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CEO compensation and risk-taking

Finnish evidence

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ABSTRACT:

CEO compensation should ensure that the company can hire the best CEO for the company while considering the company´s size and ability to pay salary. Additionally, CEO compensation is a tool for the owners to control the CEO´s interests. This means that a specific part of the salary is paid only if agreed financial or other targets are met or exceeded.

This thesis investigates whether CEO compensation increases risk-taking in the Finnish stock market. Stock volatility and beta-coefficient act as measures of risk. Volatility represents the total risk of the company while beta is a measure of the systematic risk. According to the agency theory, the CEO is working for the owners but there might be a conflict of interests. To ensure that the hired CEO makes the best day-to-day decisions on behalf of the owners, the compensation contract should encourage the CEO to do so. Therefore, at least part of the CEO compensation should be tied to the company's short- and long-term performance. This will ensure that the CEO works in the owners' best interest. However, previous literature has found that CEO compensation might harm the company in some cases.

To study the issue, this thesis uses the Finnish stock market-listed companies´ annual reviews and remuneration reports from 2015-2021 as a source for the compensation data. The data has been divided into four categories: base salary, short-term incentives, long-term incentives, and other compensation. Additionally, this thesis uses company-specific variables such as company size, profitability, R&D investments and leverage as control variables.

The results of this thesis suggest that volatility does not correlate with compensation components. When analyzing the beta coefficient the results suggest that base salary is positively correlated with the beta, which indicates that base salary seems to increase the company's systematic risk.

KEYWORDS: management compensation, agency theory, compensation, risk-taking, CEO

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TIIVISTELMÄ:

Johdon palkitsemisen tarkoitus on saada yrityksen toimitusjohtajaksi yritykseen sopiva henkilö ottaen huomioon yrityksen koon ja mahdollisuudet maksaa palkkaa. Tämän lisäksi palkitsemisella on mahdollista ohjata toimitusjohtajan ja muun ylimmän johdon mielenkiinnon kohteita. Tämä tapahtuu siten, että tietynlainen palkkio maksetaan, jos annetut tavoitteet saavutetaan tai ylitetään.

Tämä pro gradu -tutkielma tutkii sitä, kuinka johdon palkitseminen vaikuttaa yrityksen riskinottoon. Riskinoton mittarina käytetään sekä osakkeen volatiliteettiä että beta-kerrointa. Volatiliteetti mittaa yrityksen kokonaisriskiä ja beta-kerroin mittaa yrityskohtaista riskiä. Agenttiteorian mukaan yrityksen johto toimii omistajien alaisuudessa. Koska omistajat eivät suuremmassa yrityksessä enää puutu yrityksen päivittäiseen toimintaa, on oltava keino, jolla yrityksen omistajat voivat ohjata ja varmistua siitä, että päätökset tehdään heidän etuansa ajatellen. Tämä tarkoittaa käytännössä sitä, että ainakin osa yrityksen toimitusjohtajan palkkiosta tulisi sitoa yrityksen lyhyen ja pitkän aikavälin menestykseen, jotta voidaan varmistua siitä, että omistajien näkökulma on otettu huomioon. On kuitenkin olemassa riski, että tällainen palkitseminen on osittain haitallista yritykselle.

Tämä tutkielma käyttää ongelman tutkimiseen suomalaisten Helsingissä pörssilistattujen yritysten palkitsemisaineistoa vuosilta 2015–2021. Aineiston perusteella palkitseminen on jaettu neljään eri osa-alueeseen, jotka ovat peruspalkka, lyhyen aikavälin palkitseminen, pitkän aikavälin palkitseminen ja muu palkitseminen. Lisäksi tutkielmassa on käytetty yrityskohtaisia muuttujia, kuten yrityksen kokoa, kannattavuutta, tuotekehityspanosten määrää sekä velkaisuusastetta.

Tutkimuksen tulokset osoittavat, että yrityksen käyttämät palkitsemiskomponentit eivät korreloi volatiliteetin kanssa. Beta-kertoimen osalta sen sijaan voidaan todeta, että tuloksen perusteella etenkin pohjapalkka näyttää lisäävän yrityksen beta-kerrointa eli systemaattista riskiä.

AVAINSANAT: Johdon palkitseminen, riskinotto, agenttiteoria, palkitseminen, toimitusjohtaja

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1 Introduction

Executive compensation is one of the research areas in corporate finance. When studying executive compensation, researchers are trying to find out how the compensation affects CEO´s decisions. Typical research in the area covers how for example stock options affect the behavior or decisions of the CEO. CEO compensation is directly linked to agency theory (Jensen & Meckling, 1976). The theory suggests that a company has two different participants, the agent, and the principals. The principals are the company's owners, and the agent´s job is to make decisions that benefit the owners. Additionally, the compensation package should be created to attract the best CEO for the company to run the day-to-day operations. The compensation package should be interesting enough to attract the best talents.

When a company is founded, the CEO and owner are typically the same person. When the company develops and grows, the ownership of the company might segregate. This means that the CEO might not be the biggest owner of the company, or not an owner at all. Executive compensation tries to solve this issue. According to Matolcsy and Wright (2011), long-term incentives are the key to a good compensation contract. At the same time, a good compensation contract should lower agency costs. One of the owners´ biggest problems is ensuring that the CEO makes decisions that benefit the company and the owners. These decisions are not necessarily the ones benefitting the CEO. A typical way to match CEO´s and owners' incentives is to create a compensation package that includes additional components on top of the base salary (Kreilkamp et. al., 2022).

Why the additional components of the CEO compensation work, is easy to see. If the CEO owns company shares and the share price goes up, the CEO personally benefits from the good decisions. Stock options are another tool used in CEO compensation and the logic is similar. Stock options are given to the CEO and at the same time, a strike price is set for the day when the option expires. If the share price is higher than the strike price on the day the options expires, the CEO gains money. Based on this, it is easy to see why additional components of the CEO compensation work. Both shares and stock options

create a clear target for the CEO. To achieve the target, the CEO must make good business decisions which benefits the owners. If the targets are met, the CEO and the owners have benefitted from the compensation package created.

One aspect that makes CEO compensation such an interesting research topic is that the results from the past have been mixed. Additionally, CEO compensation is always evolving (Core and Guay, 2001). As this thesis will show later, there has been a significant shift from stock options to stock-based compensation. More recently, Chakraborty, Gao, and Sheikh (2019) highlight that companies with high corporate social responsibility figures are not as vulnerable to vega as companies with lower figures. This means that the compensation contract does not increase the risk-taking incentives of the CEO in a high CSR company. On the other hand, they show that such risk is visible in low corporate social responsibility companies. This means that future research shouldn´t be focusing only on R&D expenses or M&A activity but to look at CSR figures as well when researching how compensation affects risk-taking.

Furthermore, Brisley, Cai, and Nguyen (2021) find that the compensation contract does not always benefit the owners. They find that share ownership requirement (SOR) decreases the risk-taking measures of the CEO in some cases. They have found that sometimes almost the whole personal investment portfolio of the CEO consists of just one company. This means that the CEO can control the risk of their portfolio by reducing the risks of the company they are running. This would mean that the other company shareholders pay for the costs associated with the decrease in risk-taking to a sub-optimal level. This is not at all beneficial to the other shareholders of the company.

1.1 Purpose of the study and possible contributions

The purpose of the study is to examine how the CEO's total compensation affects the company's risk-taking. As the introduction and later literature review sections suggest, there are mixed results from previous literature. Therefore, additional research is needed especially from the Finnish market. It is meaningful to understand what kind of

implications the compensation package might have. In principle, the results of this thesis could be used as a decision-making base in a compensation committee when considering CEO compensation packages. In addition, this thesis will collect a dataset from the Finnish market and therefore can highlight what the compensation package for the average CEO looks like in Finland.

Using a dataset from Finland has not been used much; therefore, this thesis will contribute to the existing literature. After the research, this thesis should be able to provide an understanding of CEO compensation in Finland and how that affects risk-taking. The company owners and the compensation committees should be interested in the CEO compensation from multiple points of view. The first point of view is that the CEO has an attractive compensation package that will keep the CEO in the company. An additional point of view is that it is important to understand how the compensation package drives the decision-making of the CEO. The important thing is that the compensation package matches the CEO's incentives with the owners' incentives. The incentives themselves do not matter. A compensation package that drives high risk-taking is possible to create. Similarly, a compensation package that reduces risk-taking is possible to create. Therefore, the compensation package does not limit the owners' ability to control the risk. A compensation package should be used to direct the CEO´s interests toward the owners' interests.

1.2   Hypothesis development

Previous literature such as Hsin-han Shen and Zhang (2013) have used R&D costs as a key variable when looking at the implication of the compensation contract. They argue that increases in R&D costs are a sign of risk-taking. This is because the outcome of the R&D investment is almost always uncertain, and the stock market thinks this is a risk for the company. The risk increases the stock volatility because the stock market does not know the results of the R&D investments for some time.

On the other hand, Coles, Daniel, and Naveen (2006) study the relationship between the compensation package and critical investment decisions. These investments could include additional debt, property, plant and equipment investments, and R&D investments as in the previous study. They find that an increase in stock volatility is linked to an increase in R&D costs and leverage. On the other hand, it is negatively correlated with capital expenditure. Increasing stock volatility is important for the CEO if the compensation package contains stock options. This is because an option is a function of the volatility of the stock. Therefore, an increase in stock volatility increases the CEO`s wealth immediately as the price of the stock options increase.

Chu, Liu, Ma, and Li (2020) on the other hand argue in their study that it is difficult to understand the true effects of factors like R&D cost increase, capital expenditure, or different kinds of policies. The reason is that such decisions are not effective immediately. This means that when the top management decides to increase R&D costs, it takes time before things start to happen. This means that the stock volatility is not increasing either. In 2005 the United States created a law that requires companies to expense all stock options given to the top management. This motivates the companies to switch from stock options to stock-based compensation packages. This is simply because the stock options became more expensive for the company. On the other hand, as the previous examples have shown, an incentive to increase volatility will most likely lead to risk-taking actions from the CEO. The incentive to take risks is therefore higher when the CEO holds stock options.

The hypothesis of this thesis is based on the research setup of Armstrong and Vashishtha (2012). This thesis aims to investigate how the compensation contracts in Finland affect the volatility and beta of the companies. These variables are selected to understanding how compensation affects the risk measures of the company. Volatility and beta are selected as they are both measures of risk, but beta indicates the systematic risk of the company and volatility indicates the company's total risk. Two different risk measures

should indicate if the CEOs are more interested in one of these variables. To investigate how compensation affects risk-taking, the hypotheses are as below:

H_1 = The CEO compensation contract increases the total risk of the company

H_2 = The CEO compensation contract increases the systematic risk of the company

1.3 Structure of the study

This thesis contains several different parts. After this introduction section, the hypotheses development is presented. An overall look at the CEO compensation package follows that. That section will highlight the main parts of the compensation package and try to shed light on how those components might affect the CEO´s behavior. In the theoretical section, the most relevant theories related to CEO compensation are presented. The theoretical section is followed by a literature review, where previous studies around the subject of this thesis are presented. These papers should give a broader understanding of the previous literature and results found earlier. Later in the thesis empirical research is done, where the effects of CEO compensation plan are studied. This section will present the data set used for the empirical research and highlight the main results found.

2   CEO Compensation

This section of the thesis will present an overview of the CEO compensation and presents the CEO pay components in detail. This should give an understanding of how the CEO compensation package is formed and what it contains.

2.1   Overview of CEO compensation

According to Grinstein, Lauterback, and Yosef (2022), the CEO compensation package contains three key components. The components are paid a salary, equity-based compensation which contains both stock options and stocks, and non-equity-based compensation. Non-equity-based compensation means cash bonuses that are tied to certain performance measures. All these components will be thoroughly discussed in this section of the thesis. The compensation package contains several components which all have different purposes. It is worth pointing out that not all the components are included in every CEO compensation package. This means that in some cases the CEO might only receive paid salary and cash bonus. In such a case, the CEO wouldn´t have an equity incentive. This influences the CEO's incentives to make certain decisions. Interestingly Grinstein, Lauterback, and Yosef (2022) point out that it is typical that companies benchmark their CEO compensation packages against similar firms. This means there shouldn´t be huge differences between the compensation packages within an industry if the compensation packages are carefully benchmarked.

Song and Wan (2019) highlight in their study that as the CEO compensation contains multiple parts as described earlier, this should align the CEO´s motives with the owners´. In theory, this should mean that the incentives are aligned, and the CEO is thinking about the owners´ wealth when running the company daily. At the same time, they point out that more than half of the realized total compensation comes as equity. This highlights that the equity (stocks or stock options) is the interesting part. While the base salary stays roughly the same year to year, the equity component can vary depending on the company's financial performance and stock performance. They're from a risk-taking

point of view, equity-based compensation is the key factor. This is because the CEO can directly make a decision that increases or decrease the stock volatility or affects the long-term stock price development of the company. Based on this, one can argue that there is a possibility that CEO compensation could increase short-term stock performance maximization at the cost of long-term performance. This is not at all the owners´ incentive.

Core, Holthausen, and Larcker (1999) point out that to align the incentives between the owners and the CEO the compensation should be based on the company's performance. In practice, this would mean that as the CEO´s job is to maximize the company´s long-term value, the compensation should reflect this. The realized compensation should be tied to predetermined targets, such as financial performance figures. Therefore, the compensation would drive the CEO to fulfill these targets to receive the agreed compensation. They also highlight that the CEO compensation should be decided case by case. This is not quite aligned with what the companies are doing as Grinstein, Lauterback, and Yosef (2022) highlighted that companies benchmark their compensation packages against each other, leading to a situation where the compensation package looks roughly the same for everyone.

According to Core, Holthausen, and Larcker (1999), CEO characteristics might also affect the optimal compensation package. For example, risk-averse CEOs require higher total compensation if their pay contains mostly risky (equity) components. This means that because the CEO is risk-averse, they want to have as high a salary as possible so that the realized pay is as they want. Realized pay means what the CEO receives. Stock price movement can impact the realized pay as some stock-option can expire worthless for example. In such a case, the CEO wouldn´t receive any money from those options even though the value could have been millions of euros in another situation.

Lovett, Rasheed, and Hou (2021) support the previous findings and point out that most of the CEO compensation is received in some other form than base salary. Additionally,

they show that there has been a decrease in stock-option-based compensation due to possible consequences such as the timing of news releases. News release manipulation is a way to control the share price near the option expiry date, and the CEO´s incentive is to maximize the share price when the options expire. Additionally, as Chu, Liu, Ma, and Li (2020) pointed out that the companies have to expense the stock option. It has worked as an additional motive to move away from stock options. In general, it could be said that companies have noticed the possible consequences of stock-option-based compensation and therefore decided to move to stock-based compensation.

One of the key benefits of stock-based compensation is that the CEO becomes an owner of the company and therefore should have the same incentives as the owners. One additional benefit of a share is that in principle, it does not expire. This means that even though the timing of a press release would move the share price on short-term, there is no real benefit or harm to the CEO. The benefit is only mathematical as the wealth is unrealized when the CEO holds the shares. Therefore stock options can be seen as a one-way bet for the CEO. As the value of an option cannot be negative, the CEO can only win, which might increase the risk-taking over the wanted levels.

Figure 1. Concept of CEO compensation

Figure 1 above is based on a conceptual idea by Lovett, Rasheed, and Hou (2021). Even though the concept is not based on research, it highlights that the same solution is not working for everyone. Their idea is that the CEO compensation package should be created based on two components: the company's possible and wanted growth opportunities and CEO tenure. Possible and wanted growth opportunities are highlighted because not all companies want to grow fast. If that is not wanted, the compensation package should reflect this will.

On the other hand, the CEO tenure matter as a new CEO requires different kinds of incentives compared to a CEO that has spent a decade with the company. As the figure above shows, stock options are recommended only when the company wants to grow with a new CEO. As stock options are a function of volatility, they increase the CEO´s willingness to take risks and seek the growth that the owners want. On the other hand, in a mature company with an experienced CEO, the optimal compensation package would be salary based. This would mean the CEO has a high base salary and certain bonuses tied to company performance.

Additionally, the CEO would receive some stocks as a reward, but that is not a major component. For a more inexperienced CEO in a mature company, restricted stocks are recommended as a major compensation form to align their incentives with the owners' incentives. Lovett´s, Rasheed´s, and Hou´s (2021) approach shows that CEO compensation should evolve as time goes by and the company's nature changes. At the beginning of the CEO´s tenure, the CEO's and owners' incentives must be matched quickly. Still, later, the compensation should move away from equity-based compensation into cash-based compensation.

2.2 Base salary

The base salary in CEO compensation is the monthly fixed salary that the CEO receives. The salary is predetermined and it does not necessarily change over time. The base salary is used for the day-to-day living costs of the CEO. Grinstein, Lauterback, and Yosef

(2022) find that in their study, the base salary for the average CEO is around 1 million USD yearly. The deviation of the base salary is relatively low, which means that regardless of the company's performance, the salary is the same. This salary is the same whether the company has a good or bad year. This means that from a risk-taking point of view, the base salary shouldn´t matter. On the other hand, the base salary does not align with the incentives of the CEO and the owners either.

Grinstein, Lauterback, and Yosef (2022) find that from their dataset which contains S&P Composite 1500 index firms from 2006 until 2019, the base pay is roughly 20 percent of the total realized compensation. Their results show that the CEO base salary component's standard deviation is low while the total compensation's standard deviation is high. Based on this, one could argue that the base salary is only a small fraction of the total compensation and not even that relevant for the CEO. Ahmed et. al. (2023) highlight in their study that from 2005 until 2020, banks´ CEOs´ base salary has stayed flat at around one million USD. At the same time, the total compensation has varied between 6,2 and 2,3 million USD. This further supports the idea that the base pay does not change over time.

2.3 Bonus

Guay, Kepler, and Tsui (2019) describe a bonus as an incentive based on an income statement. Therefore, a cash bonus is not tied to the stock price development but a certain predetermined financial target for that year. Cash bonuses are typically shorter incentives. A typical process would work so that for the upcoming fiscal year, some targets are set and if those targets are met, the CEO receives a cash bonus.

Guay, Kepler, and Tsui (2019) highlight the typical calculation for the cash bonus. Certain targets such as cash flow are set for the year. The target can be for example 100 million USD cashflow. An additional target could be net income, which is 150 million USD. Both targets are weighted at 50% which means that they are equal. When the fiscal year ends, the compensation is calculated based on the realized figures from the previous year. If

the target is exceeded the target gets a value over 100 percent based on predetermined scale. The bonus outcome will be less than 100 percent if the target is not met. The same calculation is done for the net income target and combined these will form the total realized outcome. If the outcome of net income is 100 percent and the outcome for cash flow is 120 percent, the total outcome would be 110 percent. This would then be the bonus outcome. The bonus is paid based on a target bonus figure calculated from the yearly base salary. This, however, is not the only way to calculate the bonus; the practices can vary from company to company. The bonus targets can be tied to any measure the company wants. Typically, the targets include financial figures, strategy-related figures, and in some cases environmental, social, and governance figures. Whatever the company wants as a short-term incentive, can be set as a bonus target.

Grinstein, Lauterback, and Yosef (2022) say that a typical cash bonus is around 100 thousand USD yearly in their dataset. The standard deviation for that figure is high, which indicates that the cash bonus can vary from company to company and year to year. This is understandable as the company size can affect this figure. They point out that the bonus is roughly 4 percent of the total compensation. This would mean that the bonus is not insignificant, but most of the total compensation comes from other components. As said, the standard deviation is high for these figures, indicating differences between companies.

Interestingly Ahmed et. al. (2023) find that in the banking industry, about 25 percent of the total compensation comes as a cash bonus. This dataset only contains banks, which have a different compensation structure compared to other industries, which is purely due to the unique nature of the financial industry. In a wider sample, the cash bonus decreases.

Guay, Kepler, and Tsui (2019) argue that when the tenure of the CEO is low, the meaning of the bonus is higher for the CEO personally. This is because the CEO does not yet have such meaningful stock ownership of the company that those stocks would act as a good

motive. This does not align with what Lovett, Rasheed, and Hou (2021) argued earlier. However, one can see that as the CEO expects a certain level of compensation, cash bonuses might be an important motive, especially at the beginning of the CEO´s career in the company when the stock ownership is low.

In conclusion, a cash bonus is compensation paid based on short-term incentives. Typically, one fiscal year is the bonus period. The targets are set to benefit the company in the short- and medium-term. Typically, the targets include financial targets and other possible non-financial strategic targets. This gives the CEO incentives to meet those targets for that particular year. In a bigger picture, however, the cash bonus is a small part of the total realized compensation, especially in a company that is not a bank.

On the other hand, from a risk-taking point of view short-term incentives could have some effects on decision-making based on the short-term goal, especially in banking where the cash bonus forms a significant part of the total compensation. Therefore, there is a possibility that the CEO could make short-term decisions that are beneficial to them personally in the short-term but causes harm to the company in the long term. To avoid this, the compensation plans contain multiple components so that both short- and long-term incentives match.

2.4   Share-based compensation

Stocks are used as a compensation method because they align the incentives of the owners and the CEO well. This is because the CEO becomes a partial company owner; therefore, the CEO has the same motives as the other shareholders. At the same, holding stocks of the company means that the CEO must focus on making long-term decisions because the stock price will reflect those good long-term decisions at some point. In the shorter term, the stock price can be volatile, but if the CEO can make consistently good long-term decisions, the stock price will reflect those decisions sooner or later. Therefore, stocks are an important part of the total compensation of any company.

This fact is noted in the literature as well. Brisley, Cai, and Nguyen (2021) highlight that 97 percent of S&P 500 companies have a minimum stock ownership requirement. This means that the companies have set certain target ownership levels of the company for the CEO. The idea is that the CEO´s company ownership must meet this minimum criterion at any given time. This should ensure that the CEO´s incentives are aligned with the other shareholders. The minimum ownership requirement is typically a multiplier of the CEO´s salary. The minimum level can be for example five times the base salary. Alternatively, the target can be a fixed number of stocks or a fixed amount.

Grinstein, Lauterback, and Yosef (2022) find that the CEO in their dataset receives roughly 3,3 million USD worth of stock awards yearly. This figure is much higher than the previously described bonus and base salary. According to them, the stock awards form about 35 percent of the total compensation, which means that stock-based compensation is one of the most significant parts. They also find that the stock-based compensation has a high standard deviation, meaning there are big differences between companies in their dataset. Ahmed et. al. (2023) find that stock options and stock grants are 45 to 65 of the total compensation in banking. After the financial crisis, their data shows a decrease in stock-option-based compensation almost to non-existent levels, meaning that 45 to 65 percent is stock-based compensation.

Vo and Canil (2019) point out that the CEO might receive restricted stocks. The CEO cannot sell these stocks during a certain period. The period can be for example 3 years. This should ensure that the CEO focuses on long-term decisions as they should maximize the stock price in the long term. This leads to a discussion about CEO´s decisions to sell stocks in general. When the company notifies that its CEO has sold stocks of the company, it can raise questions. The stock market might start to speculate if the CEO knows something that the market has not noticed yet. Therefore, from investors´ point of view, it is important to follow CEO ownership development as this can indicate the CEO´s view of the company´s future.

Previously described topics related to the CEO stock-based compensation implies that as the stocks are such a meaningful part of the total compensation, those might affect the risk-taking actions of the CEO. On the other hand, stock-based compensation aligns the incentives of the CEO with the owners' incentives and puts the CEO into the owners` position. Stock-based compensation is efficient because the CEO can lose and gain money if the compensation is based on stocks. This is because the stock price can go up and down. This can be compared to option-based compensation where the strike price of an option is predetermined and if the stock price is less than the strike price when the options expire, the CEO does not receive any money but does not lose anything either. From this point of view, stock-based compensation seems like the better alternative. This is proven by Ahmed et. al. (2023) finding that there has been a significant shift away from stock options into stock-based compensation post-financial crisis. This indicates that the stocks do not increase risk-taking as much as stock options would, but still make sure that the CEO has the same incentives as the owners. Giving restricted stocks to the CEO can encourage the CEO even more to make good long-term decisions.

From a risk-taking point of view, the stock-based compensation means that the more stocks the CEO has, the more exposed they are to the change in stock price. In the literature this is called delta, wealth´s sensitivity to stock price change. On the other hand, sensitivity to the change in stock volatility is called vega. Delta is high when the CEO has more stocks than stock-options. If the CEO has a high delta, their decisions understandably should maximize the stock price. From a risk-taking point of view, this means that the CEO is not encouraged to increase the volatility of the stock by increasing R&D expenses or M&A activity for example. Based on this it seems that stocks work as a better alternative to stock-option as both of those align the incentives of the owners and the CEO, but stocks do it more safely.

2.5   Option-based compensation

Option-based compensation is the last major component of the CEO compensation package. Grinstein, Lauterback, and Yosef (2022) find that the value of option-based

compensation received in their dataset is about 1,3 million USD. This is equal to about 20 percent of the total compensation. This means that option-based compensation is an interesting and important part of CEO compensation. At the same time, they highlight that option-based compensation has a high standard deviation, meaning there are differences between companies and years.
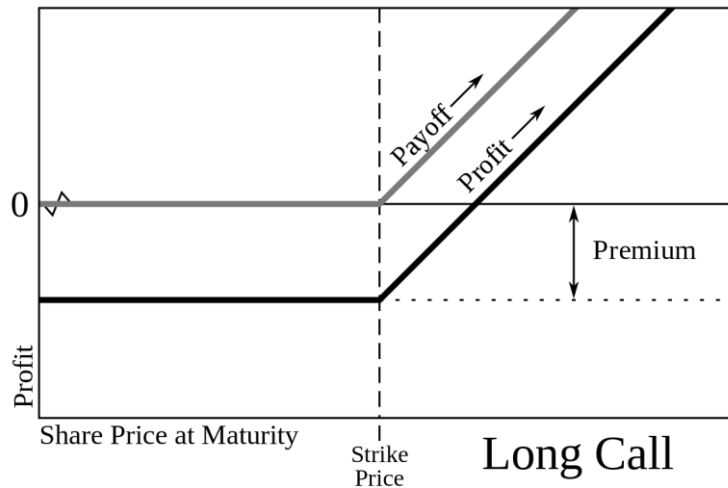
Figure 2. Stock-option

As Figure 2 above shows the value of an option is dependent on the underlying stock price. A certain strike price is set when the CEO receives the options. When the options expire a simple calculation is made. If the stock price is higher than the strike price agreed, the CEO can keep the difference. If the stock price is less than the strike price the call option is worthless but the CEO does not lose money. Therefore, the CEO can only gain money if they hold stock options.

Ahmed et. al. (2023) and Murphy (2013) both highlight that there has been a significant decrease in option-based compensation post-financial crisis. This is probably because it was noticed that significant option-based compensation leads to unwanted results. As highlighted earlier, option-based compensation has been connected with news release manipulation (Lovett, Rasheed, and Hou 2021) and risky investment decisions (Hsin-han Shen and Zhang, 2013). The companies have noticed that option-based compensation is not working as expected. As option-based compensation leads to high vega, the CEO can

maximize their wealth by increasing the volatility of the stock. This is because the value of an option is a function of the volatility of the stock. This means that as the volatility of the stock increases, so does the value of the option. This means that to maximize personal wealth, the CEO might want to pursue R&D investments even though the results are uncertain, increase M&A activity even though it is not necessary, and so on. These decisions might not be in the best interest of the owners. This creates a situation where the CEO is making decisions that cause harm to the owners and benefits the CEO personally.

On the other hand, the issues covered in the previous chapter can be turned upside down. If the owners of a company want to encourage the CEO to take risks and pursue uncertain projects, stock options are an excellent tool. Those create a clear motive for the CEO to increase the risks and as a result, they get a financial benefit. Lovett, Rasheed, and Hou (2021) support this view in their graph. In theory, stock options can be recommended for a smaller company with high growth targets. For a mature company, stock options are not recommended as then the stock options can lead to unwanted risk-taking.

From a risk-taking point of view, stock options are one key factor to investigate as those can create unwanted behavior. Stock options are interesting because the value of the realized compensation received by the CEO can vary by millions of USDs based on the stock price and volatility changes. There are ways for the CEO to affect these parameters; therefore, from the risk-taking point of view, stock-option-based compensation is interesting.

2.6 Other compensation

Other compensation means compensation that does not fit into the categories presented earlier. According to Grinstein, Lauterback, and Yosef (2022), other compensation is on average 200 thousand USD yearly. This includes things like a company car, housing benefits, travel benefits, insurance, and other possible

compensation. The other compensation is not insignificant, but as the received amount of other compensation is not related to the financial performance of the company, from a risk-taking point of view this is not interesting. This means the other compensation is the same whether the company has a good or bad year financially. The stock price movement does not affect other compensation either.

3 Theory

This theory section will present the most important theoretical approaches around CEO compensation. These theories should highlight the most important concepts and ideas based on which, CEO compensation packages should be created.

3.1 Compensation committee

Before looking into the theoretical approaches around CEO compensation, it is important to understand who decides what the CEO gets as compensation. The compensation committee and the board of directors are the most relevant parties. Livne, Markarian, and Milne (2011) highlight that the compensation committee is for example making the decisions between cash and equity-based compensation the CEO receives. This means that in principle, the compensation committee´s role is to understand the implications of the compensation contracts selected. On the other hand, as the board of directors is the boss of the CEO, this way they have the needed power to guide the CEO´s interests using the different compensation methods as a guidance tool.

Upadhyay and Öztekin (2021) show how the board of directors operates. It is a typical setup that the board of directors delegates some of the tasks to committees with more resources for an in-depth discussion regarding one specific topic. The compensation committee is one of these committees and their task is to define the compensation contract. Upadhyay and Öztekin (2021) highlight that in some companies, a CEO from outside the company is hired to be part of the compensation committee. This is to make sure that conflicts of interest are not possible, and that the compensation contract benefits the shareholders in the first place. They further highlight that if this outsider is part of the compensation committee, it is likely that the committee will increase the equity-based compensation of the CEO. Further, they see that having an outsider CEO in the compensation committee can increase the CEO compensation levels. This is because an influential CEO from outside the organization pushes the CEO to maximal performance, leading to better company performance and higher CEO compensation.

Lee (2020) highlights that compensation committees are in place as a monitoring party. Monitoring costs will be covered in more detail later in this thesis. What this means is that the compensation committee´s task is to ensure that the compensation contract of the CEO supports the board of directors´ view of the focus areas of the CEO. He shows that after the early 2000s, the role of different committees including the compensation committee has increased. Nowadays Nasdaq requires a company to have an independent compensation committee in place. This should ensure that the CEO's compensation is based on real motives and not affected by the CEO. This way, the CEO cannot determine their salary even though they would be the chairman of the board of directors.

3.2 Agency theory

Agency theory is one of the most common theories referred to in research articles covering CEO compensation. Dee, Lulseged, and Nowlin (2005) and Guo et. al. (2021) as an example refers to agency theory when talking about CEO compensation. According to Jensen and Meckling (1976), the theory says that if an external CEO runs a company, the owner-CEO relationship can be called an agent-principal relationship. This means that the CEO works as an agent for the principal. Agency theory is a well-known theory in corporate finance and relates directly to CEO compensation as executive compensation is used to solve issues related to this relationship. This means that the compensation package should be created so that the CEO works in the principal's best interest (Jensen & Meckling, 1976). In practice, this should mean that the CEO´s compensation package is linked to the owners' interests so that if the owners` wealth increase, so does the CEO.
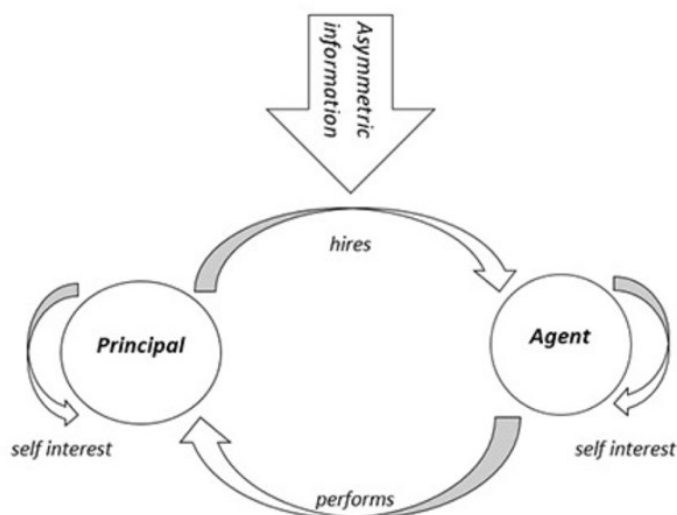
Figure 3. Agent-principal relationship

Jensen and Meckling (1976) argue that in some cases the agent and the principal are both maximizing their utility. As Figure 3 above shows, both the agent and the principal have self-interests. For the agent, the interest could be to maximize personal wealth. This would mean, making decisions that only benefit themselves. At the same time the owners, principals, might want to maximize their wealth. A short-term solution could be to minimize the costs of the company by for example paying lower salaries. This would not motivate the CEO much. Therefore, a compromise must be formed so that both sides of the relationship are happy. This should prevent the issues where the agent is maximizing their utility.

As there is a mismatch of interests, this leads to agency costs. Jensen and Meckling (1976) suggest that for example, monitoring of the CEO´s work creates monitoring costs. In practice, these can be consulting costs or board member costs whose job is to monitor the CEO. Additionally, if the CEO must be paid or forced to make a certain decision, the related costs are called bonding costs. The fact that the ownership and daily control are separated means that there are residual costs for the principals. If the CEO makes a decision that is not the most beneficial for the owners, this can be seen as a residual cost. All these costs combined for the agency costs. In practice, in a listed company, agency costs exist always. It is not possible that the CEO owns 100 percent of a listed company and therefore agency costs occur. In a private company, on the other hand, the CEO may

own the whole company. Still, agency costs can occur between the company and its creditors if the company has loans. So, agency costs are not only related to the CEO-owner relationship.

One way to reduce agency costs is to optimize the compensation package so that less monitoring is needed, for example. For example, a cash bonus target for the CEO could be set to support the owners´ willingness to achieve the decided goal. There are many other ways to reduce monitoring costs. These include auditing, control methods and systems, and budgeting restrictions (Jensen and Meckling, 1976). Using these methods, the owners can be sure that there is no need to monitor as far as the CEO stays within the set limits when it comes to budget for example. In practice, this would mean that a CEO is given an R&D budget of 1 million USD. If the owners see that this is a suitable level of risk-taking for the company, they do not have to monitor the CEO regarding the R&D expenditure if the CEO stays within the set limits. Alternatively, they could have decided not to set a budget restriction for the CEO when it comes to R&D expenditure but then they would have to monitor the CEO´s spending.

Additionally, bonding costs occur when something is restricted. For example, a debt covenant is one limitation (Jensen and Meckling, 1976). Debt covenant can limit certain business decisions or the price of the debt if certain financial figures are not met. Covenants are agreed upon when the debt contract is signed. While these limit the CEO´s possible actions and monitoring costs, another type of cost might occur. In practice, this would mean that certain attractive business opportunities must be passed because the covenants restrict the decisions. In this case, while monitoring costs are lower, the owners bear another type of cost as a lost opportunity cost. This highlights that regardless of the cost related to agency theory, the owners are always carrying the costs.

In summary, the agency theory highlights the issue with the agent-principal relationship when the control and ownership are separated. In such a situation, a compensation package should be created for the CEO, so that the incentives of the CEO are aligned with

the owners' incentives. This means that whatever the incentives are, the compensation package should support them. Additionally, there are costs related to this relationship, but auditing, different kind of restrictions, and control systems can be used to lower these costs. Regardless of the costs, the owners will always pay them directly or indirectly.

3.3   Managerial power theory

Chen, Ezzamel, and Cai (2011) define managerial power as the CEO´s (or manager´s) possibility to influence the company's board. A possible implication could be that the CEO can convince the board of directors that a certain compensation package is needed, even though this package would only benefit the CEO personally. An extreme example of managerial power is that the CEO is also the board's chairman. As the board´s job is to monitor the CEO´s work, there is a conflict of interest if the CEO is the board's chairman. Managerial power theory can be extended to multiple areas of the company but in this thesis the main focus is on CEO compensation. Chapas and Chassagnon (2021) find that the CEO compensation has been increasing even though the salaries on the lower levels of the company have not. This indicates that the CEO has power over the compensation committee. Managerial power theory contains four different areas: structural power, ownership power, political power, and prestige power. All these categories will be covered in this section and linked to CEO compensation.

Chen, Ezzamel, and Cai (2011) that structural power means power relationships based on an organization chart, basically the company's structure. Typically, one has more power the higher they are in the organization chart. This means that ultimately the CEO has power over everyone in the company except the board. The board should control the CEO, but this highlights the issue that if the CEO is the chairman of the board, then the CEO is managing themselves. Lambert, Larcker, and Weigelt (1993) point out that lower in the organization chart, the power decreases even though there are power relationships. This is typical because higher in the organization chart, better information is available and the ability to influence decisions is higher.

In some cases, the CEO can limit the information flow to the lower tiers of the organization just to raise their position. This could lead to a situation where wrong decisions are made due to the lack of correct information. It is easy to understand that this is not aligned with the owners´ motives where the CEO should act according to their best interest.

In Chen´s, Ezzamel´s, and Cai´s (2011) paper, ownership power is based on stock ownership. Logically owners of the company have a good possibility to influence the company's decisions. This creates an interesting situation as it has been highlighted earlier in this thesis that CEO ownership is a good way to align the incentives of the CEO. On the other hand, if the ownership increases too much, the CEO becomes too powerful and can decide what the company does instead of the board guiding the CEO. This could also lead to a situation where the CEO can affect their compensation package and the targets based on which bonuses are paid for example. Lambert, Larcker, and Weigelt (1993) highlight that in some cases, high CEO ownership might increase the CEO´s power in recruitment situations. They find that the CEO can select loyal people for key positions in the company so that they do not affect the CEO´s compensation decisions. This way it is easier to control the compensation package received as the loyal people around the CEO will support the CEO´s decisions. Their findings also support that the CEO has a higher influence on their compensation package the higher the ownership is. They argue that there is a positive correlation between the compensation level and ownership level.

The political power of the CEO refers to any linkage to a political party. Additionally, political power can be linked to governmental connections Chen, Ezzamel, and Cai (2011). In practice, this would mean that the CEO has some connection thru which they can affect the decisions made by the company. An excellent example is any dictatorship where the dictator can just announce that things will be done in a certain way. The CEO could have a linkage to the dictator and therefore the CEO could influence the decisions done by the dictator. In such a situation the power of the CEO comes from the political

connections. In the Western world, ownership and structural power are more significant, but it is good to understand that power can also be based on political activity.

The last category is prestige power based on the CEO´s merits. Chen, Ezzamel, and Cai (2011) link prestige power strongly to education, highlighting that higher education is typically linked to higher CEO compensation. Additionally, prestige comes from the CEO´s ways of working in the given environment. The prestige power is also higher if the CEO has board memberships outside the company. The principle is that the prestige power is based on the CEO´s CV. Therefore, the CEO can convince the board or anyone else easily when they have a strong track record of earlier high-profile roles.

3.4   Marginal productivity theory

Gomez-Mejia and Wiseman (1997) find that marginal productivity theory relates to CEO pay. They say that the marginal productivity of the CEO can determine the level of pay received. They find that supply and demand for the CEO can affect the CEO´s pay levels. In practice, if there is more demand for the CEOs than supply, the CEO's market price (salary) goes up. This would indicate why some CEOs receive high compensation.

Additionally, the theory can be extended into other marginal productivity factors such as company size or profitability. In practice, this would mean that the bigger the company the higher the CEO compensation is. A measure of company size is for example revenue or market cap. Ideally, this would mean that if the CEO can increase the profitability, they should be rewarded. Then, the CEO´s salary would be a function of the company's performance. Suppose the CEO compensation package is built according to this theory. In that case, it should support the CEO´s decisions to maximize the profitability of the company and shareholder value at the same time.

3.5   Governance theory

Corporate governance theory is one alternative theory that relates to CEO compensation. According to Becht and Jenkinson (2005), corporate governance has tried to solve issues related to CEO compensation. They state that CEO compensation is nowadays a key problem in corporate governance. The CEO might feel free to pursue any projects if correct governance is not in place. Therefore, the bigger idea behind corporate governance is to ensure that there are controls in place that ensure the CEO makes good long-term decisions that benefit the owners. The key problem is that as CEO pay has increased significantly during the earlier years of the 21st century, it raises the question of why this has happened. They find that the CEO compensation has increased in both cash and equity-based compensation. They argue that this could be because the company just wants to pay more to the CEO without proper reasons. From the governance point of view, this is not sustainable.

From the corporate governance point of view, this means that are there some other motives behind the pay increase in addition to the shareholders' incentives. The governance theory points out that even though equity-based compensation should solve issues related to agency problems, from the governance point of view, it has been hard to justify the increase in CEO compensation during the 21st century (Becht and Jenkinson, 2005). Governance theory in general is interested in conflict of interest.

What the corporate governance theory suggests is that the CEO compensation should be well communicated, the target of the CEO and pay should be clear and the compensation structure should be transparent. This would mean that the compensation committee is more accountable for their decisions. Such a system would highlight if the CEO's compensation is based on true merits or if there is something strange from a governance point of view. The CEO may be so capable of creating so much value for the shareholders that the company must increase the salary just to keep the CEO. Therefore, governance theory does not question the CEO compensation levels as such but highlights the motives behind the pay increases. Becht and Jenkinson (2005) highlight

that disclosure is important when it comes to governance, and this would promote transparency when it comes to the compensation packages of CEOs.

4   Literature review

This literature review section will cover some of the related literature on CEO compensation and risk-taking. This section highlights what has been done earlier, what kind of results have been found, and what kind of practical implications those have. The idea is to understand how the CEOs react to the compensation contract given to them. Additionally, the previous literature will show what tools the CEOs have to control the company's risk level.

4.1   Literature review of CEO compensation and risk-taking

As a lot of the older research in CEO compensation is interested in stock options, this section will first look at that. Williams and Rao (2006) find that CEOs react well to stock options. They suggest that stock options can be used as a tool to control the risk-taking incentives of the CEO. They find that the M&A volatility increases as the number of stock options increases but becomes less significant when the company size increases. Additionally, they find that the volatility of the equity correlates with stock-option-based compensation. One of the main takeaways from this paper is that the company size seems to matter, and smaller firms are more vulnerable to changes in CEO behavior as the option-based compensation changes.

Similarly, Armstrong and Vashishtha (2012) study how stock options affect risk-taking. Their main idea is to separate the risk components so that total risk (stock volatility) is separated into two components. The components are a systematic and idiosyncratic risk. They find that CEO´s sensitivity to stock volatility (vega) is linked to the company's systematic risk but not to idiosyncratic risk. This means that the CEOs´ are not interested to increase the company-specific risk regardless of the compensation contract. Their results are like Kim, Patro, and Pereira (2017) who find that stock options do not increase the risk-taking incentives of the CEO.

The following papers will show how CEOs can control the riskiness of their companies. Coles, Daniel, and Naveen (2006) have a similar research setup to the previous paper. However, the results differ. They find study if compensation contracts can affect critical business decisions such as real asset investments or R&D investments. Their idea is that the CEO can alter between these two types of investments based on their risk-taking incentives. They highlight that R&D investments are seen as the riskier choice. They find that if the CEO is sensitive to the company's stock volatility, riskier choices are preferred.

In addition to what has been written earlier, Kim, Patro, and Pereira (2017) study how leverage indicates risk-taking. Their study aims to understand how the CEO behaves in a high-leverage company. High-leverage companies are selected as the creditors are carefully monitoring the company. This can be understood as an agency cost, where the bank-company relationship creates monitoring costs as mentioned earlier in this thesis. Their research proves that in certain situations career concerns of the CEO, financial distress, and the creditors´ active monitoring decrease the risk-taking incentives of the CEO. This seems to indicate that careful monitoring is a good tool to control the CEO.

Similarly, Chu, Liu, Ma, and Li (2020) use loan contracts of the company to study how the CEO compensation and especially stock options increase CEO´s willingness to take risks. Their idea is that if the market thinks that the riskiness of a company has increased, the loan spread gets wider, which means that the cost of debt increases. While typical research treats all companies similarly, Chu, Liu, Ma, and Li (2020) argue that company-specific characters should be considered more carefully. This means that as certain industries are riskier than others, this factor should be considered so that the companies are only compared against similar companies. This way industry specific characters shouldn´t mix the results.

The results from Chu, Liu, Ma, and Li (2020) and Kim, Patro, and Pereira (2017) are similar. Kim, Patro, and Pereira (2017) find that in high-leverage companies, the CEO tends to decrease the company's riskiness regardless of the compensation contract. Additionally,

Chu, Liu, Ma, and Li (2020) find that the cost of debt has decreased since the adoption of FAS123R. FAS123R is an accounting standard that requires companies to expense all stock options, making them less attractive. This has caused a shift away from stock options into stock-based compensation. Chu, Liu, Ma, and Li (2020) indicate that this might explain the decrease in risk-taking, and after the accounting standard adoption, the cost of debt has decreased. Carline, Pryschepa, and Wang (2023) also study the implications of FAS123R. Their findings support the view that FAS123R has decreased the risk levels of the companies as the standards made stock options less interesting. They further support the view that CEO compensation can cause costs to the shareholders as the CEO might not be acting in the owners' best interest.

What the literature review section has been able to show this far is that CEO compensation has consequences. In theory, stock-option-based compensation should increase the risk-taking incentives of the CEO, but in certain situations, there are constraints. For example, already high leverage might cause a situation where getting more debt from the market is impossible. Therefore the CEO cannot increase the riskiness of the company by using more debt. Kim, Patro, and Pereira (2017) investigate this and find that the CEOs´ are not interested in increasing the company's riskiness in such a situation. The concerns of bankruptcy and possible future career concerns lead to a situation where the CEO is decreasing the company's riskiness. This indicates that CEOs have personal interests. However, Coles, Daniel, and Naveen (2006) highlight that if the CEO wants to increase the company's riskiness, it is typically done via increasing R&D investments. This is logical as the outcome of such investment is uncertain and therefore this should increase the company's volatility. Stock-option-based compensation makes the CEO sensitive to the stock's volatility change; therefore, the CEO might have personal incentives to increase the volatility of the stock.

Hsin-han Shen and Zhang (2013) find results that support the last statement. They study how firm performance changes after an increase in R&D investments. They investigate how efficient the R&D investments are and if the efficiency and returns of those

investments are linked to the compensation contract of the CEO. They find that high vega makes the CEO interested in R&D investments as the CEO has the personal benefit from the increased volatility. They find that high vega is associated with low R&D investment returns, indicating that the R&D investments are done just to increase the stock volatility and personal wealth. Additionally, they find that low vega is associated with high R&D returns, further proving the statement.

This highlights how important it is for the compensation committee to understand the compensation contract's effects. This means that when the decision on the compensation contract is made, that will guide the CEO´s interest in a certain direction. As shown here, stock-option-based compensation might cause unwanted risk-taking, so stock-based compensation might be preferred.

Similarly, other studies such as Dong, Wang, and Xie (2010) examine how the company's capital structure can indicate risk-taking. They argue that every firm has an optimal capital structure, and any deviation from this structure indicates risk-taking. An increase in leverage especially. They can find that stock options do increase risk-taking and lead to a suboptimal capital structure. This means that the CEO is increasing the company's leverage to a suboptimal level and therefore the shareowners bear the cost of this.

The literature review has been able to highlight this far that there are multiple different methods to look at when analyzing the implications of the CEO compensation contract. For example, Dong, Wang, and Xie (2010), Chu, Liu, Ma, and Li (2020), and Kim, Patro, and Pereira (2017) look at the loans of the company from multiple different points of view. The idea remains even though one study looks at leverage, another looks at capital structure and the third looks at loan spreads. All these studies are interested in balance sheet items, especially loans.

On the other hand, Hsin-han Shen and Zhang (2013) and Coles, Daniel, and Naveen (2006) look at the R&D investments of the company as a risk measure. This indicates that there

are multiple ways for the CEO to control the company's riskiness, and investment and financing decisions are the key items that the CEO controls.

Shaw (2012) has been focusing on loan contracts and especially the cost of debt. What he finds is supporting the previous studies. He finds that higher equity-based compensation indicates a higher debt cost, which is visible as a higher spread. Interestingly, he further highlights that an especially high delta lowers the company's debt cost. This means further supports why there is a point to move from stock-option-based compensation into stock-based compensation. While Chu, Liu, Ma, and Li (2020) find that the accounting treatment explains part of the reason behind the transfer away from stock options, there are multiple other factors.

Benischke, Martin, and Glaser (2019) study how behavioral factors affect CEO´s decisions and they find that the CEO´s personality matters when analyzing the response to the given compensation contract. They show that different CEOs react differently to stock options due to personality reasons. Therefore, they suggest that earlier conclusions, where the basic assumption has been that all CEOs react the same way, are not entirely accurate. They suggest that it is especially important to understand each CEO´s personality before the compensation committee can create a suitable compensation contract. They further highlight the fact, which has been stated in this thesis multiple times. The CEO´s compensation contract should reflect the company´s strategy in the first place. This means that it is understandable if the compensation contract of the CEO includes stock options to increase the risk-taking incentives. In such a situation the board must understand the implications of the given contract. It must be understood that such a contract will on average lead to an increase in risk-taking as shown earlier in this literature review section.

4.2 Literature related to financial institutions

As financial institutions differ from "regular" companies, those are typically excluded from the datasets used in research. As the dataset of this thesis includes such companies, it is worthwhile to look at the literature regarding the banks.

Bolton, Merhan, and Shapiro (2015) find that compensation contracts increase risk-taking significantly in the banking industry that they suggest that regulatory parties should intervene. They find that the compensation contracts shake the financial stability of the system. They use CDSs as an indicator of risk, and CDS can be seen as an indicator for the price of debt similarly as in Shaw´s (2012) study. Bolton, Merhan, and Shapiro (2015) suggest that if the CDS spread increases too much, the financial institutions should be able to withdraw the bonuses. These findings further support the view presented in this thesis that a compensation contract is a key tool for the compensation committee to guide the CEO´s interests. This highlights that the CEOs react relatively well to the given compensation contract, which makes it such a good tool. The key takeaway from Bolton, Merhan and Shapiro's (2015) study is that the measure of risk has to be selected carefully especially if that affects the bonuses of the top management. Many other researchers such as Armstrong and Vashishtha (2012) suggest that looking at volatility or beta is important. Still, Bolton et. al. (2015) disagrees as in their opinion such measures do not provide the correct picture of the increased risk level.

Interestingly, Pathan, Haq, and Morgan (2022) recommend that having an absolute pay limit for bank CEOs would increase risk-taking. The results are mixed with Bolton´s, Merhan´s, and Shapiro´s (2015) results presented earlier. They suggested that the regulatory parties should intervene but Pathan, Haq, and Morgan (2022) suggest that such an act would worsen things. They find that CEO power (visible as a higher pay) is good for the company as that decreases the risk-taking incentives of the CEO. The CEO tends to decrease the riskiness of the company so that they can keep their well-paying job. In theory, the CEO is playing it safe so that they can continue in the CEO position. This further supports the view that CEO´s personal characteristics and behavior matter

in the risk-taking actions. Kim, Patro, and Pereira (2017) find similar results from highly leveraged corporates. They also suggest that the CEO might decrease the leverage due to their personal career or reputation concerns.

Gande and Kalpathy (2017) suggest that limiting CEO compensation to some maximum amount is not a suitable way to control risk-taking. They do not agree with the policymakers´ one-size fit for all approach in possible limitations. Additionally, their view supports the idea of Pathan, Haq, and Morgan (2022), where the researchers suggest that the pay gap would increase risk-taking. Gande and Kalpathy (2017) study the financial institutions´ CEOs´ behavior from a compensation point of view before the financial crisis. They find that high risk-taking incentives before the financial crisis led to a more certain need for emergency funding during the crisis. In the financial institutions´ scope, they raise questions about the financial system´s stability. As banks and other financial institutions are such critical parties in the financial system´s stability the compensation contracts and possible regulatory framework should reflect this significance.

It seems to be a common trend in the literature regarding CEO compensation in the financial sector that the researchers suggest that the risk-taking incentives should be carefully controlled. Chen, Steiner, and Whyte (2006) conclude that some sort of regulation should be in place to control the risk-taking incentives that stock options create. Their recommendation is based on the findings that bank CEOs react to stock-option-based compensation so that it increases their incentives to take risks. Hagendorff and Vallascas (2011) find similar results when looking at bank mergers after the deregulation in 1999. They conclude that stock options increase the risk-taking incentives of the bank CEO.

What the whole literature review section highlight is that CEOs should respond to the compensation contract given to them. This means it is possible to control the CEO's behavior and focus by adjusting the compensation contract. Based on the literature

review section, especially stock options increase risk-taking. Typical measures for risk-taking are changes in R&D expenditure, M&A activity, and leverage. These have been typical variables in the presented research papers. This literature review section highlights that while equity-based compensation aligns with the incentives of the CEO and the owners, it additionally increases the risk-taking of the CEO. Therefore, the compensation contract and its implications must be understood when creating the compensation package. Based on the literature review it can be said that the compensation package of the CEO can be changed as the tenure of the CEO changes and the company grows. For example, at the beginning of the CEO´s tenure, the compensation package could include stock options, but a shift to stocks can later be done. This way the compensation package can be adjusted to fit the company´s current needs and wills.

5 Data and methodology

This section will present the data used for the empirical part of the thesis. Additionally, the research methodology and possible limitations of the data are presented. The data section will describe how the data is collected and from which sources. This is done to increase the transparency of the research. The methodology section will present the main regression models for this thesis and discuss why those methods were selected. The limitations section will highlight what issues the dataset creates and what should be considered when analyzing the results.

5.1 Data

Data for this thesis can be divided into three different sections. The first section of the data is regarding the compensation data itself. Second part of the dataset is the stock market volatility data. The last part of the data concerns company-specific data from companies´ balance sheets and income statements.

5.1.1 Compensation data

Compensation data for this thesis is manually searched from the annual reports and remuneration reports of the 61 biggest Finnish stock-listed companies in March 2023. The reports used are from every company´s investor relations website where all the published material is available. The years of compensation data cover years from 2015 until 2021. This dataset should be able to capture the most significant compensation methods in the Finnish stock market as the dataset covers the most significant companies. Therefore, the dataset should be able to provide meaningful and up-to-date insights into CEO compensation in Finland.

Finnish companies such as Neste (2022) and other Finnish companies report their compensation as base salary, short-term incentive package (STIP), long-term incentive package (LTIP), and other compensation. Therefore, the data collection for the empirical

analysis of this thesis will follow the model the companies report in Finland. This decision is done to make the dataset as reliable as possible so that manual adjustments to the figures are minimal. The way the Finnish companies report their compensation figures differs from how the theory sees it. As mentioned, Finnish companies do not report their compensation figures as base salary, bonus, stock-based compensation, option-based compensation, and other compensation.

In the Finnish dataset, the base salary is the monthly salary paid to the CEO. Some companies reported certain benefits, such as car, mobile phone, and housing, included in the single base salary figure disclosed. On the other hand, some other companies did report these benefits as other compensation. In such cases, these benefits are considered as other compensation. However, if the exact amount of the benefits is not disclosed, the benefits are then included in the base salary figure. STIP is the bonus paid based on last financial year´s performance and is counted as part of the compensation on the year it is paid. This means that a bonus paid in 2021 based on 2020 performance is counted as a part of the total compensation for 2021.

LTIP is a longer-term compensation method that covers a longer evaluation period, typically three years. LTIP is the closest alternative to stock-based compensation mentioned in the literature. In Finnish reporting, in the rare case that option-based compensation did occur, it was reported as LTIP. The LTIP is a performance method that is tied to certain strategic targets. For example, Neste (2022) says that the LTIP is based on the stock performance compared to the STOXX 600 Europe index. In addition, the company's greenhouse gas emissions affect the outcome of this incentive. Even though a differentiation between stock and option-based compensation is not made, the LTIP aims to align the CEO´s long-term interests with the owners´ incentives. Therefore, LTIP is a suitable variable for this thesis. From the pure data point of view, any compensation reported as a long-term incentive is used as LTIP in this thesis. This is partly from the practical point of view and the simple reason that such an arrangement creates more

comparable figures between the companies as manual adjustments are almost non-existent.

The other compensation figure in this thesis dataset includes all other compensation that does not fall under base salary, STIP, or LTIP. Most companies report benefits as a separate compensation part. In such a scenario, phone, car, and housing benefits are considered as other compensation. For example, the additional pension benefit is considered as other compensation in this thesis. Some companies report the CEO's mandatory pension expenses as a separate line in their annual review, but that line is excluded in this thesis. In this thesis, one-time compensation methods such as termination bonuses and success bonuses after a successful M&A deal are counted as other compensation. The most significant other compensation methods found are the additional pension payments and certain one-time bonuses after an M&A deal or termination bonus.

5.1.2 Stock market data

The stock market data for the OMX Helsinki price index is gathered from Nasdaq. The stock index daily closing prices period covers 2015 until the end of 2021. Based on these daily closing prices, the average volatility of the stock index is calculated using a 365-day standard deviation of the returns. The whole OMX Helsinki price index is chosen because the 61 companies selected form most of the market value of the stock market in Helsinki. An alternative stock index would have been the OMXH 25 index which only contains 25 biggest companies but for this thesis, the OMX Helsinki price index was a better alternative.

Additionally, the company-specific volatilities are calculated based on daily closing prices extracted from Nasdaq´s website (2023). If a company has two stock series listed on the Helsinki stock exchange, a more liquid stock series is selected for the analysis. The method for the volatility calculation is comparable to how stock-market volatility is calculated. This means that the stock's daily returns are calculated and then the standard

deviation of the returns during a year is calculated. Beta for every year and every company in the dataset is manually calculated based on the daily returns of the stocks.

5.1.3 Company-specific data

Company specific data comes from the Orbis database. The dataset is used to extract possible control variables such as revenue, total assets, net income, number of employees, R&D expenses to revenue ratio, and profit margin. These figures will be used as control variables in the regression model. Additionally, company leverage is self-calculated based on total liabilities excluding equity divided by total assets. Leverage will be also used as a control variable. The banks do not have leverage available from Orbis directly. Therefore, the banks´ leverage is calculated by hand from their balance sheets by year. The balance sheets are taken from the companies´ investor relations websites.

As previous literature typically excludes banks from the dataset and this thesis wants to include them, certain arrangements must be made. To consider this, a classification of companies´ industry is made based on Kauppalehti (2023) classification. Such classification is made so that the banking industry can be included in the dataset regardless of the nature of the industry. Additionally, this arrangement should indicate if there are differences in significance between any other industry. The industries Kauppalehti classifies are oil and gas, basic material industry, industrial products and services, car industry and accessories, beverages, household goods, healthcare, retail, communications, travel and leisure, IT, finance, real estate, technology, consumer goods, public interest industry and other. This classification will be used in this thesis´ dataset. After analyzing the dataset, the "other" classification can be excluded as no company represents that sector.

5.1.4 Summary of the dataset

The dataset of this thesis contains 377 different observations covering 61 different companies. Data is collected from 2015 until the end of 2021. Some companies have

only one or two observations due to a recent IPO, but most companies cover the whole seven-year period. Descriptive statistics of the dataset are presented later in this thesis.

5.2 Methodology

The empirical methodology of this thesis will follow what Peltomäki et. al. (2021) have done. The idea is to use total risk meaning stock volatility as a dependent variable. Additionally, another regression is done where the stock's beta coefficient is used as a dependent variable, and the beta coefficient should be able to capture the company's systematic risk.

Independent variables for the regression are base salary, Short-term incentives (STIP), long-term incentives (LTIP), and other compensation. The logarithmic value of all compensation figures is taken to control for the abnormal distribution of the variables. Control variables include total assets as a logarithmic value, number of employees as a logarithmic value, R&D expenses to operation revenue, profit margin, leverage, and industry dummy variable. This research setup is similar to what Peltomäki et. al. (2021) use. Due to the limitations of the Orbis dataset, the regressions are done using two datasets. One dataset does not have the R&D expenses to operating revenue as that figure was not available for all the companies in the dataset. Therefore, when using the full dataset, the R&D expenses to operating revenue are excluded. This thesis wants to include the R&D expenses as an independent variable as previous literature such as Hsin-han Shen and Zhang (2013) and Coles, Daniel, and Naveen (2006) have found that ratio to be meaningful when it comes to the effects of CEO compensation.

Based on what has been said earlier the regression models 1 and 2 will be as below:

$$(1) \quad \sigma = \alpha + \beta 1 \, Base \, salary + \beta 2 \, STIP + \beta 3 \, LTIP + \beta 4 \, other + \gamma(Firm \, specific \, control \, variables)$$

$$(2) \qquad Beta \ = \ \alpha + \ \beta 1 \ Base \ salary + \ \beta 2 \ STIP + \ \beta 3 \ LTIP + \ \beta 4 \ other$$
$$+ \ \gamma(Firm \ specific \ control \ variables)$$

5.3 Limitations of the data and methodology

As in any research, there are some limitations to the dataset and methodology selected. This section of the thesis will highlight some of the limitations noticed while writing the thesis to increase the transparency of the empirical research. This way it is possible to identify gaps in this thesis which can then be used as a base for future research and as a learning opportunity for the future.

The first limitations regarding the dataset are the dataset's manual collection process and the thesis's geographical area selection. Collection data manually from the remuneration reports and annual reviews of the companies always creates the issue that not all companies report the data similarly. This means that some companies report certain benefits such as mobile phone and car benefits as a part of base salary and do not disclose the amount of benefits paid. On the other hand, other companies report the same benefits as other compensation. In terms of this thesis, this means that the dataset is mixed so that the other compensation column in the dataset includes the benefits in other compensation if the exact amount of benefits paid is disclosed. Additionally, compared to previous literature, Finnish companies report only the base salary, STIP, LTIP, and other compensation. This is not entirely aligned with previous literature, but the dataset will be used, nevertheless.

Limiting the study to the Finnish stock market and using recent data from 2015 until 2021 creates another issue. As the data is not available from a database directly, the dataset for this thesis is not massive. 377 observations are not ideal, and the number is even lower for the regression where the effects of R&D expenditure are analyzed. The biggest limit is convenience. Even though a target size should be closer to one thousand, it must be understood that collecting such a number of observations by hand, is not convenient. The Finnish stock exchange has its limitations too. Only 147 companies are listed in

March 2023 on the Helsinki stock exchange´s main list (Kauppalehti, 2023). This means that nearly 10 years should have been selected to get the desired more than a thousand observations, given that some observations have to be excluded anyway. Using a 10-year period would create other issues such as the relevance of the older data.

The regression model used for this thesis is basic OLS regression. This means that the more sophisticated research methods are not used and therefore the most accurate results might not be available. Additionally, this research might not have been able to use all the independent variables. This means that future research could try to find additional independent variables to use in the regression model. On the other hand, this comes back to the same point as discussed earlier given the geographical limitations of the thesis, not all data is available directly from the databases. Selecting more exotic independent variables would possibly mean that such data should be collected manually from the annual reviews of the companies.

6 Empirical research

This section of the thesis will show the empirical results and present the overall picture of the CEO compensation structure in Finland. The first part of this section will show how CEOs are compensated in Finland, the mix between variable and fixed compensation in Finland, and present the descriptive statistics of the regression model. The second section will go present the regression results and conclude the final results of this thesis.

6.1 Compensation in Finland

6.1.1 Graphical presentation of the CEO compensation

Below figure 4 shows how the CEO compensation is divided into fixed and variable. In the context of this thesis, base salary, and other compensation are considered fixed compensation, and STIP and LTIP for the variable compensation part. As the figure below shows the CEO compensation in Finland is divided roughly 50-50 into fixed and variable compensation. This means that the CEO receives half of the realized salary regardless of the company's financial performance. That on the other hand means that the CEOs in Finland do not necessarily have the needed incentives to make excellent decisions on behalf of the shareholders. Ideally, most of the CEO compensation should be tied to the financial and share performance of the company. This way the compensation structure would create the CEO incentives to make even better long-term solutions.

Below figure 4 tells also that while there are changes between the years 2015 and 2021, the changes are not big. The lowest figure for fixed compensation has been 46,6 percent and the highest is 55,9 percent. This further highlights that the mix between fixed and variable compensation is steady year-on-year.
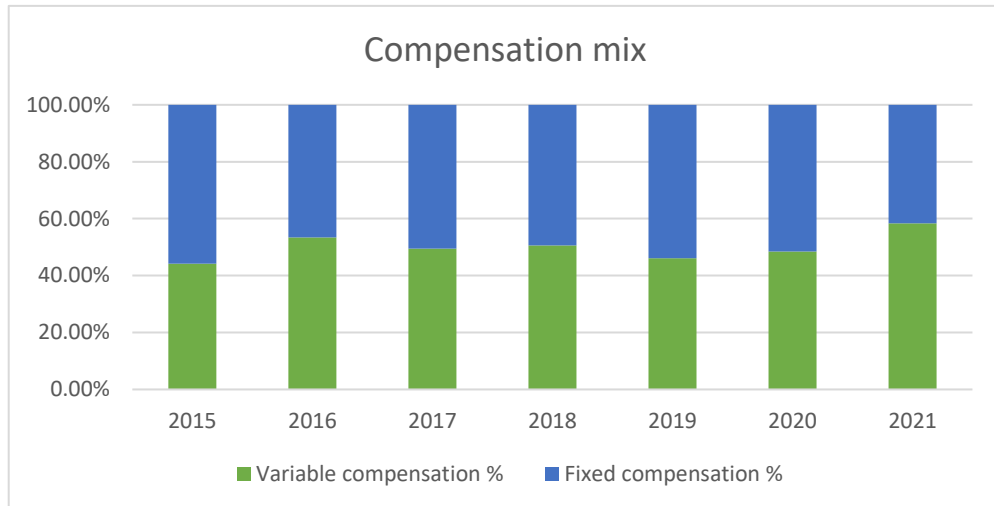
Figure 4. Compensation mix

Figure 5 shows how the average CEO compensation is structured in Finland from 2015 until 2021. Based on Figure 5, the base salary for the average CEO is roughly 650 thousand euros yearly, short-term incentives are 250 thousand euros yearly, long-term incentives are around 600 thousand euros yearly, and other compensation in the same 200-thousand-euro region as short-term incentives. It seems that these figures do not vary much between the years. Further analyzing the compensation structure based on figure 5, the base salary and long-term incentives are the most significant parts of the total compensation. On the other hand, overall high base salary might not be the most suitable option from the owners´ point of view.
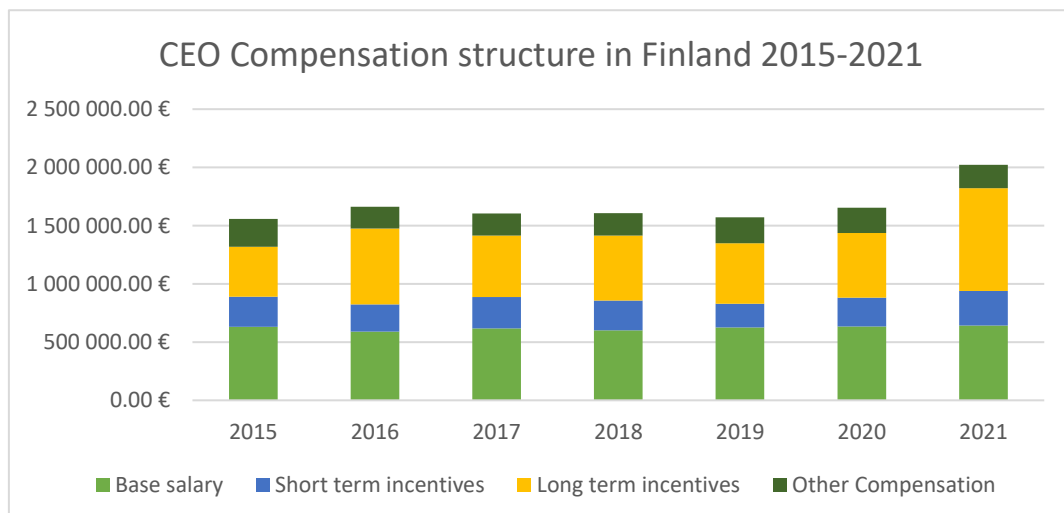
Figure 5. CEO compensation

As figure 5 presents, the base salary and the bonus are flat over time. While there are small deviations in the short-term incentives, the base salary is the same year on year. Interestingly, many companies reported the same base salary for their CEO multiple years in a row. That indicates that the variation in individual CEO´s pay comes from the other compensation factors. This is as it should be. The short-term incentives show some variation year on year, but not much. The main reason is that the amounts are relatively low. Therefore, in a bigger sample, the deviation of individual CEOs´ bonus figures year on year disappears. In the bigger picture, the bonus seems roughly the same every year.

Figure 5 highlights that other compensation has decreased from the 2015 levels. This is explained mainly as a decrease in additional pension benefits. It is visible in the remuneration reports of the companies that after around 2015 or 2016 if a CEO is changed the additional pension benefit is terminated. All the components seem to be flat throughout the period. The outlier is the long-term incentives in 2021. QT Group paid 26,8 million euros as long-term incentives to their CEO. That was due to expiring stock options. Such a big amount in a relatively small dataset is visible as a peak in long-term incentives. The long-term incentives component also seems to be flat over time.

What is also noticeable from figure 5 is that long-term compensation is more significant than short-term compensation. While the roughly 50-50 mix between fixed and variable compensation might be a negative thing, the fact that long-term compensation is the bigger portion of the variable compensation is a good thing. This means that the variable compensation is based on good long-term decisions. According to the remuneration reports such as Neste (2023), long-term compensation is typically tied to either stock performance over three years and strategic long-term targets or exclusively to the stock performance. All in all, this means that while the portion of the variable compensation is lowish, the variable compensation is mainly tied to long-term goals.

The conclusion from the compensation figures is that the deviations between years are small. That can be seen as a worrying thing as it is hard to believe that the years would have been similar from the financial point of view. 2020 and 2021 were years of the COVID-19 pandemic and even those years and the financial challenges are not visible in the compensation figures. This raises a question for future research, what is the base for compensation in Finland? While the total compensation level of the CEO is good, there should be a variation in the average figures between the years because the financial performance of the companies varies from year to year, and therefore so should the CEO compensation.

6.1.2 Descriptive statistics

Table 1 presents the descriptive statistics of the compensation for the whole dataset. All figures are in euros. As the table suggests, the total compensation in Finland is between 130 thousand and 27,5 million EUR yearly. The 27,5 million EUR is the QT Group´s outlier for the year 2021,

Descriptive statistics for compensation figures

	Base salary €	Short-term incentives €	Long-term incentives €	Other compensation €	Total compensation €
Mean	621 203,00	252 275,00	596 890,20	206 580,60	1 678 341,00
Median	550 000,00	179 000,00	168 819,00	59 919,00	1 110 494,00
Maximum	2 149 029,00	2 975 781,00	26 821 800,00	2 267 880,00	27 473 112,00
Minimum	93 540,00	-	-	-	129 180,00
Standard deviation	315 485,40	317 718,60	1 635 235,00	332 057,00	1 956 979,00
Skewness	1,135	3,791	11,526	9,558	6,896
Kurtosis	4,615	28,005	178,102	9,558	83,052
Observations	377	377	377	377	377

Table 1. Descriptive statistics, compensation, full dataset

when the CEO exercised stock options and received a big yearly compensation. Additionally, what is interesting in this dataset is that short-term compensation, long-term compensation, and other compensation can be zero. This means that the CEO might only receive the base salary in a given year. As can be seen, the standard deviations are quite high for all the parameters, indicating that the realized compensation varies year on year. The base salary column highlights the issue with the Helsinki stock

exchange. Even the base salary varies between the minimum amount of 93540 euros and the maximum amount of 2,15 million euros. This shows how big of a size difference there is between the companies as the base salary somewhat relates to the company´s size meaning that bigger companies pay bigger base salaries.

Descriptive statistics for compensation figures, logarithmic values

	Base salary €	Short-term incentives €	Long-term incentives €	Other compensation €	Total compensation €
Mean	13,21	9,82	8,46	8,44	13,97
Median	13,22	12,10	12,04	11,00	13,92
Maximum	14,58	14,91	17,10	14,63	17,13
Minimum	11,45	-	-	-	11,77
Standard deviation	0,51	4,95	6,25	5,31	0,83
Skewness	-0,240	-1,401	-0,560	-0,799	0,127
Kurtosis	3,004	3,149	1,426	1,918	2,966
Observations	377	377	377	377	377

Table 2. Descriptive statistics, compensation figures, logarithmic scale

Table 2 above presents the compensation figures as logarithmic values. These figures are used in the regressions but for practical reasons presenting compensation figures in euros in table 1 makes understanding those figures easier.

Descriptive statistics for dependent variables

	Volatility	Beta
Mean	0,307	0,810
Median	0,287	0,777
Maximum	0,894	2,259
Minimum	0,130	-0,183
Standard deviation	0,106	0,402
Skewness	1,461	0,519
Kurtosis	7,045	3,112
Observations	377	377

Table 3. Descriptive statistics, dependent variables, full dataset

Table 3 presents the descriptive statistics for the dependent variables for the whole dataset. Beta is calculated against the Helsinki stock exchange´s price index and using daily returns, and volatility is also calculated using the standard deviation of the daily returns. As the table shows, both beta and volatility vary a lot. Volatility varies between

0.12 and 0.89 meaning that the volatility has peaked at 89 percent for one company. Additionally, beta varies between -0.18 and 2.25 meaning that some companies have very high systematic risk at 2.25. On the other hand, the dataset includes a defensive company where beta is only -0.18.

Descriptive statistics for dependent variables

	Volatility	Beta
Mean	0,309	0,907
Median	0,298	0,884
Maximum	0,717	2,259
Minimum	0,139	-0,037
Standard deviation	0,098	0,418
Skewness	1,139	0,339
Kurtosis	4,957	2,834
Observations	247	247

Table 4. Descriptive statistics, dependent variables, limited dataset

Table 4 presents the descriptive statistics for the limited dataset. This means that certain industries are excluded to examine how R&D expenses affect the regressions. What the exclusion does for the main dependent variables is that the maximum volatility decreases from 0.89 to 0.72. This indicates that one of the excluded companies had an extremely high volatility of 0.89. In a bigger picture from a volatility and beta point of view, the two datasets used do not differ much, and it seems the data is somewhat consistent in both datasets.

Descriptive statistics for control variables

	Leverage	Total assets (LOG)	Profit margin	Number of employees (LOG)	Number of employees ABS
Mean	0,56	7,40	0,14	8,09	9 528
Median	0,57	7,63	0,10	8,39	4 413
Maximum	2,43	13,27	2,58	11,54	103 083
Minimum	0,12	2,90	-0,75	3,74	42
Standard deviation	0,20	1,92	0,22	1,69	15 298
Skewness	2,10	0,09	5,62	-0,37	4
Kurtosis	20,67	3,11	59,17	2,32	20
Observations	377	377	377	377	377

Table 5. Descriptive statistics, control variables, full dataset

Table 5 presents the descriptive statistics of the control variables of whole dataset. The control variables are leverage which is presented as a percentage, the logarithmic value of the total assets, profit margin in percentage, and the number of employees as a logarithmic value. As the profit margin and the number of employees column and profit margin suggest, the dataset includes different kinds of companies. In absolute terms, number of employees varies from 42 to 103000. This further highlights the differences in companies listed on the Helsinki stock exchange.

Descriptive statistics for dummy variables

	Basic materials	Car industry	Communications	Consumer goods	Finance	Food and Beverages	Healthcare	Household goods
Mean	0,1114	0,0186	0,0371	0,01857	0,1459	0,0477	0,0451	0,0584
Median	0	0	0	0	0	0	0	0
Maximum	1	1	1	1	1	1	1	1
Minimum	0	0	0	0	0	0	0	0
Standard deviation	0,3151	0,1352	0,1893	0,1352	0,3535	0,2135	0,2078	0,2347
Skewness	2,4701	7,1327	4,8956	7,1327	2,0063	4,242	4,3845	3,7681
Kurtosis	7,1016	51,876	24,9671	51,876	5,0253	18,9946	20,2237	15,1983
Observations	377	377	377	377	377	377	377	377

	Industrial products	IT	Oil	Public interest	Real estate	Retail	Technology	Travel
Mean	0,2732	0,0928	0,0186	0,03714	0,0345	0,0212	0,0159	0,0186
Median	0	0	0	0	0	0	0	0
Maximum	1	1	1	1	1	1	1	1
Minimum	0	0	0	0	0	0	0	0
Standard deviation	0,4462	0,2906	0,1341	0,1893	0,1827	0,1443	0,1253	0,1351
Skewness	1,018	2,806	7,1327	4,8956	5,1025	6,6443	7,7362	7,1327
Kurtosis	2,0361	8,8737	51,8761	24,9671	27,0357	45,1467	60,8495	51,8761
Observations	377	377	377	377	377	377	377	377

Table 6. Descriptive statistics, dummy variables, full dataset

Table 6 presents the descriptive statistics of the dummy variables. What can be seen from the table is that most of the companies in the dataset are operating in finance, industrial products, or the basic material production industry. What is also noticeable from the descriptive statistics is that there is less than 20 datapoint in many dummy

variables. For future research combining some of the dummy variables could be considered.

Descriptive statistics for compensation figures

	Base salary €	Short-term incentives €	Long-term incentives €	Other compensation €	Total compensation €
Mean	686 325,60	301 807,10	722 817,20	235 203,50	1 946 153,00
Median	628 518,00	220 748,00	263 000,00	116 000,00	1 537 148,00
Maximum	2 149 029,00	2 975 781,00	26 821 800,00	1 490 000,00	27 473 112,00
Minimum	191 163,00	-	-	-	257 025,00
Standard deviation	301 214,50	355 054,10	1 946 945,00	316 314,00	2 192 980,00
Skewness	1,331	3,739	10,214	1,783	7,046
Kurtosis	5,402	25,119	132,928	5,859	76,817
Observations	247	247	247	247	247

Table 7. Descriptive statistics, compensation, limited dataset

Table 7 and the following descriptive statistics will present the dataset where consumer goods, finance, travel, and retail industries are excluded. This is done because R&D expenses to operating revenue wanted to be used as a control variable. These industries are selected because R&D expenses to operating revenue figure were unavailable for the companies in these industries from the Orbis database. It is understandable as the retail industry is not necessarily selling goods they produce themselves but buying goods from abroad and selling in Finland to the customers. This limited dataset only has 247 observations on the lower side, but the analysis wanted to be done because R&D expenses are such an interesting variable.

Descriptive statistics for compensation figures, logarithmic scale

	Base salary €	Short-term incentives €	Long-term incentives €	Other compensation €	Total compensation €
Mean	13,35	10,51	9,10	9,00	14,19
Median	13,35	12,30	12,49	11,66	14,25
Maximum	14,58	14,91	17,10	14,21	17,13
Minimum	12,16	-	-	-	12,46
Standard deviation	0,42	4,55	6,14	5,24	0,73
Skewness	0,115	-1,797	-0,751	-0,978	0,330
Kurtosis	3,023	4,453	1,686	2,215	3,505
Observations	247	247	247	247	247

Table 8. Descriptive statistics, compensation, logarithmic scale, limited dataset

Table 8 presents the compensation figures of the limited dataset as a logarithmic value. This is done for the same reason as earlier: absolute figures are easier to understand than logarithmic values.

Descriptive statistics for control variables

	Leverage	Total assets (LOG)	Profit margin	Number of employees (LOG)	R&D expenses to operating revenue	Number of employees ABS
Mean	0,53	7,62	0,12	8,61	0,03	12 263
Median	0,55	7,83	0,08	8,84	0,01	6 803
Maximum	2,43	11,92	2,58	11,54	0,25	103 083
Minimum	0,12	2,95	-0,24	3,74	-	42
Standard deviation	0,19	1,63	0,23	1,45	0,54	17 529
Skewness	3,88	-0,27	8,23	-0,66	2,37	3
Kurtosis	42,22	2,83	82,19	3,44	7,60	16
Observations	247	247	247	247	247	247

Table 9. Descriptive statistics, control variables, limited dataset

Table 9 presents the control variables´ descriptive statistics for the limited dataset. All the figures are calculated the same way as for the whole dataset. An additional variable here is the R&D expenses to operating revenue which is presented in percentage. The minimum for that variable is zero and the maximum is over 25 percent. Median R&D investments in this dataset are 1.16 percent. Mean leverage on the other hand seems to decrease which is a clear indication that banks have such high leverage that excluding those will decrease the mean leverage of the dataset.

Descriptive statistics for dummy variables

	Basic materials	Car industry	Communications	Consumer goods	Finance	Food and Beverages	Healthcare	Household goods
Mean	0,1700	0,0283	0,0283	0	0	0,0729	0,0486	0,0445
Median	1	0	0	0	0	0	0	0
Maximum	1	1	1	0	0	1	1	1
Minimum	0	0	0	0	0	0	0	0
Standard deviation	0,3764	0,1663	0,1663	0	0	0,2605	0,2154	0,2067
Skewness	1,7566	5,6846	5,6846	NA	NA	3,2864	4,1993	4,4160
Kurtosis	4,0858	33,3149	33,3149	NA	NA	11,8008	18,6344	20,5012
Observations	247	247	247	247	247	247	247	247

	Industrial products	IT	Oil	Public interest	Real estate	Retail	Technology	Travel
Mean	0,3360	0,1417	0,0283	0,5669	0,0162	0	0,2429	0
Median	0	0	0	0	0	0	0	0
Maximum	1	1	1	1	1	0	1	0
Minimum	0	0	0	0	0	0	0	0
Standard deviation	0,4733	0,3495	0,1663	0,2317	0,1265	0	0,1543	0
Skewness	0,6943	2,0548	5,6846	3,8344	7,6659	NA	6,1799	NA
Kurtosis	1,4820	5,2222	33,3149	15,7029	59,7665	NA	39,1916	NA
Observations	247	247	247	247	247	247	247	247

Table 10. Descriptive statistics, dummy variables, limited dataset

Table 10 presents the dummy variables for the limited dataset. The table presents clearly which industries must be excluded for the regressions. The excluded industries are consumer goods, finance, travel, and retail (having a value of 0 in minimum and maximum value). The same comment as mentioned earlier can be applied again. Combining some industries to make fewer industry dummies would benefit future

research. An alternative solution would be to increase the number of observations so that all the industry dummies have a meaningful number of observations.

6.2 Regression results

This section of the thesis will present the main results of the study. The section will start with a simple regression model and continue developing the regression model to include more variables. Two different regression models will be present: one where the dependent variable is stock volatility and another where the beta is the dependent variable. Additionally, in the later part of this section, two datasets will be used, one including all the observations and the other where certain industries are excluded. The results will be presented using graphs which enable us to interpret the results. Firstly, the correlations between the variables are presented. This enables us to understand if the dataset has some significant correlations that should be considered.

Presentation of correlations between independent variables

	Base salary LOG	Short term incentives LOG	Long term incentives LOG	Other Compensation LOG	Size (Total Assets LOG)	Number of employees LOG	R&D expenses to operating revenue %	Profit margin %	Leverage %
Base salary LOG	1								
Short term incentives LOG	0,020	1							
Long term incentives LOG	0,103	0,405***	1						
Other Compensation LOG	0,216***	0,001	-0,007	1					
Size (Total Assets LOG)	0,845***	0,121*	0,213***	0,249***	1				
Number of employees LOG	0,740***	0,207***	0,161**	0,117*	0,794***	1			
R&D expenses to operating revenue %	-0,197***	0,116*	0,155**	-0,141**	-0,274***	-0,142**	1		
Profit margin %	-0,154**	-0,095	0,149**	0,087	0,034	-0,302***	-0,083	1	
Leverage %	0,043	-0,007	-0,009	-0,116*	0,153**	0,272***	-0,010	-0,138**	1

* The coefficient is statistically significant at 10 percent level
** The coefficient is statistically significant at 5 percent level
*** The coefficient is statistically significant at 1 percent level

Table 11. Correlation between independent variables

Based on table 11 it seems that the variables are not correlating that much, which is a good sign for the following regressions. Based on table 11, the number of employees has been eliminated as that correlate too much with the other size factor, total assets. Total assets correlate with base salary as bigger companies pay better salaries to their CEO, which does not affect the regression models selected. The table 11 shows that the regression models do not suffer from significant multicollinearity problems.

Regression results for volatility, compensation figures in logarithmic format

Variable	Coefficient		T-statistics
C	0,194		1,331
Base salary	0,010		0,865
Short-term incentives	0,002	**	2,133
Long-term incentives	-0,002	**	-2,331
Other compensation	-0,002	**	-2,462
Adjusted R-squared	0,042		
Observations	377		

* The coefficient is statistically significant at 10 percent level
** The coefficient is statistically significant at 5 percent level
*** The coefficient is statistically significant at 1 percent level

Table 12. Volatility model, regression 1, full dataset

Table 12 above shows the results of the first regression where stock volatility is only considered as a function of the compensation mix. The model finds that short-term compensation and other compensation are positively correlated with volatility. Additionally, long-term incentives seem to be negatively correlated. The model shows a poor fit for the purpose with a low adjusted R-squared. The full dataset of 377 observations is used for this regression. Due to the model's poor fit, no conclusions are made based on this table. Based on the R-squared, modeling stock volatility based on compensation seems difficult.

Regression results for beta, compensation figures in logarithmic format

Variable	Coefficient		T-statistics
C	-4,443	***	-9,207
Base salary	0,391	***	10,444
Short-term incentives	0,010	***	2,935
Long-term incentives	0,003		0,849
Other compensation	-0,006	*	-1,641
Adjusted R-squared	0,274		
Observations	377		

* The coefficient is statistically significant at 10 percent level
** The coefficient is statistically significant at 5 percent level
*** The coefficient is statistically significant at 1 percent level

Table 13. Beta model, regression 1, full dataset

Table 13 above represents the results of a regression where the compensation components are used to analyze the beta coefficient. The only difference to the volatility model (table 12) is that the dependent variable is changed to beta. As beta is a coefficient for systematic risk, it is interesting to see how compensation affects that. The model represents the beta slightly better, and adjusted R-squared gets a value of 0.27.

Additionally, multiple compensation components show statistical significance. This means there seems to be a certain type of link between beta and compensation structure. The coefficients are positive, meaning that an increase in CEO pay (other than other compensation) will be visible as an increase in stock beta. These preliminary results seem to be aligned with what Armstrong and Vashishtha (2012) argue. Armstrong and Vashishtha (2012) say that increasing total and systematic risks are preferred. While an increase in total risk (volatility) has not been visible yet, some hints of an increase in systematic risk are visible. The results from the main regression models will be presented next to develop the regression model.

Regression results for volatility, compensation figures in logarithmic format

Variable	Coefficient		T-statistics
C	-0,769	**	-2,084
Base salary	0,087	***	2,820
Short-term incentives	0,003	**	2,042
Long-term incentives	-0,002		-1,450
Other compensation	-0,001		-0,645
Leverage	0,538		1,572
Profit margin	-0,034		-1,150
Total assets (log)	-0,017	**	-2,015
R&D expenses	0,238	**	1,952
Adjusted R-squared	0,108		
Observations	247		

* The coefficient is statistically significant at 10 percent level
** The coefficient is statistically significant at 5 percent level
*** The coefficient is statistically significant at 1 percent level

Table 14. Volatility model, regression 2, limited dataset

In table 14 above, the R&D expenses to operating revenue are considered for the first time, limiting the dataset size to 247 observations. The model finds a statistically

significant positive correlation between base salary and short-term incentives. The drawback of the model is that the adjusted R-squared is only 0.11, which means that the model is not a good fit and therefore the results are not as good as they could be. What is also noticeable from the model is that the R&D expenses variable seems statistically significant and positive regarding volatility. This would mean that the CEO can increase the volatility of the stock by increasing the R&D expenditure. Previous literature such as Hsin-han Shen and Zhang (2013) also find that CEOs typically increase R&D expenditure if their compensation package gives them incentives to increase stock volatility.

Regression results for beta, compensation figures in logarithmic format

Variable	Coefficient		T-statistics
C	-2,408	*	-1,754
Base salary	0,191	*	1,665
Short-term incentives	0,009		1,621
Long-term incentives	0,003		0,697
Other compensation	-0,005		-1,142
Leverage	0,010		0,761
Profit margin	-0,341	***	-3,090
Total assets (log)	0,087	***	2,830
R&D expenses	0,484		1,065
Adjusted R-squared	0,325		
Observations	247		

* The coefficient is statistically significant at 10 percent level
** The coefficient is statistically significant at 5 percent level
*** The coefficient is statistically significant at 1 percent level

Table 15. Beta model, regression 2, limited dataset

Table 15 uses the same dataset as table 15 but instead of modeling volatility, table 15 represents the figures from the model for beta coefficient. One key difference is again the adjusted R-squared. 0.33 is much higher compared to the 0.11 from table 14. 0.33 is still not perfect but better at least. What is noticeable from the results presented in table 15 is that only base salary is statistically significant. An additional interesting point is that R&D expenditure is not statistically significant. This means that in this regression, R&D expenditure is not explaining the movements in the beta coefficient.

Notably, control variables such as profit margin and company size receive significant results. Those results indicate that there are other factors as well that are driving the company beta coefficient. However, additional factors are also driving the beta coefficient because the R-squared is still on the lower side. At this point, it seems that the research setup for this thesis cannot find a good combination of variables that would explain the stock volatility using compensation figures. This is based on the adjusted R-squared figures from tables 12 and 14. Nevertheless, the research setup can find variables that explain the beta coefficient to some extent.

Regression results for volatility, compensation figures in logarithmic format

Variable	Coefficient		T-statistics
C	0,094		0,376
Base salary	0,023		1,210
Short-term incentives	0,000		0,198
Long-term incentives	-0,001		-1,131
Other compensation	-0,001		-0,683
Leverage	0,019		0,571
Profit margin	-0,077	***	-2,659
Total assets (log)	-0,012	**	-2,007
Dummy variables			
Basic materials	0,053		0,738
Car industry	0,004		0,046
Communications	0,002		0,025
Consumer goods	-0,052		-0,664
Finance	-0,029		-0,414
Food and beverages	-0,084		-1,149
Healthcare	-0,017		-0,235
Household goods	0,024		0,330
Industrial products	0,015		0,215
IT	-0,023		-0,326
Oil	0,031		0,389
Public interest	-0,058		-0,790
Real estate	-0,002		-0,029
Retail	0,000		0,003
Technology	0,036		0,445
Travel	0,114		1,443
Adjusted R-squared	0,2240		
Observations	377		

* The coefficient is statistically significant at 10 percent level
** The coefficient is statistically significant at 5 percent level
*** The coefficient is statistically significant at 1 percent level

Table 16. Volatility model, regression 3, full dataset

Table 16 presents the main regression results for the volatility model for the full dataset. This model shows a poor fit as in the earlier regressions for the stock volatility. At this point it seems that the compensation components do not correlate with stock volatility. Additionally, all compensation variables are statistically insignificant. That further

highlights that the compensation components are not affecting volatility. This can be seen partly as a positive thing as the CEOs are not increasing the volatility of the company due to their compensation contract. This regression model includes all the possible industry dummy variables meaning that finance and a few other industries are not excluded yet. What should be taken as a learning point from these volatility regression results is that a better model should be developed. For future research, the researcher should be able to find more suitable independent variables that would explain the stock volatility. A regression model is still coming where the limited dataset is used together with the R&D expenditure.

Regression results for beta, compensation figures in logarithmic format

Variable	Coefficient		T-statistics
C	-2,031	***	-2,603
Base salary	0,204	***	3,332
Short-term incentives	0,004		1,032
Long-term incentives	0,002		0,722
Other compensation	-0,002		-0,524
Leverage	0,004		0,038
Profit margin	-0,128		-1,419
Total assets (log)	0,036	*	1,919
Dummy variables			
Basic materials	0,203		0,913
Car industry	-0,048		-0,196
Communications	-0,247		-1,077
Consumer goods	-0,520	**	-2,117
Finance	-0,304		-1,390
Food and beverages	-0,444	**	-1,944
Healthcare	-0,236		-1,028
Household goods	-0,219		-0,968
Industrial products	-0,017		-0,077
IT	-0,185		-0,838
Oil	-0,031		-0,125
Public interest	-0,328		-1,425
Real estate	-0,290		-1,238
Retail	-0,108		-0,450
Technology	-0,059		-0,235
Travel	-0,184		-0,751
Adjusted R-squared	0,4450		
Observations	377		

* The coefficient is statistically significant at 10 percent level
** The coefficient is statistically significant at 5 percent level
*** The coefficient is statistically significant at 1 percent level

Table 17. Beta model, regression 3, full dataset

Table 17 presented the results for the main regression using the beta model. An adjusted R-squared of 0.45 indicates that this model is a better fit than the volatility model. 0.45 is not an ideal figure. Table 17 supports the same view as earlier results from the beta model. Interestingly none of the compensation variables except base salary are statistically significant. What is interesting is the fact that base salary has a statistically

significant positive correlation with the beta. This indicates that the beta increases by increasing the base salary, no matter the company's performance. This interesting finding could indicate that Finnish CEOs are willing to take risks but not necessarily willing to risk their income. Additionally, the dummy variables indicate that the food and beverage industry seem to have a lower beta. The nature of the industry easily explains this as the food industry is not that volatile.

Regression results for volatility, compensation figures in logarithmic format

Variable	Coefficient		T-statistics
C	-0,732	**	-1,959
Base salary	0,093	***	2,976
Short-term incentives	0,001		0,743
Long-term incentives	-0,002	*	-1,677
Other compensation	0,000		0,355
Leverage	0,083	**	2,270
Profit margin	-0,084	*	-1,723
Total assets (log)	-0,025	***	-2,744
R&D expenditure	0,496	***	3,016
Dummy variables			
Car industry	-0,037		-0,925
Communications	-0,069		-1,623
Food and beverages	-0,123	***	-4,222
Healthcare	-0,063	*	-1,735
Household goods	-0,081	**	-2,459
Industrial products	-0,054	***	-2,801
IT	-0,122	***	-4,648
Oil	-0,008		-0,222
Public interest	-0,106	***	-3,770
Real estate	0,072		0,797
Technology	-0,103	*	-1,886
Adjusted R-squared	0,190		
Observations	247		

* The coefficient is statistically significant at 10 percent level
** The coefficient is statistically significant at 5 percent level
*** The coefficient is statistically significant at 1 percent level

Table 18. Volatility model, regression 4, limited dataset

Table 18 presents the results from the regression model using the limited dataset where finance, consumer goods, travel, and retail industries are excluded. This model seems to be able to show statistical significance to some of the variables, but the fit is again quite bad. Anyway, the regression can find that all industry statistically significant industry variables show a negative correlation, which means that if the industry is included, the volatility decreases. The model is also able to find that R&D expenses to operating revenue affect the stock volatility positively. This is aligned with the previous literature such as Brisley, Cai, and Nguyen (2021) who suggest that an increase in R&D expenditure

increases stock volatility as the results of the R&D investments are always uncertain and never granted.

From the compensation figures, table 18 presents that base salary is significant at one percent level and long-term incentives are statistically significant at ten percent level. Base salary shows a positive correlation with stock volatility, but long-term incentives are negatively correlated. This means that long-term compensation targets and the LTIP program do not increase stock volatility. This finding could further support the idea that Finnish CEOs are risk averse and would play it safe to grant their salary. If this was true, that would be bad news for the shareholders. The coefficients are such small that the possible realized compensation from the long-term compensation should be massive to make a real impact on stock volatility. However, as the earlier presentation of the descriptive statistics shows, the CEO compensation in Finland can be more than 5 million euros. In such cases, even a small statistical correlation coefficient can become significant. The regression model finds a statistically significant correlation between long-term incentives and stock volatility. The dataset however is limited to only 247 observations which is not ideal and therefore a single data point might have a bigger effect on the results than would be optimal.

Regression results for beta, compensation figures in logarithmic format

Variable	Coefficient		T-statistics
C	-0,765		-0,587
Base salary	0,101		0,926
Short-term incentives	-0,002		-0,395
Long-term incentives	0,002		0,514
Other compensation	0,001		0,286
Leverage	0,203		1,584
Profit margin	-0,157		-0,922
Total assets (log)	0,068	**	2,182
R&D expenditure	1,589	***	2,769
Dummy variables			
Car industry	-0,195		-1,380
Communications	-0,483	***	-3,264
Food and beverages	-0,655	***	-6,425
Healthcare	-0,441	***	-3,493
Household goods	-0,537	***	-4,693
Industrial products	-0,256	***	-3,841
IT	-0,550	***	-6,020
Oil	-0,251	**	-1,964
Public interest	-0,569	***	-5,826
Real estate	-0,650	**	-2,033
Technology	-0,537	***	-2,804
Adjusted R-squared	0,461		
Observations	247		

* The coefficient is statistically significant at 10 percent level
** The coefficient is statistically significant at 5 percent level
*** The coefficient is statistically significant at 1 percent level

Table 19. Beta model, regression 4, limited dataset

The results from table 19 are the last results from the regressions. In this regression, the limited dataset is used meaning that the research setup is comparable to table 18. The last regression is not able to significant compensation variables. This can indicate that either the Finnish CEOs are not reacting to their compensation contracts well or that the regression model cannot capture the correlation. If the CEOs are not reacting to their compensation contracts, that would be against the theory (Bolton, Merhan, and Shapiro, 2015). Based on the R-squared figures, the selected model explains the systematic risk of the company better than the volatility of the stock meaning total risk.

Table 19 presents that almost all the dummy variables are statistically significant and have a negative correlation with the beta. This further supports the view that companies where the R&D variable was available are more mature at least in the Helsinki stock exchange as the systematic risk can be higher for companies with higher growth

expectations. Additionally, the regression model finds that R&D expenses to the operating revenue variable are significant and correlate positively with the company's beta.

7 Conclusions and practical implications

This thesis presents the CEO compensation contract as a way to guide the CEO´s interests. The key takeaway for the compensation committees is that CEO compensation does matter, and the CEOs react to the given compensation contract. The CEO compensation tries to solve the issues regarding agency theory where the control and ownership are separated. The CEO´s job is to make sure that the company is developed as the owners want.

Motivating the CEO to make good decisions on behalf of the owners requires that the compensation contract includes factors that depend on the increase in shareholders´ wealth. Typically, this means that part of the compensation should be tied into long-term targets such as stock price development or certain financial targets. Additionally, to guide the short-term focus of the CEO, certain shorter-term targets can be set as a criterion for compensation. Typically, these short-term compensation elements would be tied to the one-year financial performance of the company.

This thesis presents the theoretical framework for CEO compensation. The CEO's compensation should include certain base salary paid monthly to the CEO. Additionally, the CEO might have certain benefits such as a car or mobile phone benefit. To give the CEO incentives to make good short- and long-term decisions, the compensation contract should include components that are paid based on performance. In the Finnish sample this thesis was using, the typical compensation is a short-term incentive that is paid based on the financial performance of one year. A long-term incentive program is in place, where the payout is based on long-term targets.

The results from this thesis present that the average CEO in this thesis´ dataset earns roughly 1,5 million EURs every year. This salary is the total compensation divided into base salary, short-term incentives, long-term incentives, and other compensation. Typically the split between the fixed and variable salaries is around 50 percent. This means that the average CEO would receive around 750 thousand EURs every year

regardless of the company's financial performance. This means that the CEOs´ incentives are aligned with the owners´ incentives to some extent. However, Grinstein et al. (2022) find that in the United States, the base salary is around 20 percent of the total compensation. This means that the Finnish compensation structure is not even close to as aggressive and rewarding in case the stock and financial performance of the company increases. This is something to investigate in possible future research. Nevertheless, this thesis collected and presented the compensation data from Finnish-listed companies, which has not been done often. The presentation of the compensation data itself is a good result.

The empirical research section of this thesis regresses the stock volatility meaning total risk and the beta coefficient which represents the company's systematic risk. The dataset used has 377 observations. After the regressions have been done, it can be concluded that the used regression model is not able to find correlation between stock volatility and compensation components. This means that either the incentives do not affect the stock volatility, or the variables are not the most suitable ones for this purpose.

On the other hand, the regressions for the beta coefficient are more successful and it seems that in the Finnish dataset, the base salary seems to increase the beta coefficient. This means a correlation exists between the base salary and CEO´s willingness to take risks. This can indicate that Finnish CEOs are not interested in risk-taking. Alternatively, their base salary is too high, so the additional components are not good enough incentives. Such a conclusion would question the incentive programs in the first place. Why should the CEO receive additional compensation components if most of the time only the base salary matters? The positive correlation means that an increase in base salary will increase the company's systematic risk. For example, Armstrong and Vashishtha (2012) found similar results that the CEOs tend to increase systematic risk, beta, of the company. Therefore, the main finding from this thesis supports what the previous literature has been able to find.

The main finding from this thesis can be summarized so that the point of CEO compensation is to fix the agency theory issue where the power and ownership are separated. The key question is how to make sure that the CEO makes decisions in the owners' best interest, not decisions that benefit only the CEO. CEO compensation can be used to fix this issue. As the theory and findings from this thesis support, the compensation should be a mix of fixed and variable compensation. The dataset used for this thesis reveals that the compensation is split 50-50 between the fixed and variable compensation. As mentioned, in the United States, fixed compensation can be only about 20 percent of the total compensation. This would mean there could also be a shift from fixed compensation to variable compensation in Finland. That would better align the incentives of the CEO with the incentives of the owners. This way the CEO´s compensation would be more and more tied to the company's financial performance and all the decisions should benefit the long-term financial sustainability of the company. Additionally, this would mean that the CEO must take risks to get significant compensation. Based on this thesis, the most significant compensation component in Finland is base salary.

Based on this thesis, future research could continue to analyze the Finnish dataset and include all listed companies from Finland. Alternatively possible future research could try to understand how CEO compensation affects stock performance. This would possibly highlight if the more expensive CEOs brought additional value to the shareholders compared to cheaper alternatives. Such research would bring additional insights to the compensation committees regarding the implications of the compensation contracts.

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