Decision making and company performance - During a turbulent time period

Master’s Thesis 15 credits
Department of Business Studies
Uppsala University
Spring Semester of 2019
Date of Submission: 2019-06-05

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Abstract

This thesis examines short- and long-term decision making, CEO-remuneration and its effects on company performance measured as return on assets during a time-period containing market up- and downturns with regards to company resilience. We examined this in a Swedish context by looking at listed companies on the Stockholm stock exchange during the period 2004 to 2014. The research was conducted using a multiple regression analysis to capture relationships between the dependent variable, the independent- and control variables over the observed time-period. We measure short-term action as decreases in R&D-spending, CapEx and number of employees, that can create short-term profits, whilst long-term actions is the opposite which are expected to generate a high level of company performance in the long run. In our observed population we find that companies who balance short- and long-term actions have a higher company performance, thus deviating from previous research. We also find that an increase in CEO-remuneration will not yield higher company performance when regarding firm size. The results of the study indicate that the companies in our sample have a goal alignment between the CEO and owners, although it shows tendencies of risk adversity in decision making. We find there is a more complex relationship between decision making, the CEO, and company performance than first expected.

Keywords: Company Performance, CEO-Remuneration, Agency Theory, Short-Termism, Long-Termism, Decision Making, Resilience.
# Table of Contents

1. Introduction ............................................................................................................................................. 1
   1.2 Purpose .................................................................................................................................................. 3
   1.3 Research questions .............................................................................................................................. 3

2. Theoretical framework .......................................................................................................................... 4
   2.1 Agency theory ...................................................................................................................................... 4
   2.2 Resilience, short- and long-term decision making ............................................................................. 7

3. Hypotheses formulation ......................................................................................................................... 9

4. Methodology .......................................................................................................................................... 11
   4.1 Research design ................................................................................................................................. 11
   4.2 Collection of data .............................................................................................................................. 11
   4.3 Observed time-period ......................................................................................................................... 12
   4.4 Variables ............................................................................................................................................ 13
      4.4.1 Dependent variable ...................................................................................................................... 13
      4.4.2 Independent variables ............................................................................................................... 13
      4.4.3 Control variables ....................................................................................................................... 16
      4.4.4 Control for years and industry ................................................................................................. 17
   4.5 Regression analysis ........................................................................................................................... 17
      4.5.1 Regression models ...................................................................................................................... 18
      4.5.2 Normality, skewness and kurtosis ............................................................................................. 19
      4.5.3 Outliers ....................................................................................................................................... 20
      4.5.4 Multicollinearity ......................................................................................................................... 20
      4.5.5 Homoscedasticity ....................................................................................................................... 21
      4.5.6 Linearity ..................................................................................................................................... 21
   4.6 Limitations of chosen method ............................................................................................................ 21

5. Results .................................................................................................................................................. 23
   5.1 Descriptive statistics ......................................................................................................................... 23
   5.2 Results from the regression analyses .............................................................................................. 24
      5.2.1 Regression Model I .................................................................................................................... 26
      5.2.2 Regression Model II ................................................................................................................... 26
      5.2.3 Regression Model III ................................................................................................................ 27

6. Analysis ................................................................................................................................................ 29

7. Conclusion ............................................................................................................................................ 33

8. Future Research .................................................................................................................................. 34

9. Limitations of the study ....................................................................................................................... 35

10. References .......................................................................................................................................... 37
1. Introduction

Company performance is affected by several factors, both external and internal. A financial crisis and the period surrounding it is one example of market up- and downturns, an external factor that will impact how a company performs (Cirmizi, Klapper and Uttamchandani, 2012). This type of market turbulence has been shown to affect the entire world which in turn ripples down to individual company performance. The financial crisis that occurred during 2008-2009 is one example of an external event that affected companies in both short- and long-term (Chenhall, 2003).

During a time period with market up- and downturns, one of the determining factors of how well a company handles the turbulence is their resilience (Richtnér and Löfsten, 2014; Linnenluecke, 2017; Barasa et al., 2018). If the company is prepared and managed with a long-term perspective in their decision making, their chances of performing well increases (ibid). Elements such as innovation through investments in research and development (R&D), capital expenditures (CapEx) and not decreasing their number of employees have been proved crucial for resilience (Ofori-Dankwa and Julian, 2001; Gittell, Cameron, Lim and Rivas, 2006; Richtnér and Löfsten, 2014; Linnenluecke, 2017).

Short-termism is prevalent among managers and is an example of an internal factor that can be destructive for company performance (Ofori-Dankwa and Julian, 2001; Martin, Wiseman and Gomez-Meija, 2016). Previous research has elaborated on the fact that long-term profitability is traded for short-term when the personal gain is the motivator, which in turn can create a misalignment between the chief executive officer (CEO) and the shareholders when the shareholder does not have a short investment horizon (Martin, Wiseman and Gomez-Mejia, 2016).

A recurring topic for medial discussions is the size of the remuneration that is paid to business executives within Swedish companies, in particular, listed companies (Svd, 2019). CEO-remuneration that is linked to specific measurements have been shown to affect CEO decision-making, making the CEO take decisions that are in line with increasing personal gains rather than what is optimal for the company (Bebchuk and Fried, 2003). How these decisions appear varies, but short-termism is one of the characteristics of such a decision (Baker, Jensen, and Murphy, 1988). There is much research on how to design a variable remuneration system (ibid).
Baker, Jensen, and Murphy (1988) believe that the criticism of monetary incentives based on performance does not mean that they are ineffective rather than being too efficient. It is possible to find previous research showing that monetary incentives encourage people to chase money rather than success, which can have devastating consequences for many stakeholders, including the owners of the company (Deci, 1972; Hammer, 1975). Baker, Jensen, and Murphy (1988) argue that efficient remuneration systems motivate people to do what is in their job description. While substantial monetary incentives generate unintentional and sometimes counterproductive results, this is because it is challenging to define precisely what the agent (CEO) should do and thus, how the performance is to be measured (ibid). Compensation based on performance is motivating and can lead to counterproductive effects, such as short-termism, and that companies instead use substitutes that are less effective in motivating the CEO (agent) (ibid).

According to previous research within this area, short-termism turns to be an agency problem when a CEO puts their own needs before the company's long-term best (Jensen and Murphy, 1990a; Walsh and Seward, 1990; Jensen, 2008). Short-termism as a consequence of the chosen CEO remuneration model can, according to previous research, appear as decreasing R&D-expenses, CapEx and number of employees (Dechow and Sloan, 1991; Jacobs, 1991; Bushee, 1998; Guay, 1999; Rajgopal and Shevlin, 2002; Gittell et al., 2006; Chava and Purnanandum, 2010; Martin, Wiseman and Gomez-Meija, 2016). By making these decisions, the company will not only suffer in the long-term overall, but it may also affect the company's resilience during market turbulence (Ofori-Dankwa and Julian, 2001; Linnenluecke, 2017). Since short-termism does not benefit the company's ability to generate long-term growth and development, market downturns could, therefore, be more damaging on companies where the CEO has been practicing short-termism (Ofori-Dankwa and Julian, 2001; Linnenluecke, 2017). This creates an agency conflict where there is a lack of goal alignment between the owners and the CEO (Randøy and Nielsen, 2002). In times of uncertainty, an agent (CEO) will review positive and negative aspects of decisions and choices to be made related to personal gain, and they are loss aversive in this context (Martin, Wiseman and Gomez-Meija, 2016).

Research concerning the relationship between the CEO's remuneration and the company's performance is something that has been studied worldwide and during a long period with varying results. There are several studies that have shown a positive relationship between CEO remuneration and company performance (Murphy, 1985; Jensen and Murphy, 1990b; Gregg et
al., 1993; Vittaniemi, 1997; Attaway, 2000; Zhou, 2000; Shim and Lee, 2003; Stammerjohan, 2004; Tai, 2004; Stathopoulos, Espenlaub and Walker, 2005; Guy, 2005; Merhebi et al., 2006; Ozkan, 2007). All of the above-mentioned previous studies have been made on listed companies in the European, North American or Australian markets. Similar studies have also been carried out on Asian capital markets where it also has been possible to find a relationship between the CEO's remuneration and the company's performance (Kubo, 2005; Firth, Fung and Rui, 2006; Kato and Kubo, 2006). However, there are also studies that are not able to find any relationship between these two variables (Miller, 1995; Firth et al., 1995; Madura, Martin and Jessel, 1996; Jones and Kato, 1996; Randøy and Nielsen, 2002; Duffhues and Kabir, 2008; Gigliotti, 2013). After a review of previous studies in this field, it becomes clear that there are few studies performed on Swedish companies. There is also a lack of studies that investigate whether market turbulence does matter or not.

1.2 Purpose

The purpose of the study is to investigate the relationship between short- and long-term decision making and company performance of listed companies on the Stockholm stock exchange. We will also investigate whether the total- and variable CEO-remuneration affect company performance or not. These relationships and effects could become prominent during a time-period containing both market up- and downturns for which we will investigate this during a time-period containing such elements.

1.3 Research questions

How do short- or long-term decisions affect company performance during a period including market up- and downturns?

- How does CEO-remuneration affect company performance?
2. Theoretical framework

2.1 Agency theory

According to Bebchuk and Fried (2003), the principal-agent theory can explain how the remuneration of a company's CEO should be structured and is a fundamental theory in this field of research. This theory deals with and explains the principal-agent problem and how risk should be spread within a company with regard to the CEO's compensation structure (Bebchuk and Fried, 2003).

Principal-agent theory deals with and explains the principal-agent problem and how different risks should be allocated between a principal and an agent. Common to most publicly traded companies is that those who own the companies, i.e., the shareholders (the principal), do not have the time or the knowledge themselves to manage the company's operations. The solution is to hire a CEO (agent) to run and manage the company. In connection with the management and control of the company's resources being transferred from the owner to the CEO, the CEO will receive an information advantage to the owners. The relationship between the owner and the CEO will then be affected by the information asymmetry that arises between them. One problem that may occur is that the CEO uses information acquisition to enrich herself at the expense of the company and the owners. (Schleifer and Vishny, 1997)

The creators behind the agency theory, Jensen and Meckling (1976), argue that if both parties are utility maximizers, there is reason to believe that the agent will not always act in relation to what is best for the principal. The problem that then may arise and which the agency theory is based on is that the agent can be driven by various incentives that differ from the principals (ibid). The founders of this theory argue that there are two ways for the principal to mitigate this agent-principal problem. Firstly, the problem can be mitigated by increased monitoring of the agent, to limit any discrepancies in interest (ibid). Second, the agency problem can partly be mitigated by the agent being given an incentive to act more in accordance with the principal's interest (ibid). These ways of mitigating the agent problem are not free. The sum of the costs incurred to mitigate the problem is included in what Jensen and Meckling (1976) define as an agency cost. The sum of the agency cost is the costs of monitoring, incentive-changing measures, and the costs that arise despite previously described measures (residual loss). Jensen
and Meckling (1976) further argue that the best way to mitigate the agency cost is by having a balanced combination of different remunerations.

The reason for principals to use monitoring is to reduce the effect of information asymmetry between the principal and the agent (Jensen and Meckling, 1976). From a Swedish perspective, public listed companies have a history of being actively supervised by their owners, perhaps as a consequence of a relatively large concentration of ownership and dual-class shares (Carlsson, 2007). Having owners who are strong and more committed often means that they are more scrutinized (ibid). According to Fama (1980) and Fama and Jensen, (1983), one of the most important and the most common way to monitor the agent is to make sure that the company has a solid board of directors that in turn bears responsibility for this. Bebchuk and Fried (2003) believe that the CEO has a strong influence on the board. That the CEO influences her salary thus becomes part of the agency problem as the costs for the shareholder's increase (ibid).

Variable remuneration intends to reward the CEO after succeeding in achieving a specific goal, for example, increased market value or result over a shorter specified time-period (Svensson, 2001). If the company performs well, the CEO will be monetary rewarded as a way to mitigate agency problems (Samani, 2012). Offering remuneration that is dependent on performance to a higher degree also increases the possibility of control (ibid). The variable remuneration has thus come to form the basis for the research on the CEO's remuneration since, according to the principal agent theory, it may perhaps most clearly mitigate the effect of the agency problem (ibid). Studies have further shown that the lower the direct monitoring, the higher the performance-based remuneration (Core and Guay, 1999; Cai et al., 2009). Edmans and Liu (2010) argue that a prerequisite for variable remuneration to be paid is that the company is profitable or has sufficient funds. If the company becomes insolvent, the CEO would thus be without variable remuneration. In the event of a risk of insolvency, there is thus a possibility that a variable remuneration may motivate the CEO to save the company even more (ibid). Assuming that the CEO has the power to decide on the compensation rate, it should not be remarkable if the CEO chooses to remove variable remuneration in favor of a higher pension when the risk exists that the CEO would otherwise be without variable remuneration if the company underperforms for an extended period of time (ibid).

The use of principal-agent theory in social science literature is widespread, and it is one of the most popular theories for discussing and analyzing CEO remuneration, and there are several
reasons why this theory is well used among researchers within the field of business and management control in general (Randøy and Nielsen, 2002). Research has shown that rewards after performance lead to temporary thinking and thus stimulate short-term action (Stathopoulos, Espenlaub, and Walker, 2005). Rewards that depend on performance could occupy the agent's focus and become their goal, and the result could be that the CEO becomes less inclined to act according to what is best for the company (Kohn, 1993). Murphy (1999) further argues that, in order to receive the variable remuneration, the CEO may prioritize short-term goals at the expense of the long-term. If a company is on the verge of becoming insolvent, there is a risk that the CEO will act daringly to save the company and thus its variable remuneration (Edmans and Liu, 2010). The risk then exists that the CEO exacerbates the company's financial position (ibid).

The principal-agent theory considers several aspects, examples of that are company risk and the uncertainty in the CEO's decisions and communication between the agent and principal (e.g., Jensen and Meckling, 1976). At the same time, it draws attention to the fact that simple structural problems occur within organizations (Eisenhardt, 1989). The agency theory has influenced a large part of the latest research concerning the CEO's remuneration, (Randøy and Nielsen, 2002; Stammerjohan, 2004; Bolton, Scheinkman and Xiong, 2006; Guy, 2005; Duffhues and Kabir, 2008; Gigliotti, 2013). Although it is a widely used framework for similar studies, there are weaknesses associated with the use of this theory. The critics claim that the agent theory is too one-sided and ignores the complexity of organizations as the interests of other staff or loyalty are not taken into account (Donaldson, 1990). Instead, it is argued that another person has significant influence over the agent's decisions (ibid).

Furthermore, the theory is based on simple assumptions that cannot always be made. Some assumptions are that the output can always be measured and compared and that information in an organization is conveyed asymmetrically (Eisenhardt, 1989). Even though there are some drawbacks with this theory, we would argue this is a suitable theoretical framework given the purpose of this thesis.
2.2 Resilience, short- and long-term decision making

Resilience is an organization's ability to handle turbulent situations that can arise from different events and with varying severity (Bouaziz and Smaoui-Hachicha, 2018). The elements of resilience are an organization's capacity to deal with these situations in a way that allows them to retain performance despite the crisis and the ability to recover, how well the organization can foresee the crisis and its ability to adapt to it (Linnenluecke, 2017; Barasa et al., 2018; Ran, Bhamra and Tsinopoulos, 2018).

Reserves and planning will determine how quick a recovery can be, and it is essential to invest and plan in a way that enables future growth, and engage in activities that show promise, whilst exploring new opportunities is another crucial aspect (Linnenluecke, 2017). This enables fast recovery and returns to performance before the crisis (ibid). Being open to development and managing performance is another aspect that will increase the chances of regaining performance (ibid).

Short-term decisions will limit a company's ability to recover after a turbulent event (Ofori-Dankwa and Julian, 2001; Linnenluecke, 2017). Being committed to resilience, and acting accordingly before, during, and after the crisis will increase the ability to cope with the turbulence, preparing the organization for challenging times (ibid). Innovation enables an organization to be more adaptable continually and increases the ability to anticipate turbulence (ibid). Periods like the financial crisis in 2008-2009 are examples of events that put pressure on companies and showcase the fragility of company performance, but it also put pressure on how they were governed and managed (Richtnér and Löfsten, 2014; Linnenluecke, 2017). One aspect of coping with a turbulent situation is by being creative (e.g., innovative), and it has been argued that resilience and creativity can complement each other in times of a crisis (Hamel and Välikangas, 2003).

One critical factor in being a resilient company is product development, and being creative in this aspect. Creativity in this context is the creation of new and useful products and other offerings that can contribute to company performance. Furthermore, it is also essential that the environment within the company supports this. The managerial aspect is also vital in enabling sufficient product development. It has been argued that this might be the only way out of a crisis. (Richtnér and Löfsten, 2014)
When a company anticipates turbulent conditions, they might increase their R&D spending in order to cope with the challenging times to come (Guldiken et al., 2016). How extensive these investments are may differ due to internal circumstances (Barker and Mueller, 2002). A company that is performing well might not be as inclined to invest in R&D as those who are not, whilst lower company performance might instead lead to an increase in R&D spending (Greve, 2003). Decreased company performance might lead to higher R&D spendings, more so when it is due to a lack of previous innovation (ibid). A lowered company performance might also make managers more inclined to take risk, and this thus indicates that during bad times, a well-managed company will rather increase their R&D spending (ibid). However, this is dependent upon a lack of agency problems, since agency problems may occur due to the risks and uncertainty that are related to R&D (Kor, 2006). The latter indicate short-termism in managerial decisions since innovation (R&D) may make a company more resilient (Richtnér and Löfsten, 2014; Linnenluecke, 2017).

Another aspect of short-termism is that managers prefer short-term gains over results in the future (Laverty, 1996). Besides a reduction in R&D, short-termism can appear as cut-downs in capital expenditure (CapEx) (Souder and Bromiley, 2012). Decisions like these are managers trading long-term results for results in the short-term, which affects not only company growth but also its competitiveness (ibid). CapEx is related to the future, e.g., CapEx is a sign of long-term related to future growth and performance (ibid). To take it one step further, CapEx which can generate growth and profits will thus enable companies to invest more down the line, such processes can, in other words, benefit the company (ibid). When resources are limited, a decision regarding investments may be of short-term nature, which in turn can reduce future growth (ibid).

Decreasing the number of employees during periods with market turbulence is usual amongst companies, especially during- and since the financial crisis in 2008-2009 and the recession-related to it (Datta, Guthrie, Basuil and Pandey, 2010). A reduction in number of employees is not only a short-term action, it can also affect company performance negatively (ibid). Companies who retain their employees during a crisis can perform better than peers through utilizing personnel and preserve relationships and use the crisis to strengthen these relationships (Gittell et al., 2006). This can also contribute to a faster recovery in performance after a crisis has occurred (ibid).
3. Hypotheses formulation

Our first hypothesis relates to company investments and employees, whom are examples of elements that will enable future company performance, where new ideas, smart investments, and retaining employees are essential aspects, especially in the context of resilience and during time-period including market turbulence (e.g., Martin, Wiseman and Gomez-Meija, 2016; Linnenluecke, 2017). Examples of measures that are seen as long-term are investing in innovations, developing the company's assets and retaining number of employees. Decreases in R&D-investments, CapEx and number of employees can be considered short-term behavior whilst the opposite is considered long-term behavior; and long-term behavior is expected to yield higher company performance, especially during turbulent time-periods (Jacobs, 1991; Dechow and Sloan, 1991; Bushee, 1998; Rajgopal and Shevlin, 2002; Gittell et al., 2006; Chava and Purnanandum, 2010; Datta et al., 2010; Souder and Bromiley, 2012; Martin, Wiseman and Gomez-Meija, 2016). Based on the reasoning above, combined with our previous theoretical presentations, we have formulated the following hypothesis meant to investigate the relationship between decision making and company performance through the combination of the three mentioned variables as measurements of short- or long-term decision making:

\[ H_1: \text{There is a significant positive relationship between long-term actions and company performance during a time-period including market up- and downturns} \]

Our second and third hypotheses are based on the section regarding the principal-agent theory (Jensen and Meckling, 1976). There is previous research that claims to explain how a CEO's remuneration should be designed to create as much value as possible, partly for the CEO but also for the shareholders (Bebchuk and Fried, 2003). Conyon and He (2004) find that remuneration models containing both fixed and variable remuneration for a company's CEO create an essential advantage in the work to reduce agency costs that arise from information asymmetry. Kolb (2010) also finds that an incentive-creating compensation model creates a higher company performance. We believe that if we start from the agent theory, the relationship between CEO remuneration and the company's performance should contribute to a vital incentive maker for the company's success. There is further previous research that shows a positive relationship between CEO salary and corporate performance (Murphy, 1985; Jensen and Murphy, 1990b; Vittaniemi, 1997; Attaway, 2000; Zhou, 2000; Merhebi et al., 2006; Kato and Kubo, 2006; Ozkan, 2007). Company performance and CEO-remuneration ought to be
interlinked and furthermore create incentives (e.g., Randøy and Nielsen, 2002), and according to the agency theory, a positive relationship between CEO-remuneration and company performance must exist (Stathopoulos, Espenlaub, and Walker, 2005). Given this, we believe that there is a positive relationship between CEO-remuneration and company performance. Based on this reasoning, in combination with our choice of a theoretical framework, we have formulated the following hypotheses.

\[ H_2: \text{There is a significant positive relationship between total CEO-remuneration and company performance during a time-period including market up- and downturns} \]

\[ H_3: \text{There is a significant positive relationship between variable remuneration and company performance during a time-period including market up- and downturns} \]
4. Methodology

4.1 Research design

In this thesis, we intended to study company performance during a time-period including market up- and downturns. With this as the foundation of our research, we investigated if and how our selected independent variables affected company performance. Furthermore, we included control variables intended to explain the variance in company performance further and control the relationships between the dependent variable and the independent variables. All this in line with answering our research questions and the purpose of this thesis. There are two approaches to the relationship between theory and practice, deductive and inductive. The purpose and research questions of this thesis led to the use of a deductive approach (e.g., Miller, 1995; Randøy and Nielsen, 2002; Shim and Lee, 2003).

The choice of a quantitative method for this paper derived from previous research within the area, and literature advocating quantitative research for a purpose and research questions of our nature (e.g., Vittaniemi, 1997; Greve, 2003; Randøy and Nielsen, 2002). As we based our research on financial data from the chosen companies and intended to investigate variables and outcomes during a time-period, the choice of a quantitative research method enabled us to study the relationships between the variables amongst the sampled companies.

4.2 Collection of data

In this thesis, secondary data was used to conduct the study. The data was collected from Thomson Reuters Eikon, using Datastream, except for CEO-remuneration and some missing R&D-observations, which were collected manually from the annual reports of the companies in our sample (Table 1). We believed this to be a reliable source and it was also used in previous research (Ozkan, 2007; Duffhues and Kabir, 2008; Murphy, 2013) The annual reports were accessed through the database Retriever Business. This combination of sources was used since all of the necessary data were not accessible through Thomson Reuters Eikon (Datastream). Furthermore, it provided all the necessary data since we only used quantitative data. The sample of panel-data for 67 companies over eleven years totaling 737 observations (Table 1), was according to Tabachnick and Fidell (2013) sufficient when using our chosen method of a multiple regression analysis.
The observations chosen for our study were companies that had been listed on the Stockholm stock exchange during the observed period since the purpose of our study required that the included companies had been listed for the entire time-period. This requirement led us to excluding companies that either was introduced- or removed from the Stockholm stock exchange during our observed time-period. This could thus in turn have led to survival bias within the sample, that those companies included in the study survived the entire time-period, whilst companies who did not, were not included. This was something we were aware of during the conduction of the study, but it was also required to only include companies that had been listed during the entire time-period with regards to the purpose of the study and its feasibility. Further requirements for inclusion in the study was that the companies had to engage in R&D through investments and present remuneration for the CEO separately for each year during the observed period. Companies who did not present data necessary for conducting the study were sorted out; in these cases, the data was not available in neither Thomson Reuters Eikon nor their annual report. All other collected data besides R&D-expenses and CEO-remuneration were accessible through the chosen sources of information. This approach resulted in a selective sample, in line with our research questions and chosen methodology, illustrated in Table 1.

Table 1. Data selection

<table>
<thead>
<tr>
<th>Process</th>
<th>No. of companies</th>
<th>Total observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial sample</td>
<td>74</td>
<td>814</td>
</tr>
<tr>
<td>Missing R&amp;D-values</td>
<td>- 4</td>
<td>- 44</td>
</tr>
<tr>
<td>Missing CEO-Remuneration</td>
<td>- 3</td>
<td>- 33</td>
</tr>
<tr>
<td>Total observations after data processing</td>
<td>67</td>
<td>737</td>
</tr>
</tbody>
</table>

Table 1 summarizes the selected variables included in the study. Data was collected for eleven years and included companies with R&D-expenditure listed on the Stockholm stock exchange during 2004-2014, this was the baseline for the data collection from Thomson Reuters Eikon. The selection was based on if companies had R&D-expenditure during the observed period, companies who did not present data for the entire period were excluded from the study. Companies who did not present CEO-remuneration separate were also excluded.

4.3 Observed time-period

To investigate the relationships between our dependent variable and independent variables, in line with the research questions and purpose, it was necessary to use a time-period that would capture relationships over time. Our observed time-period in this study were the years 2004-2014. This period was chosen in order to enable the study to observe company performance
and their resilience since it included market up-downturns such as the period surrounding the financial crisis in 2008-2009. Since previous research had shown that behavior before, during and after a crisis affects company resilience (Hamel and Välikangas, 2003; Richtnér and Lõfsten, 2014), it was important that the sample included these years in order to conduct the study in line with the research questions.

4.4 Variables

4.4.1 Dependent variable

The dependent variable in our study was company performance. The definition of performance is widespread, and thus also the measures of it. Our chosen measurement of company performance was ROA (Return on Assets). This measure of performance has been used in several previous similar studies (Firth et al., 1995; Mehran, 1995; Jones and Kato, 1996; Zhou, 2000; Shim and Lee, 2003; Kato and Kubo, 2006; Ozkan, 2007; Dufflues and Kabir 2008; Matolcsy and Wright, 2011; Gigliotti, 2013) and is considered to be a suitable and objective measure for measuring a company's performance, which is why we also chose to use ROA as our measure.

Equation 1

\[ ROA_{tt} = \frac{\text{Net Revenue}_{tt}}{\text{Total Assets}_{tt}} \]  

Equation 1 illustrates the equation for ROA where Net Revenue was divided with Total Assets to achieve a measurement of company performance, resulting in the variable ROA (Return on Assets). This was done for each observed year for each company for the entire sample.

4.4.2 Independent variables

To investigate whether a company and its CEO had a short-term strategy or not, we chose to observe short- and long-term indicators measured through three independent variables. These variables could be indicators of short- och long-term decision making by the CEO and the company according to previous research and have been used to investigate similar framing of a question (Jacobs, 1991; Dechow and Sloan, 1991; Bushee, 1998; Linnenluecke, 2017).

We used the share of R&D that the company spends related to revenues. According to previous research, this was a good measure of how much the company invests in its future (Dechow and Sloan, 1991; Jacobs, 1991; Bushee, 1998). We have, just like Greve (2006), chosen to calculate
this by observing the proportion of R&D in relation to the company's total turnover each year during our chosen period. The use of this ratio enabled comparisons between companies regardless of size.

Equation 2

\[ RD_{ti} = \frac{R&D \text{ expenditure}_{ti}}{\text{Revenues}_{ti}} \]  

*Equation 2 illustrates the equation for RD where R&D-expenditure was divided with the company’s revenues to achieve a measurement for the company’s Research & Development activities, resulting in the variable RD. This was done for each observed year for each company for the entire sample.*

Another way to measure to what extent a company chose to invest in its future was by observing its investments in Capital Expenditures (CapEx). This measure for short-term CEO decision-making had also been used in previous research (e.g., Guay, 1999; Rajgopal and Shevlin, 2002; Chava and Purananandum, 2010; Souder and Bromiley, 2012; Martin, Wiseman and Gomez-Meija, 2016). We chose to calculate the proportion as capital expenditures in relation to depreciation, in line with Souder and Bromiley (2012). This ratio showed the relationship between current- and previous investments thus showcased previous behaviors and acted as a good measure for short- or long-term decision making. As it was relative to the company’s own investments it was independent of company size.

Equation 3

\[ \text{CAPEX}_{ti} = \frac{\text{CapEx}_{ti}}{\text{Depreciation}_{ti}} \]  

*Equation 3 illustrates the equation for CAPEX where Capital Expenditure (CapEx) was divided with Depreciation in order to achieve a measurement for the company’s Capital Expenditure activities, resulting in the variable CAPEX. This was done for each observed year for each company for the entire sample.*

One way for companies to decrease costs in the short term is by dismissing employees (Gittell et. al, 2006; Datta et. al, 2010). That is the reason why we have chosen to look at the percental difference in the number of employees between each year (e.g., Jones and Kato, 1996; Vittaniemi, 1997). We did that by calculating the yearly change in the number of employees. This showed decision making related to number of employees indicated short- or long-term
decision making as it showcased current- and previous decision making in relation to each other, regardless of company size.

Equation 4

\[ EMPL_{t,t} = \frac{(Employees_{t} - Employees_{t-1})}{Employees_{t-1}} \]  

*Equation 4 illustrates the equation for *EMPL* where number of employees year *t*-1 was subtracted from number of employees year *t*, this was then divided with number of employees year *t*-1 to achieve the percental change in number of employees each year, resulting in the variable *EMPL*. This was done for each observed year for each company for the entire sample.*

The total remuneration for the company's CEO was one of our independent variables to measure its relationship with company performance. We chose to use total remuneration; fixed compensation plus any variable remuneration to the CEO excluding options. Taking total remuneration into account for this type of study was in line with previous research (Jones and Kato, 1996; Randøy and Nielsen, 2002; Merhebi et al., 2006; Firth, Fung and Rui, 2006; Kato and Kubo, 2006; Duffhues and Kabir, 2008; Gigliotti, 2013).

Equation 5

\[ LNREMU_{t,t} = LN(Total\ Remuneration_{t}) \]  

*Equation 5 illustrates the equation for *LNREMU* where the natural logarithm of Total Remuneration was taken to achieve a transformed value for CEO-remuneration, resulting in the variable *LNREMU*. This was done for each observed year for each company for the entire sample.*

In addition, we chose to investigate if there was any difference in the company's performance depending on whether its CEO had any variable remuneration or not (e.g., Jensen and Meckling, 1976). To measure this, we constructed variable remuneration as dummy variables taking a value of 1 if variable remuneration was paid, and 0 if not.
Equation 6

\[ D_{VAR_{t_i}} = 1 \text{ or } 0_{t_i} \]  \hspace{1cm} (6)

Equation 6 illustrates the process of generating the dummy variable \( D_{VAR} \) where the observations were coded 1 if the value exceeded 0, and coded 0 if the value was 0 to achieve a measurement for if the company paid variable remuneration to its CEO, resulting in the variable dummy variable \( D_{VAR} \). This was done for each observed year for each company for the entire sample.

4.4.3 Control variables

Control variables were variables that affected the dependent variable but which we had a little individual interest in, but that could help us explain one or more phenomena and control for variance explained in the dependent variable and lower the risk for spurious relationships (Muller and Fetterman, 2002).

One chosen control variable to be included in our study was size of the company. There was previous research with similar objectives that also used size measured as the natural logarithm of market capitalization (Vittaniemi, 1997; Randøy and Nielsen, 2002; Shim and Lee, 2003; Duffhues and Kabir, 2008). By controlling for size, we intended to capture variance possibly explained by size of the company rather than the independent variables and investigate its relationship with the dependent variable.

Equation 7

\[ LNSIZE_{t_i} = LN(\text{Market Capitalization}_{t_i}) \]  \hspace{1cm} (7)

Equation 7 illustrates the calculation of the variable LNSIZE where the natural logarithm of Market Capitalization was taken to produce a transformed variable for company size, resulting in the variable LNSIZE. This was done for each observed year for each company for the entire sample.

To control how the companies in our regression analysis performance were affected by its leverage, we chose to use the company's Debt-Ratio as one of our control variables. This variable had also been used in previous research (Madura, Martin and Jessel, 1996; Randøy and Nielsen, 2002; Duffhues and Kabir, 2008). Debt-ratio provided control for a variable relatable to investment funding and thus related to our independent variables. Debt-Ratio could thus provide an alternative explanation of variance in ROA. The use of this ratio was independent of company size.
Equation 8

\[ DR_{ti} = \frac{Total\ Liabilities_{ti}}{Total\ Assets_{ti}} \]  

(8)

*Equation 8 illustrates the calculation for the variable DR where the company’s Total Liabilities where divided with its Total Assets to achieve a value for its Debt-Ratio, resulting the variable DR. This was done for each observed year for each company for the entire sample.*

4.4.4 Control for years and industry

The use of yearly firm data meant using panel-data in our regression analyses. To control for this and thus reduce bias in beta-coefficients, yearly- and industry effects were controlled for through dummy variables. Since we had eleven years it rendered ten dummy variables, one less than the number of observed years. The same procedure was used for industry. Industry classification was conducted in accordance with the GSCI-industry classification including eleven industries, we thus followed the same procedure as for years (S&P, 2018).

4.5 Regression analysis

In our thesis, we intended to investigate the relationship between one dependent variable (ROA) and several independent variables. With this purpose, we used a multivariate method, a multiple regression analysis (Tabachnick and Fidell, 2013). This method is used when investigating the relationship between one dependent variable and multiple independent variables (ibid). This method of choice was in line with previous research similar to ours (e.g., Miller, 1995; Stammerjohan, 2004; Tai, 2004) and enabled us to see the relationship between each independent variable and the dependent variable. Furthermore, multiple regression analysis showed to which degree the model with our independent variables explained the variance in the outcome of our dependent variable, e.g., predicting the outcome of it (Tabachnick and Fidell, 2013). The results of our study were analyzed on a 1 %, 5 %, and 10 % level of significance to determine whether we find support for our hypotheses or not. Furthermore, the coefficient of determination, adjusted \( R^2 \), was observed to determine to which degree the variance for our dependent variable was explained by our models (Bebchuk and Fried, 2003).
### 4.5.1 Regression models

As the purpose of the study was to investigate the relationships between the dependent variable and independent variables based on the hypotheses formulation in Section 3, three different regression models were constructed.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta_0$</td>
<td>Intercept</td>
</tr>
<tr>
<td>$\beta$</td>
<td>Regression coefficients</td>
</tr>
<tr>
<td>RD</td>
<td>Research &amp; Development (R&amp;D)</td>
</tr>
<tr>
<td>CAPEX</td>
<td>Capital Expenditure (CapEx)</td>
</tr>
<tr>
<td>EMPL</td>
<td>Yearly %-change in Employees</td>
</tr>
<tr>
<td>LNREMU</td>
<td>Natural logarithm of Total Remuneration</td>
</tr>
<tr>
<td>DVAR</td>
<td>Dummy variable if variable remuneration is paid</td>
</tr>
<tr>
<td>LNSIZE</td>
<td>Natural logarithm of Market Capitalization</td>
</tr>
<tr>
<td>DR</td>
<td>Debt-Ratio</td>
</tr>
<tr>
<td>$\epsilon$</td>
<td>Error term assumed to be zero on average</td>
</tr>
<tr>
<td>$t$</td>
<td>Year-indicator</td>
</tr>
<tr>
<td>$i$</td>
<td>Firm-indicator</td>
</tr>
</tbody>
</table>

*Table 2 summarizes and describes the variables included in the three regression models, explanations for the calculation of each variable are described in the methodology sections for the included variables.*

Regression Model I was formulated in order to answer H$_1$ and included our independent variables RD, CAPEX and EMPL to observe their relationship with the dependent variable ROA during the chosen time-period.

**Model I:**

$$ROA_i = \beta_0 + \beta_1 RD_i + \beta_2 CAPEX_i + \beta_3 EMPL_i + \epsilon$$

In regression Model II we added the independent variables LNREMU and DVAR in order to answer H$_2$ and H$_3$. The inclusion was made to observe the relationship between Total Remuneration and if the CEO had variable remuneration or not, and the dependent variable ROA. It was also done in order to investigate if variance explained in Model I by the independent variables was rather explained by the variables LNREMU and DVAR.
Model II:
\[ ROA_{ti} = \beta_0 + \beta_1RD_{ti} + \beta_2CAPEX_{ti} + \beta_3EMPL_{ti} + \beta_4LNREMU_{ti} + \beta_5DVAR_{ti} + \varepsilon \]

Regression Model III included the aforementioned variables and our control variables. This model was constructed to control the results from Model I and Model II, intended to minimize the risk for spurious relationships between the independent variables and the dependent variable.

Model III:
\[ ROA_{ti} = \beta_0 + \beta_1RD_{ti} + \beta_2CAPEX_{ti} + \beta_3EMPL_{ti} + \beta_4LNREMU_{ti} + \beta_5DVAR_{ti} + \beta_6LNSIZE_{ti} + \beta_7DR_{ti} + \varepsilon \]

4.5.2 Normality, skewness and kurtosis
One crucial element before conducting a multivariate analysis with continuous variables was to investigate the degree of normality in the data (Tabachnick and Fidell, 2013). To have a normally distributed dataset was preferable, although a multiple regression analysis is quite robust, it was necessary to investigate the level of normality (ibid). Normality constitutes of two factors, skewness and kurtosis; skewness indicated to which degree our data was symmetric and the kurtosis shows how peaked our data was (ibid).

We ran descriptive statistical tests in order to determine the level of normality, skewness, and kurtosis of our dataset. The output constituted of illustrations such as histograms and boxplots, and descriptive statistics showing the skewness and kurtosis of each variable. The values of skewness and kurtosis gave the degree of deviation from normality, the histograms and box plots illustrated it and enabled a complete picture of the extent to which our data deviated from normality. We had problems with normality; our variables deviated from normality before trimming and transformation.

Although there is an acceptance for a certain level of deviation, our data was deviating too much which required us to trim and transform the data in order to achieve acceptable levels of skewness and kurtosis (Tabachnick and Fidell, 2013). An often used method for transforming data (e.g., Randøy and Nielsen, 2002) is to take the natural logarithm of the values which compress the values into a more normally distributed data set (Tabachnick and Fidell, 2013).
We took the natural logarithm of our variables Total Remuneration and Market Capitalization (Size) since they were not ratios. Further, we used winsorizing to trim the most extreme values and outliers from our dataset, this was done for all variables. The process of winsorizing the data constituted of replacing the values below- and above a certain percentile, with that percentile, we winsorized our dataset on a five percent level in each end (Kokin and Bell, 1994). After these steps, our data had acceptable levels of skewness and kurtosis. We were aware that this, in turn, could have an impact on the results of our study, but it was necessary to enable the analysis and use of the chosen method of research. One element that could have been affected as a consequence of these steps was the generalizability of the results.

4.5.3 Outliers
In our sample we identified problems with outliers amongst our data, the outliers were deviating extreme values, causing skewness in our dataset. To identify these outliers, we produced scatter plots where we could distinguish them and determine if they were univariate- or multivariate outliers (Tabachnick and Fidell, 2013). We could distinguish univariate outliers that skewed our sample, but there was no pattern indicating multivariate outliers. Although we had a lot of outliers, they were independent of each other. As these observations could skew the result of the study, it was necessary to trim our data in order to get a dataset that would yield acceptable levels of skewness and kurtosis, through winsorizing.

There could have been different reasons for outliers, one being due to errors when entering data manually (Tabachnick and Fidell, 2013), which could have been the case in our study since we collected certain data manually. Another reason could have been that the population we observed contained extreme values, to the extent that it violated the conditions for normal distribution (ibid). We screened through our data to determine if it was due to error when inputting data and we did not find such errors, meaning that the latter of the explanations seemed more likely. When a population has problems with extreme values, they should be kept in the study, but their impact needs to be reduced; which we did through the process of winsorizing (ibid).

4.5.4 Multicollinearity
In our study we had to investigate if our variables were correlated, before running our regressions. We did a Variance Inflation Factor (VIF)-test in order to determine if there was multicollinearity amongst our independent variables and the included control variables. We
also produced a correlation matrix to illustrate the relationship between the variables. None of our variables exceeded a value of 5 in our VIF-test suggesting that we did not have a problem with multicollinearity (Tabachnick and Fidell, 2013). The cut-off value for correlations in this study was ±0.9, which is where the correlation can become a problem (ibid).

4.5.5 Homoscedasticity
Investigating the variability amongst our independent variables and the dependent variable was conducted through plots where we sought to investigate the homoscedasticity. Since it is related to the normality of the data, before our transformation and trimming of data the assumptions of homoscedasticity seemed to be violated. After the transformation and trimming, we got results that were acceptable for our chosen method of research. (Tabachnick and Fidell, 2013)

4.5.6 Linearity
Before running our multiple regression analyses, the linearity of between our independent variables and the dependent variable was checked through probability plots. The sought after result was a perfect linear relationship between the variables. It showed, after transformation and trimming, relationships amongst the variables that deviated from perfect linearity but since it was no prominent deviations, and since our regression model was relatively robust, we could perform our multiple regression analyses using our dataset. (Tabachnick and Fidell, 2013)

4.6 Limitations of chosen method
Although regression analysis is a widely used method in research, it is associated with some problems, and it had limitations. One prominent limitation was that this method does not show causality amongst variables, only relationships. This translated to that the model would never truly derive at a full explanation of the phenomena. Another limitation with our method could have been that the retrieved data from Thomson Reuters did not account for the potential differences in how companies report their assets. The same possible discrepancy existed in the recognition and reporting of corporate profits, which was a part of ROA. Furthermore, the chosen variables to include in the model could have posed a problem themselves, since choosing the most suitable variables was complicated and there was a possibility that another variable not included might explain the relationship to a higher degree. Other issues related to included variables might be the relationship between independent variables since regression analysis is sensitive to correlated independent variables. (Tabachnick and Fidell, 2013)
We were aware that there are several measures of company performance and that a choice of another variable than ROA or a combination of several variables, e.g. Return on Equity or Return on Invested Capital, could have given another outcome in our regression analyses. Furthermore, there are other issues related to the method, which were discussed in previous paragraphs. These problems were related to sample size, normality, outliers, linearity and homoscedasticity but are the extent of these problems varied between studies and is related to the specific dataset. (Tabachnick and Fidell, 2013)

We used SPSS in order to conduct our statistical analysis, one limitation with SPSS when conducting a multiple regression analysis with panel data (as in our case), it does not estimate robust standards errors. This could have led to that the standard error might been biased; thus, the interpretation of confidence intervals should have been done with caution. Besides this, the beta coefficients were robust.
5. Results

In this section we will present the results of our study performed as explained in the previous section. Before conducting our regression analyses, we performed tests for descriptive statistics and correlations amongst our included variables, these will be presented first and then the results from our three regression models will follow in descending order. In this section we will also present the results for our tested hypotheses, whether we found support for them or not.

5.1 Descriptive statistics

In Table 3, we have summarized the descriptive statistics for the variables included in this study. For our dependent variable ROA we have a mean value of 0.006 with a relatively large interval (-0.44 - 0.199) considering the nature of the variable, it does however not come as a surprise since our period included market turbulence, and that 189 of our observations showed negative ROA during the observed period.

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Min. statistics</th>
<th>Mean statistics</th>
<th>Max. statistics</th>
<th>Std. deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>737</td>
<td>-0.438</td>
<td>0.006</td>
<td>0.199</td>
<td>0.155</td>
</tr>
<tr>
<td>RD</td>
<td>737</td>
<td>0.002</td>
<td>0.131</td>
<td>0.948</td>
<td>0.238</td>
</tr>
<tr>
<td>EMPL</td>
<td>737</td>
<td>-0.264</td>
<td>0.019</td>
<td>0.264</td>
<td>0.125</td>
</tr>
<tr>
<td>CAPEX</td>
<td>737</td>
<td>0.059</td>
<td>0.707</td>
<td>1.753</td>
<td>0.484</td>
</tr>
<tr>
<td>LNREMU</td>
<td>737</td>
<td>7.156</td>
<td>8.323</td>
<td>9.747</td>
<td>0.786</td>
</tr>
<tr>
<td>DVAR</td>
<td>737</td>
<td>0</td>
<td>0.68</td>
<td>1</td>
<td>0.466</td>
</tr>
<tr>
<td>LNSIZE</td>
<td>737</td>
<td>11.622</td>
<td>14.839</td>
<td>18.775</td>
<td>2.149</td>
</tr>
<tr>
<td>DR</td>
<td>737</td>
<td>0.09</td>
<td>0.461</td>
<td>0.761</td>
<td>0.200</td>
</tr>
</tbody>
</table>

Table 3 shows descriptive statistics for the included variables in the study. Presented is the number of observations, minimum-, mean-, -maximum and standards deviation values for each variable.

The presented correlation matrix in Table 4, the correlations between the variables in the study are presented. The majority of the correlations are significant on a p<0.01-level indicating that some assumptions can be made. Moreover, the correlations can contribute to explaining the observed phenomenons in the results from the regression models presented below. The cutoff
value for this study was correlations of ± 0.9, which none of our correlations exceed. One noticeable correlation is between RD (Research & Development) and ROA (Return on Assets) at -0.645 and the correlation between LNSIZE (Size) and LNREMU (Total Remuneration). Besides those two correlations, none other exceeds a correlation of ± 0.5.

Table 4. Correlation matrix

<table>
<thead>
<tr>
<th>Variable</th>
<th>ROA</th>
<th>RD</th>
<th>EMPL</th>
<th>CAPEX</th>
<th>REMU</th>
<th>DVAR</th>
<th>SIZE</th>
<th>DR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RD</td>
<td>-0.645**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMPL</td>
<td>0.227**</td>
<td>-0.182**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAPEX</td>
<td>0.274**</td>
<td>-0.300**</td>
<td>0.140**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LNREMU</td>
<td>0.316**</td>
<td>-0.282**</td>
<td>0.019</td>
<td>0.242*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DVAR</td>
<td>0.206**</td>
<td>-0.156**</td>
<td>0.076*</td>
<td>0.063</td>
<td>0.409**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LNSIZE</td>
<td>0.416**</td>
<td>-0.284**</td>
<td>0.100**</td>
<td>0.308**</td>
<td>0.859**</td>
<td>0.310**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>DR</td>
<td>0.139**</td>
<td>-0.380**</td>
<td>-0.002</td>
<td>0.277**</td>
<td>0.409**</td>
<td>0.069</td>
<td>0.406**</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 4 shows the correlation for between the variables included in the study using Pearson’s correlation coefficient. The level of significance in the correlation is illustrated through markings where; * = significant on a 5 %-level and ** = significant on a 1 %-level.

5.2 Results from the regression analyses

The results from our three regression models are presented in Table 5 below and are explained in text format in the following paragraphs.
Table 5. Results from regression analyses

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model I</th>
<th>Model II</th>
<th>Model III</th>
</tr>
</thead>
<tbody>
<tr>
<td>RD</td>
<td>-0.441***</td>
<td>-0.421***</td>
<td>-0.445***</td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
<td>(0.021)</td>
<td>(0.020)</td>
</tr>
<tr>
<td></td>
<td>1.393</td>
<td>1.439</td>
<td>1.522</td>
</tr>
<tr>
<td>EMPL</td>
<td>0.090**</td>
<td>0.091***</td>
<td>0.033</td>
</tr>
<tr>
<td></td>
<td>(0.036)</td>
<td>(0.035)</td>
<td>(0.033)</td>
</tr>
<tr>
<td></td>
<td>1.144</td>
<td>1.145</td>
<td>1.176</td>
</tr>
<tr>
<td>CAPEX</td>
<td>0.039***</td>
<td>0.030***</td>
<td>0.020**</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.010)</td>
<td>(0.010)</td>
</tr>
<tr>
<td></td>
<td>1.389</td>
<td>1.428</td>
<td>1.492</td>
</tr>
<tr>
<td>LNREMU</td>
<td></td>
<td>0.029***</td>
<td>-0.039***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.006)</td>
<td>(0.011)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.439</td>
<td>4.895</td>
</tr>
<tr>
<td>DVAR</td>
<td>0.012</td>
<td>0.011</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.009)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.308</td>
<td>1.340</td>
<td></td>
</tr>
<tr>
<td>LNSIZE</td>
<td></td>
<td></td>
<td>0.036***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.004)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.863</td>
</tr>
<tr>
<td>DR</td>
<td>-0.166***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.023)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.513</td>
</tr>
<tr>
<td>Constant</td>
<td>0.043</td>
<td>-0.236***</td>
<td>-0.194***</td>
</tr>
<tr>
<td></td>
<td>(0.038)</td>
<td>(0.066)</td>
<td>(0.063)</td>
</tr>
</tbody>
</table>

Table 5 illustrates the results from the three regression models in this study using the previously presented variables. The β-coefficient is presented in line with each variable showcasing its value and direction, the standard error is presented in the parentheses below the coefficient and the VIF-value that controls for multicollinearity is presented cursively in the third row in connection to each variable in each model. The significance of each variable is illustrated through; * = significant on a 10 % -level, ** = significant on a 5 % -level and *** = significant on a 1 % -level. All three models were controlled for yearly- and industry. Adjusted R² present the total explanatory level in each model for the variance in the dependent variable ROA. The F-value, and the P-value in connection to it, shows that the Adjusted R² is significant in our models, and it shows that the entire models are significant. Model I: ROAₜᵢ = β₀ + β₁RDₜᵢ + β₂CAPEXₜᵢ + β₃EMPLₜᵢ + ε. Model II: ROAₜᵢ = β₀ + β₁RDₜᵢ + β₂CAPEXₜᵢ + β₃EMPLₜᵢ + β₄LNREMUₜᵢ + β₅DVARₜᵢ + ε. Model III: ROAₜᵢ = β₀ + β₁RDₜᵢ + β₂CAPEXₜᵢ + β₃EMPLₜᵢ + β₄LNREMUₜᵢ + β₅DVARₜᵢ + β₆LNSIZEₜᵢ + β₇DRₜᵢ + ε.
5.2.1 Regression Model I

In Model I we included our dependent variable ROA and our three independent variables representing short- or long-term actions according to the following model:

\[ ROA_{it} = \beta_0 + \beta_1 RD_{it} + \beta_2 CAPEX_{it} + \beta_3 EMPL_{it} + \varepsilon \]

The results of the first regression model (Table 5) show significant results for our independent variables RD and CAPEX (Capital Expenditure) on a \( p < 0.01 \) level, and EMPL (%-change in employees) is significant on a \( p < 0.05 \)-level. The coefficients for our independent variables show different relationships with the dependent variable. EMPL (0.09) and CAPEX (0.039) shows positive relationships with the dependent variable ROA, although weak. RD (-0.441), on the other hand shows a negative relationship with ROA. To summarize the effect of the independent variables in this model on our dependent variable, they all do have a significant relationship contributing to explaining the variance in ROA with varying directions in the coefficients.

Model I has an adjusted \( R^2 \) of 0.462 (46.2%) indicating that our first model as a whole explains 46.2 % of the variance in our dependent variable ROA. The model thus indicate that the variance in ROA is affected by other variables besides those included in this model.

We do not find support for our first hypothesis since not all of our included variables show significance with a positive coefficient. Although all independent variables are significant on a \( p < 0.01 \)-level, the variable RD show a negative relationship with ROA indicating that a one-unit change in RD will negatively affect ROA with -0.441. In order to accept the first hypothesis, all values had to show significant, positive, relationships with the dependent variable. We cannot accept \( H_1 \).

5.2.2 Regression Model II

Model II included the same variables as Model I, but two variables were added to the model; LNREMU (Total Remuneration) and DVAR (dummy variable if companies paid variable remuneration or not to the CEO):

\[ ROA_{it} = \beta_0 + \beta_1 RD_{it} + \beta_2 CAPEX_{it} + \beta_3 EMPL_{it} + \beta_4 LNREMU_{it} + \beta_5 DVAR_{it} + \varepsilon \]
The results of the second regression model show significant results for all but one of the independent variables on a p<0.01-level, the included dummy variable for variable remuneration D\text{VAR} is not significant on any acceptable level. A noticeable result here is that our variable for EMPL goes from being significant on a p<0.05-level in Model I to being significant on a p<0.01-level in Model II. This is a change in results that could be explained by a correlation amongst the independent variables, but it could also be due to other factors. Furthermore, we can see that all but one of the significant relationships have a positive relationship (EMPL (0.091), CAPEX (0.03), LNREMU (0.029)) with the dependent variable ROA, but they are weak. RD has a strong negative relationship with ROA.

In Model II we get an adjusted $R^2$ of 0.484 (48.4 %) indicating that the model explains 48.4 % of the variance in ROA. As can be seen, the explanatory level increases from Model I, likely due to the inclusion of more variables where one is significant on a p<0.01-level. Although D\text{VAR} is not significant, it might contribute to the increase in explanation of the variance in ROA.

Since LNREMU show a weak, but positive, relationship with the dependent variable ROA on a p<0.01-level, we thus find support for H$_2$. We do however not find support for our third hypothesis, H$_3$, since our results do not show a significant positive relationship between D\text{VAR} and our dependent variable ROA.

### 5.2.3 Regression Model III

In Model III the variables included in previous models was complemented with two additional control variables, LNSIZE (Size) and DR (Debt-Ratio):

$$\text{ROA}_i = \beta_0 + \beta_1\text{RD}_i + \beta_2\text{CAPEX}_i + \beta_3\text{EMPL}_i + \beta_4\text{LNREMU}_i + \beta_5\text{DVAR}_i + \beta_6\text{LNSIZE}_i + \beta_7\text{DR}_i + \epsilon$$

The results of Model III show significant results for all but one independent- and control variables on a p<0.01 level, the included dummy variable for variable remuneration is not significant on an accepted level in this model either, and the results show that the significance for CAPEX is p<0.05 and the significance on the independent variable EMPL disappeared. Our independent variable EMPL is not significant on any acceptable level, whilst CAPEX goes from being significant on p<0.01-level to being significant on a p<0.05-level. These results
indicate that the variance explained by the variables in previous models instead might be explained by the included control variables in Model III. The coefficients for the variables display different relationships with the dependent variable ROA. Two variables show similar relationships in Model III as in the previous models; RD (-0.445) shows a negative relationship, CAPEX (0.02) a weak positive relationship. LNREMU (-0.039) however show a weak, but a negative relationship with ROA in Model III, DR (-0.166) also shows a negative relationship whilst LNSIZE has a positive relationship (0.036). The change in LNREMU from positive to negative might be due to correlations with other variables, and that relationship captured in Model II is rather due to the size of the firm. When disregarding LNSIZE, LNREMU show a positive relationship with ROA on an average, while the inclusion of LNSIZE leads to a negative relationship between the aforementioned variables. These results show that when regarding size of the company, it is not beneficial to pay higher remuneration to the CEO to achieve higher ROA. This could be due to several reasons which will be discussed in the following section. These results will thus be our subject for analysis and discussion due to the significance in our control variables.

In Model III we see similar patterns as for between Model I and Model II; the inclusion of more variables renders a higher adjusted $R^2$, which in Model III is 0.558 (55.8 %). This result indicate that Model III has an explanatory level of 55.8 % of the variance in ROA.
6. Analysis

To measure resilience, it was necessary to choose a turbulent time-period, including both up- and downturns in the market. In our sample, we had some interesting observations, including the fact that 189 of our 737 observations showed negative results during the selected time-period. This indicates that we captured a time-period that would be representative for observing elements of resilience. Furthermore, the different characteristics of the companies included in our sample provided a further basis for the comparison of which features that offer means to resilience.

One noticeable result was the relationship between R&D-spending and ROA. From the presented theoretical framework, we expected a positive relationship, instead, we found that it was a negative relationship between these variables, and therefore, these results are in contrast to previous research within this area (e.g., Chava and Purnanandum, 2010). Although the predicted result was different from the outcome, we find that it may be an explanation of why that is the case. Hamel and Välikangas (2003) stated that R&D might be a way of turning results around if the company has low performance. At the same time, Greve (2003) argues that companies that are already performing a high level of ROA might not be as inclined to invest in R&D due to the risks- and costs related to it, which thus could explain the relationship we found. This is a phenomenon we would argue is logical since if you are already performing well, it could be hard to convince other decision makers within the company to spend much resources on finding other ways to proceed with your operations. This becomes a hard matter of balance between risk-taking and a more secure strategy, and since R&D is associated with risk, it may tip the scale towards the more secure route (Greve, 2003). Although R&D in previous studies has been shown to yield positive effects, the risk aversity amongst managers may also be an explanatory factor, and the risk could hinder decision makers from committing fully to R&D (e.g., Linnenluecke, 2017). At the end of the day, a company’s business model becomes a question for the decision making organs within a firm, and perhaps this is one of the matters that in the long run makes the difference between the last longing companies and those who are not (e.g., Martin, Wiseman and Gomez-Meija, 2016; Linnenluecke, 2017). Although complicated, it boils down to a question of short- or long-term decision making where the lower levels of R&D that yield better company performance during the observed time-period, might become a problem further down the line outside the observed time-period. Another aspect of
the results is that the companies that performed better in our sample might have been more prepared through higher levels of R&D-investments before the observed time-period and thus contributing to the resilience of these companies.

During turbulent times when resources are limited, managers may be pressured to utilize resources more efficiently than during better times, which in turn could explain the relationship between lower levels of R&D and company performance since the returns from R&D-investments are not immediate, but rather in the future (Greve, 2003). This is something that, according to Ofori-Dankwa and Julian (2001) is deleterious for a company’s prosperity in the long run. An alternative explanation could be that managers find other decisions that benefit the company better, i.e., CapEx, where we found a positive relationship with ROA. Other declarative elements for our results might be that larger- and less levered companies tend to be better prepared for market downturns either due to experience or other factors since we also find a positive relationship between the control variables Size and Debt-Ratio, and the dependent variable ROA. This indicates that R&D, CapEx, and changes in the number of employees are not the sole explanatory factors for resilience and company performance. Further, there might be a cut-off level where investments in R&D are no longer beneficial, where the returns are too low.

Although innovation and product development are essential elements of building a resilient company, factors such as planning, and the managerial aspect also contribute to achieving this (Linnenluecke, 2017). As our results show, we can see that company performance during this time-period might be due to the decisions made by the company's decisive managers. By that, we refer to that although the companies that perform best do not follow our theoretical aspect to a tee, they show behavior indicating long-termism, but also elements of short-termism according to (e.g., Chava and Purnanandum, 2010). Our results reflect that companies engaging in fundamental measures, such as assuring CapEx is high, will yield better performance. This element of planning, although effects could be relatively close in time, is one way of ensuring future returns, and is, in accordance with Souder and Bromiley (2012), actions that illustrate long-term decisions. Our results are further in line with Souder and Bromiley (2012) as the companies investing heavier in CapEx also perform better, which indicates higher levels of competitiveness and resilience (Ofori-Dankwa and Julian, 2001; Souder and Bromiley, 2012; Linnenluecke, 2017). During our observed time-period, we also find tendencies of a positive
relationship between an increase in number of employees and company performance, in line with previous studies (Gittell et al., 2006; Datta et al., 2010). Although not significant which limits the possibilities to draw conclusions from it. It is important to emphasize that the results are not significant in Model III, indicating that it does not affect ROA significantly. However, the tendencies are another indication of long-termism amongst our observed companies. Since we had a sample including all listed companies on the Stockholm stock exchange during the observed time-period (engaged in R&D-activities), we included companies with vastly different business plans which might require various measures in coping with turbulence which is a possible explanation for the observed outcome. Our results are to a certain extent aligned with decision making that will generate returns which in turn enables other measures to be taken since there is room to maneuver, especially when revenues run low during certain time-periods, and when the companies work towards regaining performance.

The agency theory states that a company's principals must create incentives for the company's CEO to create as high performance as possible (Jensen and Meckling, 1976). Our result is a slightly negative relationship between the CEO's total remuneration and the company's performance in Model III, including all control variables (Table 5). Another aspect of our results is that since the relationship changed through the inclusion of more variables, it could be other variables as well that could be added which might reverse the relationship. This is supported by the explanatory levels of our models that indicate that the variance in ROA is also dependent upon other variables that are not included in our models. As our theoretical framework presented, previous research related to CEO-remuneration and company performance has found contradicting evidence. Some studies find a positive relationship between CEO-remuneration and company performance, whilst other studies have not been able to find any relationship between the two variables (e.g., Randøy and Nielsen, 2002; Ozkan, 2007). None of the studies find a negative relationship when regarding size, as we do. They do provide possible explanations of why this might be the case, that higher remuneration for the CEO’s in our sample does not yield higher company performance. These results are more in line with the results Donaldson (1990) finds, that other variables could explain a CEO behavior than monetary incentives, such as loyalty or to maintain a good reputation as a company manager to keep his or her position as attractive in the labor market in the event of a change of employer. An interpretation of our results that could be assumed to be reasonable given our choice of theoretical framework is that the agency problems, according to Jensen and Meckling
(1976), are always existent within a company to some extent, but it appears that in our sample they are dealt with in an adequate way. A potential explanation for the fact that the agent problems are primarily controlled, according to our results, could be that in Sweden, there is relatively concentrated ownership (Carlsson, 2007). This also means that the information asymmetry that arises between the management of the company and its owners is more comfortable to control, and thus lower the agency costs (Jensen and Meckling, 1976).

The contradictory results in our study are however relatable to the remuneration element since it appears as the remuneration plans as of now do not yield higher company performance, but at the same time, it shows that decision making in the companies deviate from long-termism. If we relate this to our discussion regarding agency theory in the previous paragraphs, it is impossible not to raise the question whether the companies in our samples could adjust the structure of its fixed- and variable remuneration systems in order to decrease risk aversion in the CEO. This is a pattern that we can see throughout our results, where there are indications of risk-minimizing behavior among the observed companies on an average. If this is due to remuneration-related issues or the market up- and downturns are hard to pinpoint, but it shows that although Swedish companies are considered to be well-managed with low levels of agency problems, the results show tendencies of decision-making that can be considered short-term whilst long-termism also exist.
7. Conclusion

The results of our study deviated from our expectations based on our theoretical framework. This became evident when analyzing the results in relation to previous studies and highlighted some contradictions. This allowed for some interesting concluding thoughts of the study and its results. As the aim of this study was to investigate the relationship between short- and long-term decisions and company performance, and what effects CEO-remuneration had on it. What is to be deemed as long-term decision and what creates resilience, is not investing too much in R&D, but rather focus on other measures that will yield better company performance, e.g., CapEx. Although not significant, the indications regarding the change in the number of employees support this. Long-term decisions tend to yield not only good company performance, but it could also create an environment within the company that aligns goals between the CEO, owners, and its employees. An aspect that in turn, would lead to positive cycles of company performance.

The question that arises is whether this is due to other elements not captured by our included variables, or that the intended effect of R&D according to previous research is overestimated in our sample of Swedish listed companies during 2004-2014. It could possibly be due to Swedish market conditions or risk aversion, not committing completely to R&D due to the risks associated with it. The more likely explanation would, however, be the aforementioned, and that more reliable and less risky decisions and investments yield higher average returns which in turn generate better company performance for our sample. What leads us to this conclusion is the relationship we found regarding CEO-remuneration. As it shows, in general, it is not beneficial for companies to increase remuneration with hopes of yielding higher company performance, rather the opposite. This indicates that the CEO and the decisions that are being made are with the best of the company in mind rather than personal gain.

The results we found might be due to the structure of the general ownership model of Swedish public companies, where the ownership is quite concentrated. This could thus generate a goal alignment between the CEO and the owners, which leads to the CEO making long-term decisions, which is considered to be the way towards high company performance. On the other hand, it is not possible to completely exclude the fact that the element of short-termism exists, either in relation to R&D or that it presents itself in other forms, not captured in the variables included in this study. However, it seems like there is a deeper connection between decision
making, the CEO, and company performance than we first expected before conducting the research.

8. Future Research

During this study, several ideas and potential incidents have been discussed. This is a subject that fascinates us, and there is a lot left to discover in this field of research. An additional layer that had been of interest also for our part had been to include whether the CEO is an owner in the company or not. Partly as a consequence of an incentive program containing shares, but also if the majority owner was also active in the company's operating activities. It would have been interesting if such executives had dealt with some crucial decisions differently. Not least from a short-term perspective, which is one of the approaches we had during this study. If it is a newly started company, you may expect that the remuneration that the CEO picks out is relatively small. However, there is also reason to believe that a CEO who is a majority owner of the company will act more long-term when it comes to decisions that are associated with long-term behavior. A proposal for future studies is, therefore, to study the connection between profitability and CEO remuneration, including ownership, in order to investigate whether ownership is a well-functioning incentive to increase profitability.

When the companies' annual reports were studied, we also reacted that the distribution between the number of men and women who served as the CEO was uneven. From an ethical and social perspective, it would be interesting for future research to study the relationship between decision making, CEO-remuneration and company performance, with regards to gender of the CEO. Besides, since there is previous research that shows that women and men tend to act differently when it comes to risk-taking, it would also be interesting to see if any connection could be caught when there are differences long and short-term thinking depending on the gender of the person who is the CEO of the company.

Another study we find had been exciting to investigate other types of behavior that can be considered short-term. Looking at a company's frequency regarding acquisitions could have been an interesting angle. We believe that a reduction in the share of acquisitions can be interpreted as defensive and thus possibly short-term behavior. We also think it would be interesting to conduct a study with similar questions as ours but with a qualitative approach. In
that case, we would be given a better opportunity to deeply understand and analyze how a CEO reasoned when it comes to deciding what is most essential to profit at harder times. It would be exciting to see if there were significant differences in behavior and priorities among different companies, perhaps in different industries as well.

9. Limitations of the study

One of the limitations of this study was that we only included Swedish companies engaged in R&D-activities. Although it was in line with our research questions and what we intended to investigate, a broader population could yield more generalizable results regarding short- and long-term decision making. Furthermore, including more or other variables, might lead to more extensive results of what contributes to organizational resilience. The chosen time-period could also have been more extensive or include more market up- and downturns which in turn might enable comparisons between the periods and thus resulting in a more comprehensive explanation of resilience and company performance. The choice of ROA as a measurement of company performance could have been complemented with other performance measures, or different regression models could have been constructed to investigate if certain performance measurements were affected differently by the included independent variable. We also identified limitations regarding our sample. One category of companies that we have included in our analysis is biotech firms, which tend to have a relatively large portion of spending in research and development investments compared with other companies due to market expectations and competition. We decided to include these companies still since we did not want to lose too many observations. Worth to notice is that only a few of them were extreme whilst the majority of the observations were in line with the rest of the population.

Another limitation of the study is that we included CEO-compensation as fixed- and variable remuneration, excluding stock options and other benefits. These are elements that could affect decision making and, in the end, organizational resilience. To build on this it could also be beneficial to include the remuneration of other top management executives or board members that also can affect decision making, and although not to the same extent as the CEO, they do indeed affect the company. The choice of variables intended to measure short- or long-term in decision making is another limitation. Although we get relatively high explanatory levels in our models, there is room for the inclusion of more variables, or change of variables in order to investigate other elements that affect company performance at the end whom a CEO can
affect. This could thus yield higher explanatory levels in the models and result in a more comprehensive explanation of what makes an organization resilient measured in company performance and its relationship to CEO-remuneration.
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