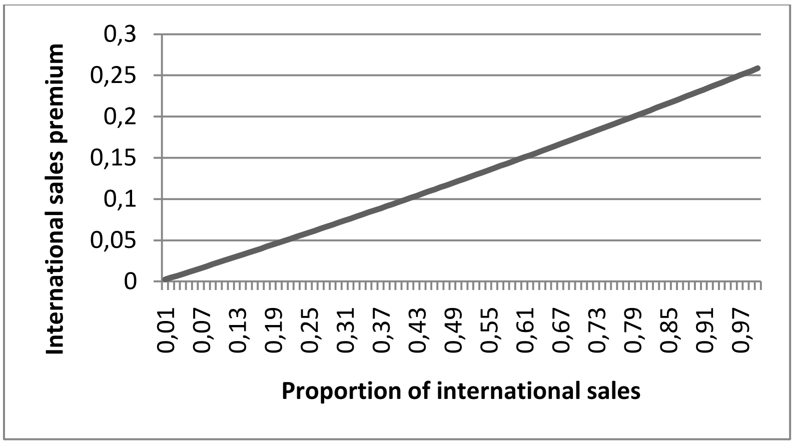

Figure 7 Pay premium as a function of international sales.

It is seen that there is a linear relationship between international sales and the pay premium. The affect is not very large as 50% international sales would correspond to an increase in total compensation of 12,5% but it is statistically significant. As discussed earlier the sign and magnitude of the pay premium seems reasonable as compared to other studies [Oxelheim 2009].

Further as seen in Table 15 the analysis is very sensitive to the correct functional form of the pay-structure and adding the cubical term makes all the difference. This somewhat peculiar phenomenon will be explored below.

The regression results for the pooled data 2006-2008 are shown in Table 22. The difference is the functional form of f(IOT), model I f(IOT)=a IOT, model II f(IOT) = a IOT+b IOT^2, model III f(IOT)=a IOT+ b IOT^2+c IOT^3.

It is seen that the coefficients for all variables except the U.S. dummy and the coefficients for the powers of IOTs are stable in all three models. The main difference is that as the explanatory power of f(IOT) goes up the U.S. dummy goes down (in absolute value) and in model III, which is the most credible for reasons explained above, the difference is statistically insignificant and only one percent.

In model I, a given increase in the ratio of incentives/total gives a fixed increase in pay level. In model II and III the interpretation can be obtained by differencing the regression equation (holding the other variables constant for simplicity)

$$\frac{\Delta Tot.comp.}{Tot.comp.} = [0{,}44 + 2 * 2{,}54\, IOT]\Delta IOT$$

The first term has the same interpretation as model I i.e. a fixed increase. The second term implies that an in increase in total compensation depends on the level of incentive compensation. A higher level of incentives induces a larger increase in total compensation.

For model III the interpretation can be derived similarly

$$\frac{\Delta Tot.comp.}{Tot.comp.} = [3.19 - 2 * 5.67 IOT + 3 * 5.69 IOT\hat{}2]\Delta IOT$$

The interpretation is that the increase is quadratic rather than linear. In Figure 8 the three different models are compared.

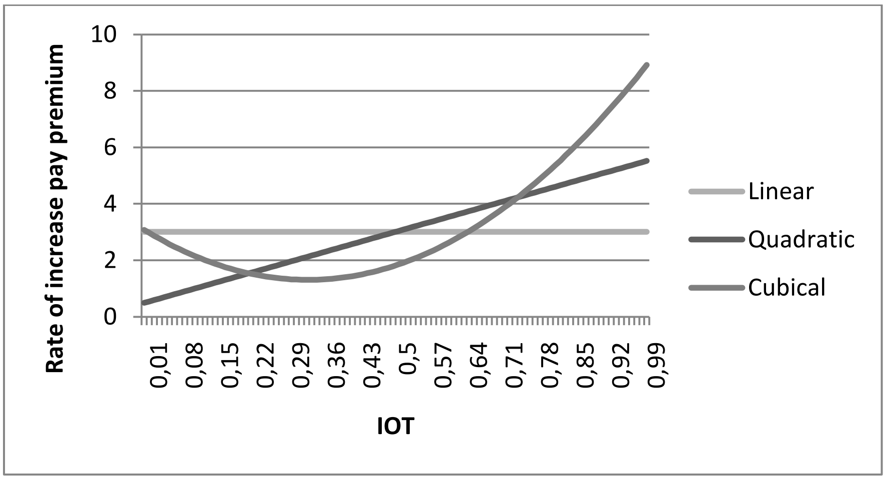

Figure 8 The different models for modeling the pay structure component.

A plausible explanation of the model is that the linear pay structure the CEO does not display a correct specification of risk aversity as it would be expected that an increase in compensation should depend on the level of risk measured as the proportion of incentives over total compensation.

The quadratic form of pay structure on the other hand implies that a depending on the level of incentives over total, which is a measure of the uncertainty in the compensation, that a higher level of risk implies a larger increase in total compensation. This could be seen as a sign of risk aversion and agency theory which suggests that the more risk the CEO anticipates the larger increase in compensation is necessary to compensate for the uncertainty.

The cubical model suggests that in the beginning increasing the level of incentives lowers the increase in total compensation, but when incentives are a larger part of compensation than 33% the derivative increases i.e. the compensation rises and this model is more realistic in that as the closer to IOT gets to one the larger the increase in compensation is.

Defining the incentive pay premium factor as

$$Total\ comp. \propto incentive\ pay\ factor = e^{f(IOT)}$$

The incentive pay premium is then defined by subtracting one from the incentive pay factor received at each level of incentives/total compensation. For example if no incentives are paid f(0)=0 and the incentive pay premium factor=0. If an increase in incentives is received say that the CEO receives 50% of his compensation in terms of incentives, the three models produce very different results as seen in Figure 9.

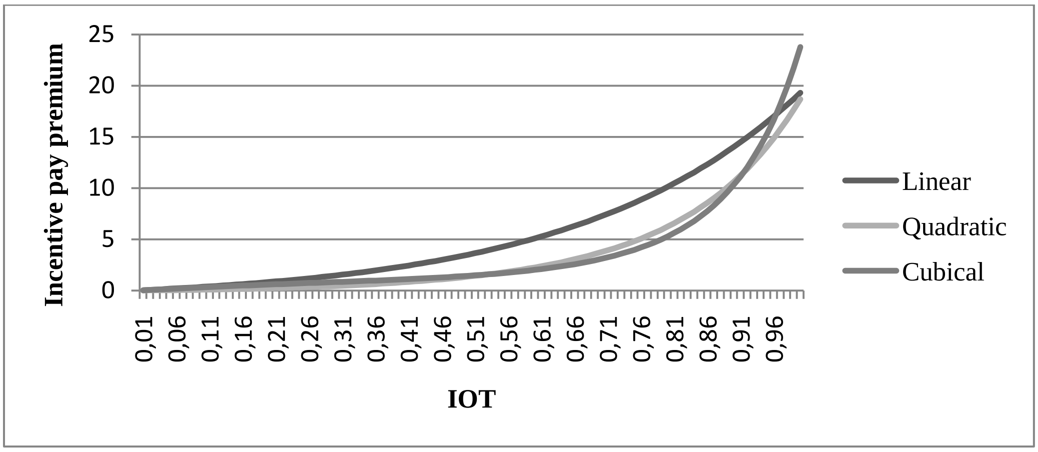

Figure 9 Incentive pay premium as a function of incentives over total compensation.

The linear model gives a pay-premium of approximately 350% whereas the quadratic and the cubical give 130%. Further if the CEO receives 67 % of compensation as incentives the linear model predicts an incentive pay premium factor of 650%, quadratic 280% and cubical 270%. From experience it seems more plausible that say having 50% of total compensation tied to bonus and options giving a pay premium of 130% as suggested by the quadratic and cubical models than 350% as suggested by the linear. As IOT approaches one the cubical model pay-premium passes both the linear and the quadratic.

As this theory has been developed in this thesis, how does it relate to other researchers work?

Hall and Murphy [2002] have developed a theory based on risk aversion and option valuation which predicts that an options value given a risk aversion coefficient of 2 and an executive having 50% of his wealth in company stock be 63,5% of its Black-Scholes value, and given a higher risk aversion coefficient would further decrease its value. Another application of their theory suggests that an executive with a risk aversion coefficient of 3 and 67% of his wealth in stock would be worth 21%. What this demonstrates is that the predictions of this theory are in the "ball park" so to speak i.e. similar results can be obtained through different methods.

As seen in Table 15 the differences between the models of the pay structure lies in the affects captured by U.S. dummy and the pay structure variables. This can be understood in the light of the strong multicollinearity between the dummy variable and the pay structure. The significant variables are sales, international sales, pay structure and the industries consumer goods and health care.

5.4 Robustness checks

An aspect that hasn't been addressed properly is that of how is the results affected by that our sample has a lot more American firms than Swedish. This can be examined by taking a random sample of the American companies, and keep the Swedish to get a different mixture. Obviously taking a sample which includes only the highest paid executives in the U.S. and compare them with the lowest paid in Sweden would alter the results so it is important to keep the sample random, and not skewed. An important point that needs to be emphasized is that by taking a random sample, we not only reduce the number of companies but actually change the mixture to some extent, this is the explanation that not identical results are obtained. But of course if changing the sample would produce very different results that would indeed be worrisome. In practice the random sample can be made in EXCEL by using the RANDOM function to generate a uniformly distributed number between zero and one and take a certain portion of that interval to include along with the Swedish. Another aspect of this is that reducing sample size increases the variance and the assumption of asymptotical normal distribution is weakened.

In Table 24 the results of the regression analysis with 570 observations whereof 279 Swedish and 291 American is displayed. The result is similar but one important difference is that including only the first term in the pay structure actually reduces the pay gap to insignificant. This can be understood by including fewer American firms the weight of the more extreme pay structure is reduced. The cubic regression model also works with all coefficients significant at the one percent level. This model has a higher R-squared and exactly the same value of the pay premium as for the sample with 1266 observations is obtained.

The fact that a sample with equal number of American and Swedish is less sensitive to the functional specification of the pay structure is interesting to explore. Dropping the U.S. dummy the model is applied to the American and Swedish samples. The result for the Swedish sample, displayed in Table 25, is that only the linear model coefficient is significant and adding more terms over-specifies the model. It is seen that including the pay structure increases the R-squared from 56% to 71%. In the Swedish sample 2006-2008 using the pay structure to the first order and testing the hypothesis that the correct functional form should include the next two terms in the series, the hypothesis is clearly rejected with a p-value of 0,66 using the omitted variable test.

For the American sample the results are different as displayed in Table 26. Here the functional form is more important and all the coefficients are larger and terms up to the third order are significant. Testing for omitted variables the null hypothesis is discarded and even a fourth order term is accepted at the 5% significance level.

This is exactly what would be expected by the reasoning above, that, for the Swedish companies with rather low proportion of incentive pay, risk aversion is not an issue hence the model specification is not as sensitive. In the American sample however with high incentive proportion risk aversion is more important and it is therefore of value to try and capture the behavior as good as possible with the cubical specification of the pay-structure. The skeptical reader might then inflict, ok, but this due to the differences in sample size, but that is actually not the case, as the results, have been repeated with a sample size of only 197 observations.

A possible explanation of why it is necessary in the current model to use the Taylor series approach including more powers of incentive as compared to the work done by Fernandes 2009 is that they compare 27 countries and here we only compare two. Moreover the countries that we compare, Sweden and the U.S., are the two countries in Fernandes' study with the largest differences in the use of incentive pay. So that the dummy variable is very strongly correlated with incentive pay/over total pay does not come as a big surprise. In Fernandes' study they have more countries so that the correlation between U.S. dummy variable and larger incentive pay should not be as profound. This makes their analysis not as sensitive to precisely how the incentive pay interacts with total compensation, and it is seen that the high powers are very strongly correlated so that only retaining the first power can be considered a good proxy. In the current work the more exact functional relationship is needed, as there is a high correlation, leverage, which tends to bias or severely distort the results.

The current work is a good demonstration of what false conclusions can be drawn if one decides to disregard failure to Ramsey's RESET test and or omitted variables tests. Without understanding the mechanisms of why the model used in this work differs from the one originally proposed by Fernandes et al. there would be reason for concern.

While these simple statistical tests don’t prove that the theory is correct (which is logically impossible) what it does show is that it cannot simply be dismissed. This fact is the key to the scientific method.

A regression model including time dummies has also been tested and it produces similar results displayed in Table 27. It is seen that while the dummy variable for 2007 is significant the impact is very small and the other coefficients remain unaffected. The reason that this model is not included as the main regression model is because the panel is unbalanced the interpretation of the dummy variables is somewhat unclear, and as it doesn’t add much explanatory power the pooled regression is used.

6. Results discussion

In this chapter we will return to the specific questions formulated in the introductory chapter.

Are the results for Sweden and the U.S. consistent over the most recent time period 2006-2008?

Although the sample used is not a well balanced panel because of that the sample for each year is quite large, the random error should be fairly small and the results indicate that difference in pay level is consistent throughout the period. The pay level increases in 2007 and decreases in 2008 in both Sweden and the U.S. The statistical tests show that there is a small statistically insignificant pay premium for the Swedish CEOs in the period.

To what extent is the comparison affected by the sample choice, i.e. are similar results obtained for a different sample?

The suggested model has been tried on several different samples. The results are consistent i.e. the differences in pay-level are consistent by altering the sample. In addition to comparing the compensation levels between the countries, the model has also been applied to the Swedish and the American sample respectively. The results found are consistent with those of Fernandes 2009.

Does the functional form of the pay structure affect the result?

Maybe the most theoretically interesting contribution of the current work is how the functional form of incentive pay interacts with the total compensation. A higher order model is suggested based on the theoretical framework of agency costs and risk aversion and statistical tests. The model has been tested on both the pooled and individual year data and omitted variable tests, along with Ramsey's RESET test that suggests that the correct functional form includes higher order terms, nonlinear effects. The idea of including higher order interaction terms has also been tested on both the Swedish and American samples. The results indicate that for the Swedish sample the correct functional specification only includes the linear term. This is consistent with agency theory and risk aversion as the incentive part of compensation is low. In the American sample the results indicate that third order terms is a minimum and even inclusion of a fourth order term can be relevant. As the American companies have larger incentive pay closer to one, it could be expected that higher order terms become more relevant as the risk aversion becomes more important.

7. Conclusions

In this chapter some general conclusions will be drawn and suggestions for future exciting work will be provided.

7.1 General conclusions

The current work has demonstrated the use of regression analysis to measure and answer the interesting question are Swedish CEOs under paid compared to American? As have been suggested and "demonstrated" by a several Swedish reports. A straightforward comparison would suggest that Swedish CEOs are clearly under paid. But this work demonstrates that with a rather simple model/framework the differences in compensation level between the countries can be explained. The key variables are the firm specific variables, sales, Tobin's Q, international sales, and the pay structure as given by incentives/total pay. This work has clearly moved the research area in executive compensation a small step forward in that it presents a transparent but yet a new way of making comparisons between countries including different pay components such as restricted stocks and options.

The model suggested by Fernandes et al. using incentive pay over total pay to capture the affect of that CEOs are paid differently in different countries has been extended to specify the correct functional form. The approach of only including the first power is simple but is flawed for two reasons:

> 1) The linear model does not capture the fact that an increase in total compensation depends of the current incentive proportion as suggested by agency theory and risk aversion.
>
> 2) The model cannot be used on the current data set because statistical test show that higher order terms are indeed significant and omitting variables in regression analysis leads to bias.

To resolve these problems a theory implying that it is necessary to include higher order terms being relevant to capture the affect of risk aversion has been suggested and tested on several samples. As limited time and resources prevents us from exploiting the implications using the current data the theory cannot simply be discarded. Theory and tests combined shows the importance of nonlinear terms for especially dealing with American CEOs which have a high proportion of incentive pay over total. This work also demonstrates how it is necessary to be careful in dealing with statistical models and regression analysis to prevent you from ending up with the wrong conclusions.

When doing work in a new field as an undergraduate the most important findings are often done along the way so as to where to go next. The most important contribution of the current work is to make two suggestions that would be interesting to explore and that can make truly novel contributions to an already rather extensive field.

7.2 Suggestions for future work

7.2.1 Macroeconomic effects on CEO compensation in international comparisons

The original idea with this thesis was to provide an extension of the methodology presented by Oxelheim 2009 i.e. macroeconomic effects on inter-country comparison. The study objects the U.S. which is a large economy and Sweden which is a small and open economy that relies heavily on trade and export is there. So is the work done by Oxelheim. By contacting the author, additional material, i.e. a detailed outline and necessary data can be received and how to overcome the multicollinearity issues stopping the current work be discussed.

7.2.2 Functional form of pay structure interaction

Fernandes' work suggested that incentive pay over total compensation is an important variable in inter country comparison. The current work suggests extending this work to study the functional form of incentive pay and how it interacts. It seems that the proposition of higher order terms being important deserves a more thorough investigation and testing on other samples to see if the theory holds or if can be contradicted. Moreover dividing the total incentive pay into its components equity and non-equity incentive to see if there are any differences is also an area needing more attention.

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Appendix

Supplementary information of the sample, variable definitions and regression results/output.

A.1 Sample data

A.1.1 Summary compensation table

	Summary compensation Levels: 2006-2008 thousands USD										
	U.S. compensation					**Swedish compensation**					**Sample**
	Nr.	Min	Max	Mean	Median	Nr.	Min	Max	Mean	Median	Mean
2006	303	976	38084	9267	7856	94	80	4905	1299	915	7381
2007	356	986	34968	9576	7984	95	285	5408	1563	1030	7889
2008	328	590	35292	8640	6997	90	193	4234	1189	882	7036
Total	987			9170		279			1353		7448

Table 16 Compensation levels 2006-2008 in the U.S., Sweden and sample.

A.1.2 Firm specific factors

	Sales billion $	Tobin' s Q	International Sales		Sales billion $	Tobin's Q	International Sales
Sweden					**Sample**		
2006	3,418	2,10	0,44		13,8	2,06	0,309
2007	3,63	1,82	0,48		15,8	1,98	0,344
2008	3,90	1,1	0,5		17,3	1,43	0,352
2006-2008	3,64	1,68	0,47		15,7	1,83	0,336
U.S.							
2006	16,974	2,054	0,268				
2007	19,082	2,026	0,307				
2008	20,98	1,53	0,312				
2006-2008	19,06	1,87	0,297				

Table 17 Firm specific factors for Sweden, the U.S. and the Sample.

A.1.3 Pay component proportions

	Sweden [%]					Sample [%]			
	Salary	Other	Non-equity	Equity		Salary	Other	Non-Equity	Equity
2006	55,2	22,8	19,3	2,73		24,8	7,86	26,2	41,2
2007	54,9	22,2	19,5	3,39		23,6	7,46	23,7	45,2
2008	60,9	24	13	2,10		26,7	8,31	18,6	46,9
2006-2008	56,9	23	17,3	2,74		25,0	7,87	22,6	44,5
	U.S. [%]								
2006	15,3	3,2	28	53					
2007	15,3	3,53	24,8	56,3					
2008	17,4	3,99	19,4	59,2					
2006-2008	16	3,6	24	56					

Table 18 Proportions of the pay components for Sweden, the U.S. and the sample respectively.

A.1.4 Industry classification

GICS Classification	GICS Classification	Sweden [%]	U.S. [%]	Sample [%]
Consumer discretionary Consumer staples	1) Consumer goods	17,6	24,4	22,9
Energy Utilities	2) Energy & Utilities	2,87	14,9	12,2
Financials	3)Financials	23,3	15,1	16,9
Health care	4) Health Care	6,09	10,9	9,87
Industrials	5) Industrials	31,9	12,2	16,5
Information technology Telecommunication services	6) Information Technology and Telecommunication Services	11,8	15,1	14,4
Materials	7) Materials	6,45	7,40	7,18

Table 19 Definition of industry dummy classification. Category number 7 is dropped in the regressions.

A.2 Variable definitions

Variable	**Definition**
Compensation variables	
Total compensation	Sum of Salary + Other pay+ Bonus + LTIP + Option awards+ Restricted stock awards
Salary	Salary in U.S.D.
Other pay	Other compensation (benefits + d.c. pension)
Non-incentive pay	Salary + Other pay
Options	Options grant date fair value (Black-Scholes)
Equity incentive pay	Stock and option awards
Non-equity incentive pay	Bonus + LTIP
Incentive pay	Equity incentive pay + Non-equity incentive pay
EIOT (Equity-incentive pay over Total comp.)	Equity-incentive pay/Total compensation
NEIOT (Non-equity incentive pay over Total comp.)	Non-equity incentive pay/Total compensation
IOT (Incentive pay over Total comp.)	Non-incentive pay/Total comp.
Firm characteristics	
U.S. dummy	Equals one if firm is based in the U.S.
Log(Sales)	Log of sales in thousands of US$ at the end of the year (WS item 01001)
Log(Tobin's Q)	Logarithm of total assets (WS item 02999) plus market value of equity (WS item 08001) minus book value of equity (WS item 03501) divided by total assets at the end of the year
International sales	International annual net sales (WS item 07101) as a proportion of net sales (WS 01001) at the end of the year.

Table 20 Variable definitions.

A.3 Regression results

A.3.1. Full sample

A.3.1.1 Excluding pay structure

	2006	2007	2008	2006-2008
C	**1,78**	**2,75**	**3,09**	**2,57**
	0***	0***	0***	0***
USDUMMY	**1,26**	**1,2**	**1,51**	**1,32**
	0***	0***	0***	0***
LOG(SALES)	**0,35**	**0,3**	**0,25**	**0,3**
	0***	0***	0***	0***
LOG(TQ)	0,11	0,08	0,05	**0,1**
	0,22	0,27	0,49	0,016**
INTERNATIONAL	**0,29**	**0,27**	**0,35**	**0,31**
	0,03**	0,012**	0,0008***	0***
SERIES02=1	0,14	0,02	0,14	0,1
	0,2	0,85	0,2	0,11
SERIES02=2	0,11	0,01	**0,24**	0,12
	0,36	0,94	0,038**	0,069*
SERIES02=3	0,21	0,03	0,13	0,13
	0,08	0,8	0,28	0,071*
SERIES02=4	**0,31**	0,15	**0,33**	**0,25**
	0,017**	0,23	0,014**	0,0006***
SERIES02=5	0,11	0,01	**0,28**	**0,14**
	0,33	0,89	0,0048***	0,0263**
SERIES02=6	0,13	0,04	0,06	0,08
	0,31	0,71	0,63	0,26
Observations	397	451	418	1266
R^2	0,73	0,69	0,71	0,7

Table 21 Firm specific variables and industry structure regression results.

Regression results firm characteristics. *** 1 % significance level, ** 5% significance level, * 10% significance level. Bold face coefficients are significant.

A.3.1.2 Pooled regression including pay structure

2006-2008	Linear	Quadratic	Cubical
C	**3,04**	**3,48**	**3,57**
	0***	0***	0***
USDUMMY	**-0,33**	**-0,27**	**-0,01**
	0***	0,0002***	0,88***
LOG(SALES)	**0,23**	**0,22**	**0,20**
	0***	0***	0***
LOG(TQ)	-0,04	-0,05	**-0,05**
	0,25	0,10	0,061*
INTERNATIONAL	**0,24**	**0,24**	**0,23**
	0***	0***	0***
IOT	**3,01**	**0,44**	**3,19**
	0***	0,044**	0***
IOT^2		**2,54**	**-5,67**
		0***	0***
IOT^3			**5,69**
			0***
SERIES02=1	**0,14**	**0,16**	**0,15**
	0,0027***	0,0002***	0,0007***
SERIES02=2	0,04	0,05	0,04
	0,39	0,24	0,40
SERIES02=3	0,07	0,05	0,01
	0,16	0,27	0,75
SERIES02=4	**0,14**	**0,15**	**0,14**
	0,010**	0,0035***	0,0054***
SERIES02=5	0,07	**0,08**	0,05
	0,15	0,0488**	0,22
SERIES02=6	0,02	0,01	-0,03
	0,66	0,82	0,52
Observations	1266	1266	1266
R^2	0,85	0,87	0,87

Table 22 Regression results for pooled data and varying functional specification of the pay structure.

A.3.2. Individual years including pay structure

	2006			2007			2008		
C	**2,57**	**3,07**	**3,2**	**3,14**	**3,7**	**3,75**	**3,41**	**3,72**	**3,81**
	0***	0***	0***	0***	0***	0***	0***	0***	0***
USDUMMY	**-0,42**	**-0,38**	-0,08	**-0,29**	**-0,25**	-0,02	**-0,3**	-0,17	0,04
	0***	0***	0,52	0,04**	0,08*	0,92	0,02**	0,14	0,76
LOG(SALES)	**0,25**	**0,24**	**0,22**	**0,23**	**0,22**	**0,2**	**0,2**	**0,2**	**0,19**
	0***	0***	0***	0***	0***	0***	0***	0***	0***
LOG(TQ)	-0,07	-0,08	-0,08	0	-0,02	-0,03	-0	-0,06	-0,06
	0,3	0,18	0,16	0,96	0,65	0,6	0,47	0,27	0,25
INTERNATIONAL	**0,26**	**0,26**	**0,23**	**0,23**	**0,21**	**0,21**	**0,19**	**0,24**	**0,22**
	0,01**	0***	0,01**	0,01**	0,01**	0,01**	0,02**	0***	0,01**
IOT	**3,21**	0,52	**3,69**	**2,86**	0,11	**2,79**	**2,98**	**0,56**	**2,79**
	0***	0,23	0***	0***	0,78	0***	0***	0,01**	0***
IOT^2		**2,65**	**-6,68**		**2,68**	**-5,15**		**2,4**	**-4,42**
		0***	0***		0***	0,02**		0***	0,05*
IOT^3			**6,39**			**5,4**			**4,78**
			0***			0***			0***
SERIES02=1	**0,18**	**0,2**	**0,18**	0,12	**0,13**	**0,12**	0,13	**0,16**	**0,13**
	0,03**	0,01**	0,02**	0,17	0,09*	0,09*	0,11	0,04**	0,09*
SERIES02=2	0,02	0,05	0,03	0,01	0,01	0	0,09	0,09	0,06
	0,79	0,54	0,7	0,89	0,91	0,96	0,31	0,25	0,38
SERIES02=3	0,11	0,08	0,04	0,04	0,01	-0,01	0,07	0,04	0
	0,24	0,29	0,64	0,66	0,87	0,93	0,44	0,58	0,96
SERIES02=4	**0,18**	**0,17**	**0,17**	0,1	0,1	0,1	0,14	**0,17**	0,14
	0,09*	0,08*	0,06*	0,3	0,24	0,22	0,12	0,05*	0,12
SERIES02=5	0,04	0,06	0,03	0,04	0,05	0,03	0,11	**0,12**	0,08
	0,61	0,41	0,73	0,65	0,55	0,72	0,18	0,09*	0,25
SERIES02=6	0,02	0,04	0,01	0,05	0,03	-0,01	-0	-0,05	-0,09
	0,8	0,65	0,93	0,62	0,72	0,86	0,85	0,55	0,26
Observations	397			451			418		
R^2	0,86	0,88	0,88	0,83	0,86	0,86	0,86	0,88	0,88

Table 23 Individual year regressions with varying pay structure. The sub-columns correspond to the different models of the pay-structures, the linear the quadratic and the cubical.

A.3.2 Robustness checks

8.3.2.1 Pooled regression with equal number of American and Swedish firms including pay structure

2006-2008				
C	**2,30**	**2,96**	**3,13**	**3,25**
	0,00	0,00	0,00	0,00
USDUMMY	**1,21**	-0,04	**-0,23**	-0,01
	0,00	0,69	0,04	0,92
LOG(SALES)	**0,32**	**0,25**	**0,25**	**0,24**
	0,00	0,00	0,00	0,00
LOG(TQ)	0,08	-0,04	-0,04	-0,05
	0,10	0,32	0,27	0,20
INTERNATIONAL	**0,21**	**0,14**	**0,16**	**0,12**
	0,02**	0,04**	0,02**	0,07*
IOT		**2,37**	**0,80**	**3,28**
		0,00***	0,00***	0,00***
IOT^2			**1,92**	**-6,08**
			0,00***	0,00***
IOT^3				**5,81**
				0,00***
SERIES02=1	0,09	0,03	0,05	0,03
	0,38	0,75	0,51	0,64
SERIES02=2	0,13	-0,04	-0,03	-0,04
	0,28	0,68	0,73	0,57
SERIES02=3	0,12	-0,06	-0,08	-0,11
	0,26	0,50	0,33	0,15
SERIES02=4	0,19	-0,02	0,01	0,03
	0,14	0,80	0,91	0,74
SERIES02=5	0,12	0,00	0,02	-0,02
	0,19	0,98	0,74	0,78
SERIES02=6	0,17	0,01	0,00	-0,03
	0,10	0,87	0,95	0,68
Observations	570	570	570	570
R^2	0,79	0,88	0,89	0,90

Table 24 291 U.S. firms randomly selected and 279 Swedish.

A.3.2.2 Pooled regression Swedish firms including pay structure

Sweden 2006-2008				
C	**2,25**	**2,86**	**2,87**	**2,88**
	0,00***	0,00***	0,00***	0,00***
LOG(SALES)	**0,33**	**0,27**	**0,27**	**0,27**
	0,00***	0,00***	0,00***	0,00***
LOG(TQ)	0,05	-0,07	-0,07	-0,07
	0,48	0,23	0,23	0,23
INTERNATIONAL	0,00	-0,01	-0,02	-0,02
	0,99	0,94	0,85	0,88
IOT		**1,74**	**1,98**	**1,67**
		0,00***	0,00***	0,01**
IOT^2			-0,42	0,83
			0,42	0,68
IOT^3				-1,15
				0,48
SERIES02=1	**0,23***	0,12	0,11	0,11
	0,07	0,27	0,31	0,32
SERIES02=2	**0,30**	0,06	0,06	0,06
	0,04**	0,57	0,60	0,62
SERIES02=3	0,17	-0,05	-0,05	-0,05
	0,20	0,67	0,66	0,65
SERIES02=4	**0,41**	0,10	0,11	0,11
	0,03**	0,50	0,46	0,49
SERIES02=5	**0,17**	0,03	0,02	0,02
	0,05*	0,72	0,81	0,81
SERIES02=6	**0,30**	0,15	0,15	0,14
	0,01***	0,14	0,14	0,15
Observations	279	279	279	279
R^2	0,56	0,71	0,71	0,71

Table 25 Swedish regression results 2006-2008.

A.3.2.3 Pooled U.S. firms including pay-structure

U.S. 2006-2008				
C	**3,98**	**2,31**	**4,2**	**3,95**
	0,00***	0,00***	0,00***	0,00***
LOG(SALES)	**0,29**	**0,22**	**0,18**	**0,17**
	0,00***	0,00***	0,00***	0,00***
LOG(TQ)	**0,1**	**-0,01**	**-0,06**	**-0,05**
	0,06*	0,7	0,08*	0,11
INTERNATIONAL	**0,41**	**0,29**	**0,27**	**0,28**
	0,00***	0,00***	0,00***	0,00***
IOT		**3,64**	**-0,92**	**4,31**
		0,00***	0,02**	0,00***
IOT^2			**3,7**	**-8,09**
			0,00***	0,00***
IOT^3				**7,22**
				0,00***
SERIES02=1	0,08	**0,2**	**0,19**	**0,18**
	0,26	0,00***	0,00***	0,00***
SERIES02=2	0,12	**0,1**	**0,08**	0,07
	0,11	0,06*	0,09*	0,12
SERIES02=3	0,11	**0,15**	0,07	0,04
	0,18	0,01**	0,16	0,4
SERIES02=4	**0,24**	**0,2**	**0,18**	**0,16**
	0,00***	0,00***	0,00***	0,00***
SERIES02=5	**0,16**	**0,11**	**0,09**	0,07
	0,04**	0,05*	0,08*	0,13
SERIES02=6	0,03	0,02	-0,03	-0,08
	0,76	0,69	0,54	0,14
Observations	987	987	987	987
R^2	0,26	0,68	0,72	0,73

Table 26 U.S. regression results 2006-2008

A.3.2.4 Pooled regression including time effects

2006-2008			
C	**3,02**	**3,47**	**3,56**
	0,00***	0,00***	0,00***
USDUMMY	**-0,33**	**-0,26**	-0,01
	0,00***	0,00***	0,88
LOG(SALES)	**0,23**	**0,22**	**0,2**
	0,00***	0,00***	0,00***
LOG(TQ)	-0,04	**-0,05**	**-0,06**
	0,24	0,08*	0,07*
INTERNATIONAL	**0,23**	**0,24**	**0,22**
	0,00***	0,00***	0,00***
IOT	**3,01**	**0,44**	**3,18**
	0,00***	0,05*	0,00***
IOT^2		**2,54**	**-5,64**
		0,00***	0,00***
IOT^3			**5,66**
			0,00***
SERIES02=1	**0,14**	**0,16**	**0,15**
	0,00***	0,00***	0,00***
SERIES02=2	0,04	0,05	0,04
	0,39	0,24	0,4
SERIES02=3	0,07	0,05	0,01
	0,16	0,27	0,76
SERIES02=4	**0,14**	**0,15**	**0,13**
	0,01**	0,00***	0,01**
SERIES02=5	0,07	**0,08**	0,05
	0,16	0,05*	0,24
SERIES02=6	0,02	0,01	-0,03
	0,68	0,83	0,49
YEAR=2007	**0,06**	**0,06**	**0,06**
	0,04**	0,04**	0,03**
YEAR=2008	0,01	0,01	0,02
	0,63	0,83	0,54
Observations	1266	1266	1266
R^2	0,85	0,87	0,88

Table 27 Regression including time effects (year 2006 is dropped).